Anastasiya Shamshur

Essays on Capital Structure Stability

Dissertation

Prague, January 2012

CERGE
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Contents

Abstract

Recent financial literature claims that capital structure of firms stays unchanged during the long periods of time. In my dissertation I investigate the question of capital structure stability from different angles. First chapter asks whether the macroeconomic volatility could be translated to capital structure adjustments. To answer this question I consider CEE countries during 1996 to 2006 period since those economies went through extensive economic changes including transition from central planning to market economy, large-scale privatization, and substantial economic reforms to become the EU member. Surprisingly, macroeconomic changes are not translated to capital structure changes. Therefore, second chapter focuses on causes of such puzzling behavior. I find that credit constraints firms face in obtaining finance are responsible for the observed pattern. Unconstrained firms are more active in adjusting their capital structure in response to economic changes. Moreover, firm's ownership plays an important role in explaining leverage of unconstrained firms. Third chapter studies changes in leverage in the context of M&As. I compare the leverage of both acquiring and acquired firms using difference-in-differences propensity score technique. I find that there is an increase in the leverage of acquiring firms and no change in the leverage of the acquired firms.

Abstrakt

Současná finanční literatura říká, že se kapitálová struktura firem nemění během dlouhých období. Ve své dizertaci zkoumám otázku stability kapitálové struktury z různých úhlů. První kapitola se zabývá otázkou zda se makroekonomická volatilita může vést ke změnám a přizpůsobení kapitálové struktury. Pro zodpovězení této otázky se studuji země Střední a Východní Evropy v období mezi lety 1996 a 2006. Tyto země v uvedeném období prošly rozsáhlými ekonomickými změnami včetně transformace z centrálního plánování na tržní ekonomiku, rozsáhlé privatizace a značných ekonomických reforem, aby se staly členy EU. Ukazuje se, že makroekonomické změny se překvapivě neodráží do změn v kapitálové struktuře. Proto se druhá kapitola zaměřuje na důvody tohoto zvláštního chování. Zjišťujeme, že kreditní omezení, kterým firmy čelí při získávání financování, jsou jedním z hlavních faktorů vysvětlujících získané výsledky. Firmy, které omezení nemají, jsou daleko aktivnější při přizpůsobování své kapitálové struktury v reakci na ekonomické změny. Navíc vlastnictví firem hraje důležitou roli při vysvětlování využití zadlužení (leverage) firem, které neměly významná kreditní omezení. Třetí kapitola studuje změny ve využití dluhu v kontextu slučování a akvizic firem (M&A). Srovnávám využití dluhu ovládaných i ovládajících firem za použití techniky rozdíl-v-rozdílu (difference-in-difference propensity score). Zjišťuji, že u ovládajících firem dochází k nárůstu zadlužení, zatímco u ovládnutých firem se využití zadlužení nemění.

Preface

In this dissertation, I address issues related to the capital structure of a firm and its stability. According to the theory, firms choose their capital structures in such a way to maximize the value of firm. However, the decision concerning capital structure is important not only from the returns maximization point of view, but also because the ”optimal” capital structure should balance the risk of bankruptcy with the tax savings of debt. The choice of capital structure is thought to be determined largely by such firm-specific characteristics as the size of the firm, its profitability, tangibility and market-to-book ratio. At the same time, Lemmon, Roberts and Zender (2008) demonstrate that leverage ratios stay surprisingly stable over time and that well-known capital structure determinants account only for a modest part of the variation in leverage, while the majority of variation is unobserved firm-specific and time-invariant. It is important to mention that the study uses a sample of US firms. Given that the US economy is relatively stable over time, it raises the question whether this significant stability in capital structure is pre-determined by the US macroeconomic conditions or is a property of leverage ratios.

Therefore, the first chapter studies the question of capital structure decisions of firms in Eastern European transition economies. I focus on European emerging markets because they could be characterized by a high degree of instability due to major transformations of their economies and also several external shocks. The major changes include a transition from a central planning to a market economy including privatization, the Russian financial crisis, and EU enlargement. The data come from the Amadeus database constructed by Bureau Van Dijk. I use the Top 1 million companies module and focus on seven CEE countries (the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland and the Slovak Republic). I find that despite overwhelming changes in all spheres, leverage ratios exhibit a similar level of stability as in the US. Such leverage ratio behavior seems to be puzzling; however, given underdeveloped capital markets, large asymmetric information in transition economies and the lack of internal sources, the financing constraints firms face could be responsible for the observed stability in leverage ratios.

The second chapter investigates the effect of financing constraints on capital structure of the firm using endogenous switching regression with the unknown sample separation approach. The evidence suggests that financially unconstrained firms are more responsive to economic changes and adjust to the target substantially faster than constrained firms. I also look at the ownership structure of a firm as a potential capital structure determinant. The existing differences in ownership patterns between the US and Europe explain my motivation for the inclusion of this factor into the model. The majority of US firms have a dispersed ownership structure, while in Europe, concentrated ownership prevails meaning that owners are not only making important strategic decisions, but also have strong incentives to monitor managers. The controlling share owner is directly interested in firm performance and is likely to take part in firm capital structure decisions. This claim is supported by the results: Direct ownership explains about nine percent of the unexplained variation in leverage in a sub-sample of unconstrained firms. I conjecture that using annual information on ownership and ownership changes together with ultimate ownership may reveal even a higher influence of ownership on the capital structure decision.

The third chapter studies the capital structure stability in the context of M&A activities. In particular, I focus on the changes in leverage of acquiring and acquired firms associated with M&As using the difference-in-differences propensity score matching approach. For the analysis, I use the Zephyr database of M&A deals merged with Amadeus; both databases are collected by Bureau van Dijk. Analysis is based on UK M&As from 1999 to 2007. I find that there are no changes in the leverage of target firms generated by M&As, while the leverage of acquirers increases after the acquisition. This result is expected since acquirers often have to attract additional financing sources to complete the acquisition.

Chapter 1

Is the Stability of Leverage Ratios Determined by the Stability of the Economy?[1]

Abstract

The capital structure choice firms make is a fundamental issue in the financial literature. According to a recent finding, the capital structure of firms remains almost unchanged during their lives. The stability of leverage ratios is mainly generated by an unobserved firm-specific effect that is liable for the majority of variation in capital structure. I demonstrate that even substantial changes in the economic environment (transition from central planning to a market economy and privatization, the Russian financial crisis, and EU membership) do not affect the stability of firms' leverage.

JEL Codes: G32, C23
Keywords: Capital Structure, Financing Decisions, Eastern Europe

[1] An earlier versions of this work has been published in Shamshur, A. 2009. "Is the Stability of Leverage Ratios Determined by the Stability of the Economy?", CERGE-EI Working Paper Series, 2009, No. 393 and in Hanousek, J. and Shamshur, A. (2011). A Stubborn Persistence: Is the Stability of Leverage Ratios Determined by the Stability of the Economy? Journal of Corporate Finance 17(5):1360-1376. This study is supported by a GACR grant (402/09/1595) and by grant No. 56909 of the Grant Agency of Charles University. All errors remaining in this text are the responsibility of the author.

Introduction

Capital structure choice is an important decision for a firm. It is important not only from a returns maximization point of view, but also because this decision has a great impact on a firm's ability to successfully operate in a competitive environment. Current literature has suggested a number of factors that can explain about 30% of the total variation in capital structure. However, Lemmon, Roberts, and Zender (2008) notice that the capital structure of firms remains almost unchanged during their lives meaning that leverage ratios are significantly stable over time. The authors also stress that the stability of leverage ratios is mainly generated by an unobserved firm-specific effect that is responsible for the majority of variation in capital structure.

As Lemmon et al. (2008) focus on the US economy which is relatively stable over time, their finding raises the question whether this significant stability in leverage ratios is determined by the stability of the economy in which the firms operate. The impact of substantial changes in the economy on capital structure stability has not been studied yet. In the US context, it could be investigated how the capital structure of firms changes in response to a crisis. For example, Lemmon et al. (2008) use a sample that consists of all non-financial, firm-year observations between 1963 and 2003. This time span embraces the US savings and loan crisis in the 1980s and the dot-com bubble. However, neither of these crises caused deep recession or depression of production and investment in the economy as a whole. The financial sector was stabilized and continued growing after a funds infusion. So, neither crisis dramatically affected the capital structure of firms.

In this paper, I use data from European emerging markets that were exposed to a higher degree of instability due to major transformations of their economies and several external shocks.[2] The major changes include a transition from a central planning to a market economy including privatization, the Russian financial crisis, and EU enlargement.

After the USSR collapsed (in 1991), the former USSR countries started the process of transition from a centrally planned system to a market-oriented economy. They undertook massive privatization schemes that were the cornerstone of the reconstruction of their whole economic system (Estrin, Hanousek, Kocenda, and Svejnar, 2009). Large-scale privatizations started the rebuilding of firms' capital structure in accordance with current needs and opportunities. All these transformations in the economy were accompanied by the evolution of national accounting systems and the application of

[2] The average leverage by country and over time is plotted in Figure 1.1. I used two different definitions of leverage. Narrow leverage is defined as the sum of short-term and long-term debt over total assets. This measure does not take into account that some assets may be offset by specific non-debt liabilities, for example, an increase in the gross amount of trade credit leading to a narrow leverage reduction (Rajan and Zingales, 1995). Therefore, my primary measure of leverage excludes trade credit. It can be seen from Figure 1.1 that leverage is more volatile than narrow leverage.

international standards. The total mess in accounting was aggravated by accounting dishonesty. In this situation, large asymmetric information hindered firms' access to debt financing, though their investment opportunities often exceeded their internal sources. Firms were experiencing hard credit constraints and were forced to rely mostly on their internal funds.[3]

The Russian financial crisis occurred in August, 1998 and mostly hit the countries heavily dependent on the export of raw materials. All the former USSR countries were affected by the crisis. First, export and import firms suffered from the crisis due to a decline in trade and exchange rate pressures. Second, the majority of firms were affected by an increase of interest rates and a decrease in equity prices. Figure 1.1 illustrates that the Russian financial crisis had an impact on firms' leverage in the majority of CEE countries. There is a decrease in average leverage ratios (more pronounced for the primary leverage measure) that started roughly (depending on the country) in 1998 and continued until 2002.[4]

However, the Russian crisis had no impact on the structural reforms in Eastern and Central Europe (Backe and Fidrmuc, 2000). The transition process was particularly prompt in EU-applicant countries[5] because, despite socio-political aspects, their economies had to satisfy the EU requirements or had well-functioning market economies with agents able to compete at the EU level. Definitely, economic adjustments to get to a level appropriate for EU membership had affected firm behavior. After the accession of Central and Eastern European countries to the EU, firms obtained significant benefits. For example, the barriers to trade and investment were eliminated and firms got access to the international (EU) market, and what is more important, to international credit markets. This is confirmed also by the data: Overall, the average leverage started to increase after EU accession. The positive dynamics persist in Latvia, Lithuania, and Poland (see Figure 1.1).

Taking into account the considered events, I investigate whether the capital structure of firms in CEE countries exhibit the same level of persistence as in the US or rather actively changes in response to economic evolution.

The paper is organized as follows. In the next section, I survey the literature. In section 3, I describe the traditional determinants of capital structure and their possible signs in transition economies. Section 4 describes the data sources and provides summary statistics of the sample. In section 5, I present the models and discuss the obtained results. I summarize the paper and conclude in section 6.

[3]Even now debt remains the main source of financing in many transition countries due to underdeveloped capital markets and lack of equity capital. See Business Environment and Enterprise Performance Survey (BEEPS) and SME Access to Finance, Flash Eurobarometer 174, European Commission, 2006.

[4]The analysis presented below also confirms the relatively small effect of the 1997-1998 crises. Annual dummies for those two years were negative, indicating a negative effect on leverage ratios. However, the overall effect was not substantial: The 1997 effect was about -0.016, and the 1998 effect was -0.012. The effects of the other years were much smaller and statistically insignificant.

[5]Countries include Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia.

Literature Review

The question about the choice of capital structure by firms is fundamental in the financial literature. This literature is fairly extensive and includes contributions by Titman and Wessels (1988), Rajan and Zingales (1995) and Frank and Goyal (2009). Scholars have identified a number of factors which are correlated with leverage. For example, Frank and Goyal (2009) begin with a long list of factors from prior literature. They choose six factors (industry median leverage, market-to-book assets ratio, tangibility, profitability, firm size and expected inflation) that account for more than 27% of the variation in leverage, while another 19 factors improve the explanatory power of the model by only 2%. The set of leverage determinants identified by Frank and Goyal (2009) is employed by a large number of studies[6].

However, a recent paper of Lemmon et al. (2008) notes that traditional leverage determinants explain a minor part of the variation in leverage (at most 30%), while 60% remain unexplained. This variation comes from an unobserved firm-specific, time-invariant component that is responsible for persistence in leverage ratios over time. As the authors focus on the US economy, which is relatively stable, it is not clear whether leverage ratios exhibit a similar level of persistence when the economic environment rapidly changes over time. To answer this question, I will focus on transition economies.

There are only a few papers that attempt to study the capital structure of firms in transition economies. Some of them are concentrated on the firm-specific determinants. Cornelli, Portes, and Schaffer (1996) and Delcoure (2007) investigate capital structure determinants and find that leverage ratios of firms in transition economies behave differently from leverage ratios of firms in Western economies. For example, asset tangibility and profitability are negatively related to leverage in transition countries, while studies on Western firms report positive relationships. Cornelli et al. (1996) explain the negative relation between leverage and asset tangibility by the poor prospects of the previously capital-intensive sectors in the new environment and the negative relation between profitability and leverage by credit rationing.

Apart from static leverage regressions, scholars employ a dynamic capital structure model. They assume that firms have their target leverage level and the actual leverage of the firm deviates from the target level due to adjustment costs. The dynamic capital structure in transition economies is studied by Haas and Peeters (2006) and Nivorozhkin (2005). The authors apply methodology that allows both the target leverage and the adjustment speed to vary across firms and over time. They find that the determinants of the target capital structure of firms in transition countries are similar to those observed in western countries. According to them, profitability and firm age appear to be the most robust

[6] The studies usually cite an unpublished version of the Frank and Goyal paper.

determinants of target leverage ratios among transition countries.

Unlike previously considered studies, Joeveer (2006) investigates the significance of firm-specific, country institutional and also macroeconomic factors in explaining variation in leverage ratios. The study focuses on Eastern European countries[7] from 1995 to 2002. Joeveer (2006) finds that firm-specific factors mostly explain the variation in leverage for listed and large unlisted firms, while country-specific factors are responsible for the variation in leverage of small unlisted firms.

My work differs from existing studies by focusing on the question of capital structure stability and its sources. I expect that the rigidity of capital structure is determined by the stability of the economy. Thus, the capital structure of firms in Eastern and Central Europe evolves in response to economic changes. Furthermore, I anticipate that the stabilisation of leverage ratios occur after EU enlargement in 2004 because the accession countries have achieved a certain level of economic and socio-political development required by the EU, major economic changes have completed, and economic stability has increased compared to the transition period.

Leverage Factors

Below I briefly describe the determinants of capital structure suggested by theory and by recent studies of capital structure in transition economies.

Profitability

On the one hand, financial structure theory considers debt as an instrument to reduce agency cost. Debt is used as a monitoring device that prevents managers from building their own empires Jensen (1986). Moreover, debt could be served as a tax shield. So, the more profitable firms demand more debt and the relation between profitability and leverage is positive. On the other hand, when asymmetric information is great and, consequently, bank interest rates are high, large profitable firms will choose to use their internal sources, but others will have to borrow. This implies a negative relation between profitability and leverage.

Previous studies (Rajan and Zingales, 1995; Joeveer, 2006; and Haas and Peeters, 2006) have identified statistically significant negative relationships between profitability and leverage.

Profitability is calculated as operating profit (loss) before tax over total assets (Haas and Peeters, 2006).

Growth Opportunities

[7] Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania and Slovakia.

According to the pecking order theory, firms that are expecting high growth in the future require additional equity financing. In order to use profitable investment opportunities, rapidly growing firms tend to be less leveraged. Furthermore in agency theory, Jensen (1986) argues that firms with greater opportunities for shareholders could choose investments, and it leads to wealth expropriation from debt holders. Thus, a negative relation between growth opportunities is expected. At the same time, a fast-growing firm cannot fully rely on internal funds. A shortage of financial sources will be covered by issuing debt.[8] This implies a positive relation between growth opportunities and leverage, which is consistent with existing literature.

I proxy growth opportunities by GDP growth.

Size

There are several reasons for a positive relation between size and leverage. First, size could be a proxy for the probability of default because larger firms tend be more diversified and, consequently, have a lower risk of bankruptcy. Bankruptcy costs are also lower for large firms meaning a lower price of leverage. Second, the larger firms with diversified ownership structure are less able to control managers, but debt is a monitoring device. Third, a larger firm is associated with higher transparency even in transition economies where asymmetric information is large. Thus, it is easier for them to obtain bank credit. In addition, they are more likely to have access to international credit markets. For all these reasons, large firms will demand more debt.

However, Titman and Wessels (1988) find a negative relationship between size and leverage, while Haas and Peeters (2006) and Joeveer (2006) report a positive relationship. The difference in obtained results could be determined by the fact that larger firms are able to issue more equity than small firms due to lower asymmetric information with financial markets.[9] This is mostly the case of developed countries with low financial distress.

Size is proxied by the natural logarithm of total assets.

Tangibility of Assets

Theory suggests that tangible assets could be used as collateral. Collateral usage decreases agency costs of debt or reduces the lender's risk and protects them from the moral hazard problem caused by shareholder-lender conflict of interests. In this situation, a positive relationship is expected. However, when tangible assets are firm-specific, their liquidation value is low and firms in transition economies are forced to finance them internally, which would imply a negative relationship between leverage and a firm's tangible assets.

[8] Similar to Haas and Peeters (2006), the possibility of issuing equity is not considered.
[9] According to the pecking order hypothesis.

Evidence on the relationships between tangibility and leverage could be determined by economic development. Rajan and Zingales (1995) and Delcoure (2007) report that they are positive, but Haas and Peeters (2006) and Joeveer (2006) find them negative.

The tangibility of assets is measured as tangible fixed assets over total fixed assets.

Maturity of Assets

There is evidence that firms strive to match the maturity of assets and liabilities in order to reduce the risk of bankruptcy (Morris, 1976; Hol and der Wijst, 2008; Heyman, Deloof, and Ooghe, 2008). If the maturity of debt is shorter than the maturity of assets, then return generated by assets might not be sufficient to repay the debt or enough cash might not be available. At the same time, if the maturity of debt is longer than the maturity of assets, the firms might have problems with finding new assets to support the debt.

Hol and der Wijst (2008) find a positive relation between assets maturity and short-term debt and a negative relation with long-term debt.

The maturity of assets is measured as current assets to total assets.

Corruption Perception Index (CPI)

CPI measures corruption defined by Transparency International as the misuse of entrusted power for private gain. In other words, the index measures an institutional quality and provides both time-series and cross-sectional variation.

I expect a positive relation between a firm's leverage and CPI because a lower CPI means lower institutional quality and higher asymmetric information. So, it is more difficult for an ordinary firm to obtain financing from banks. However, Fan, Titman, and Twite (2008) argue that the CPI could reflect the possibility of investor rights being expropriated by managers or authorities. They find that the frequency of using debt by firms is higher than the frequency of using equity in more corrupted countries because it is more difficult to expropriate debt holders than outside equity holders.

The index ranging from 0 to 10 with the lower values indicate more severe corruption.

Age

Age is found to be a significant determinant of capital structure in transition economies (Haas and Peeters, 2006; Joeveer, 2006). Older firms have lasting relationships with business and financial partners resulting in a certain reputation, lower information asymmetries, and higher leverage. This implies a positive relationship between firm age and leverage.

Age is computed as the natural logarithm of the difference between the last observed year and year of incorporation.

Industry Median Leverage

Industries differ by their leverage level. These differences are determined by inter-industry heterogeneity in technology, assets, and risk among others. Firms operating in industries where the median leverage is high tend to have high leverage. However, it could be that managers use the industry median as a benchmark for a firm's leverage. Frank and Goyal (2009) argue that the industry median is robust to the leverage definition. A positive relationship between industry median and leverage is expected.

The median industry leverage is measured as the median of leverage by NACE code and by year.

Data

The firm-level data are obtained from the Amadeus database constructed by Bureau Van Dijk. This database is the most comprehensive source containing financial information on public and private companies in Europe. The Amadeus database is available in different modules that are Top 250,000 companies, Top 1.5 million, and All Companies (around 1 million companies in 41 European countries). In this study, I use the Top 1 million companies and focus on eight Eastern European countries (the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia) between 1996 and 2006.[10]

While the biggest problem of the data from transition economies is missing values, I require that all key variables have non-missing data. I keep only firms that have leverage from a zero-to-one interval. Firms from the financial intermediation sector ("opaque" firms) are excluded from the sample since they have a different balance sheet and a specific liability structure. Similar to other studies, I exclude observations if the sum of current and non-current liabilities does not exceed the trade credit because in this case, according to the leverage definition, the numerator is negative. Observations where capital is negative are excluded as well.[11] The definitions of all variables used are presented in the Technical Appendix.

The resulting sample is unbalanced, and the number of observations across countries varies. Estonia, Hungary, and the Czech Republic have the largest coverage, while Lithuania and the Slovak Republic have the least coverage. Summary statistics for our sample are presented in Table 1.1.

The mean leverage in all countries is in the 40 percent range; however, it is lower in Estonia (0.37)

[10] I would like to thank the Organizational Dynamics Graduate Studies Program, the University of Pennsylvania for access to this data.

[11] It may seem that the cleaning procedure reduces the total sample size by about 19% if the whole population of firms without missing values in key financial indicators is considered (capital, current assets, current liabilities, operating profit/loss, and tangible fixed assets). However, if I consider as a realistic starting point only firms that have non-negative tangible fixed assets (or non-negative capital), the cleaning procedure would reduce the total sample size by less than 5%. For more details see Table 1.2.

and about 50 percent in the Czech Republic and Latvia. The largest firms in terms of total assets are located in Poland. In terms of profitability, firms' mean return on assets is larger than their median return. This implies that the firms' profitability distribution is positively skewed, and most firms have low profitability, while only a few firms have very high profitability. The average age of the firms in our sample is about 7 years.

Model

The Determinants of Leverage in Transition Economies

I start studying the determinants of leverage ratios using cross-sectional regressions as in Rajan and Zingales (1995), and in Frank and Goyal (2009).

$$Y_{ijt} = \alpha + \beta X_{ijt-1} + \nu_t + \gamma_j + \epsilon_{ijt} \tag{1.1}$$

where Y_{ijt} is leverage of firm i in country j at time t; ν is a time fixed effect, γ is a country fixed effect and ϵ is a random error term. Since residuals of given firm may be correlated across years (unobserved firm effect) and the sample contains more firms than years, an appropriate way will be to include dummy variables for each time period, each country and then cluster by firm. Using this approach requires year and firm effects to be unchanged over time. When year effect is fixed, time dummies will remove the correlation between observations in the same time period and only the firm effect will be in the data. The assumption of fixed firm effect is quite fair because I have a short panel where it is impossible to distinguish between permanent and temporary firm effects (Petersen, 2009).

The results are presented in Table 1.3. To control for scale effects, I scale all variables by the total assets. In addition, explanatory variables are lagged one period to control for potential endogeneity issues.[12]

In the first column I focus on the core determinants[13] of firms' leverage ratios identified by previous studies (Rajan and Zingales, 1995; Frank and Goyal, 2009). These six factors which are size, tangibility, profitability and growth opportunities, industry median and expected inflation account for only 8.04% of the variation in capital structure. The results I obtain are similar to previous works examining transition economies. Size of the firm and GDP growth have a positive and highly significant effect.

[12] Related studies of leverage determinants in transition economies (Delcoure, 2007; Joeveer, 2006) do not account for potential endogeneity.

[13] Dividend payments and market-to-book ratio are not included because the overwhelming majority of firms in the sample (387,176 out of 388,896) are unlisted and the data are not available for them.

Tangibility is positively related to leverage, but significant only at 10% level. However, it appears that profitability is insignificant, while industry median leverage and expected inflation have a strong positive effect on leverage.

In the second column I also add firm age, maturity of assets, CPI and a dummy for listed firms. Unexpectedly, age of the firm is negatively related to leverage ratio (contrary to Haas and Peeters (2006), but consistent with Brav (2009)). On the one hand, older firms are better known on the market. They have a certain reputation and lower information asymmetries, thus, it is easier for them to obtain credit. On the other hand, a negative sign could be due to older firms that are able to finance their operations from their internal sources and prefer to do so rather than use the external sources. The dummy for firm status is negatively related to leverage and highly significant, which is consistent with Brav (2009) who demonstrates that public firms in the UK have lower leverage than private firms. In this specification, tangibility is significant at the 10% level and positively related to leverage, which is consistent with studies from developed economies, while expected inflation loses its significance.

Finally, the last column examines only profitable firms. It could be seen that all the determinants except expected inflation and growth opportunities of the firm proxied by GDP growth are significant. Assets maturity has a negative impact on leverage. As expected, CPI positively affects leverage of the firm meaning that lower corruption in the country leads to higher debt levels. This contradicts Fan et al. (2008) who find that higher corruption level is associated with higher debt usage.

In order to look at the differences in leverage between public and private firms, I conduct an analysis based on the firm's status (Table 1.4). I find that all firm-specific factors are significant determinants of leverage despite tangibility, which is not significant for the subsample of listed firms. This is generally consistent with Joeveer (2006) (only profitability and age of the firm appear to be insignificant factors) and Delcoure (2007) (all factors have an important impact on leverage despite the firm's growth opportunities). In addition, external factors such as GDP growth and industry median leverage are highly statistically significant. As expected, there is a positive relation between leverage and industry median leverage, meaning that firms use industry median leverage as a benchmark and adjust their own leverage accordingly. A negative relation between leverage and GDP growth is consistent with Joeveer (2006) for the broad leverage of public firms.[14] However, the corruption level appears to be an insignificant leverage determinant for listed firms suggesting that publicly traded firms are not closely connected to a country-specific level of corruption.

Similar to public firms, the leverage of unlisted firms tends to be positively related to firm size and

[14]The definition of broad leverage is in the Technical Appendix.

industry median leverage. Notice that for unlisted firms the industry median leverage has a greater impact than for listed firms (0.64 compared to 0.41). Moreover, tangibility is significant at the 10% level and has a positive coefficient, and profitability and expected inflation are not significant. In contrast to listed firms, CPI is significant and positively affects the leverage of unlisted firms. This is consistent with the hypothesis that a lower index (or higher corruption) leads to higher asymmetric information, which constrains firms from obtaining external financing. The age of the firm and the maturity of assets have a negative impact on the leverage of unlisted firms. Both factors are strongly significant. Interestingly, the maturity of assets is positively related to the leverage of public firms, but negatively related to the leverage of private firms. In line with the findings of Hol and der Wijst (2008), this could be considered as evidence of short-term debt financing usage by public firms, while private firms mostly rely on long-term debt. On the whole, the findings for unlisted firms are in line with Joeveer (2006). There are some differences that could be explained by the use of different leverage measures.

How much of the Variation in Leverage is Firm-specific Time-invariant?

The recent findings of Lemmon et al. (2008) point out that traditional leverage determinants account only for a modest part of the variation in leverage, while the firms' fixed effect regression explains about 60% of the variation. In order to investigate whether the fixed effect is responsible for the majority of the variation in the leverage in transition economies, I run the following regression (Lemmon et al., 2008).

$$Y_{ijt} = \alpha + \beta X_{ijt-1} + \eta_i + \nu_t + \gamma_j + u_{ijt}, \tag{1.2}$$

$$u_{ijt} = \rho u_{ijt-1} + w_{ijt},$$

where u is stationary, w is a random disturbance that is assumed to be possibly heteroskedastic but serially and cross-sectionally uncorrelated, and η is a firm fixed effect.

I start with estimating the leverage regression by a pooled OLS, fixed effect and random effect models for listed and unlisted firms. Table 1.5 contains the obtained results.

As reported above in the case of the pooled OLS model, all factors except profitability and expected inflation have a significant impact on the leverage of unlisted firms. In the case of public firms, tangibility and CPI are not statistically significant. As observed across a broad set of studies, the estimated relation between leverage level and tangibility is positive. However, the coefficient is significant only for unlisted firms. The pooled OLS model explains less than ten percent of the variation in the leverage of private firms and about twenty-two percent of the variation in the leverage of public firms. The fixed and random effect models perform much better.[15] Using the Hausman specification test, the random effect model is rejected in favor of the fixed effect model. Despite the statistical significance of macroeconomic factors (like GDP growth and expected inflation), I do not see a strong economic significance. This suggests that the overall macro effect is captured primarily by the firm-level effect and that the firm/sectoral interaction with overall economic development is rather marginal. Tangible assets are not significant for the panel of unlisted firms but become a significant and influential factor when only listed firms are analyzed. One can speculate that this result reflects uncertainty in transition countries when tangible assets are unfortunately highly "mobile" and could disappear relatively quickly during some problematic or turbulent times. Since listed firms are typically subject to different screening and jurisdiction, we see an increased effect of tangible assets in this sub-sample. Last but not least, as expected, larger firms tend to have higher leverage opportunities because they are more diversified and face lower bankruptcy risk and the corruption index has a positive significant coefficient in the fixed effect model for both listed and unlisted firms. Further, I run the regression of leverage on firm fixed effects to answer the question how much of the variation is firm-specific and time-invariant. The adjusted R^2 from this regression is about sixty-five percent, which is even higher compared to the US. Then the sensitivity analysis considers only firms with at least five, seven, and ten years of non-missing data for book assets and confirms that the unobserved, firm-specific, time-invariant component is still responsible for about sixty percent of the variation in the leverage of those long-living firms. This result is quite surprising given the rapidly changing economic environment during the transition in the considered countries. Therefore, further investigation of leverage stability sources is needed.

Conclusion

Inspired by the recent findings of Lemmon et al. (2008) concerning capital structure stability in the US, I use a comprehensive database of firms in transition countries to study whether this significant stability in the leverage ratios is determined by the stability of the economic environment. First, I examined the explanatory power of leverage determinants identified by previous studies as relevant for both developed and transition economies. It appears that a number of core determinants are able to explain only about 8% of the variation in leverage. This percent is low mostly because the majority of firms in the sample are unlisted. For listed firms about 22% of the variation in leverage is explained by tradi-

[15] The fixed effect model has a statistical advantage over the pooled OLS models because it takes into account the heterogeneous nature of the data. At the same time, a threat exists that the fixed effect estimation would kill the cross-sectional variation and leave only the time-series variation in the data. This fact explains the significant reduction of the coefficient estimates of a pooled regression.

tional determinants. However, listed companies are only about 1% of the entire sample. The obtained coefficient estimates are in line with estimates reported in earlier studies in transition economies (Joeveer, 2006; Delcoure, 2007). At the same time, the variation explained by traditional determinants in transition economies is lower than in developed economies. This is not surprising because asymmetric information is large and observable firm-specific characteristics are not fully reliable from a financial institution's point of view.

Second, I focus on the question of capital structure stability. As I mention above, leverage ratios are stable over time in the US economy. However, transition economies are different from the US economy. They have experienced overwhelming transformation and exogenous shocks. Although Eastern and Central European firms went through transition from central planning to a market economy, privatization, the Russian financial crisis, and EU membership, the firm fixed effect is responsible for an even larger part of the variation in leverage meaning that the capital structure of the firm has not even been affected by substantial economic transformations. It could be the case that credit constraints restrained firms from significant changes in their capital structure. This is confirmed by the studies in capital structure dynamics in transition countries, which report that firms in these economies tend to be under-leveraged compared to their optimal leverage level and adjust their capital structures more slowly than firms in developed economies (Haas and Peeters, 2006; Nivorozhkin, 2005). So, in transition economies where asymmetric information is large, firms often may not be able to raise sufficient capital to finance viable projects. Financial institutions are eager to have full information about the firm to which they are lending money. However, the quality of the firm and the quality of its investment projects are not always easy to verify. This process often takes time; thus, firms prefer to rely on their internal sources which implies a certain rigidity in their leverage. Therefore, I would like to investigate whether financial constraints affect firms' capital structure choices and whether they are responsible to some extent for the observed stability in capital structure. As the majority of the unexplained variation comes from unobserved, time-invariant firm characteristics, I will look at the ownership of a firm as a potential capital structure determinant. My motivation for the inclusion of this factor into the model is based on the existing differences in ownership patterns between the US and Europe. In the US, dispersed ownership prevails, while in Europe it is more concentrated. Majority ownership not only gives the right to make important strategic decisions, but also creates strong incentives to monitor managers. The controlling share owner is directly interested in firm performance and is likely to take part in firm capital structure decisions. Thus, ownership structure may appear to be an important determinant of a firm's capital structure.

Notes

Leverage = debt/(debt + equity), where debt=total liabilities - trade credit.

Broad leverage = total liabilities/total assets.

Narrow leverage = debt(long-term and short-term credit)/(debt + shareholder funds).

GDP growth is a proxy for the growth opportunities of the firm.

Age = Log($Year_t$ - year of incorporation).

Log(total assets) is the natural logarithm of the total assets.

Tangibility is tangible assets to total assets.

Profitability is profit to total assets.

Maturity of assets is current assets to total assets.

Corruption Perception Index (CPI) is an index ranging from 0 to 10. A lower value indicates more severe corruption.

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Figure 1.1: Average Leverage by Country and over Time

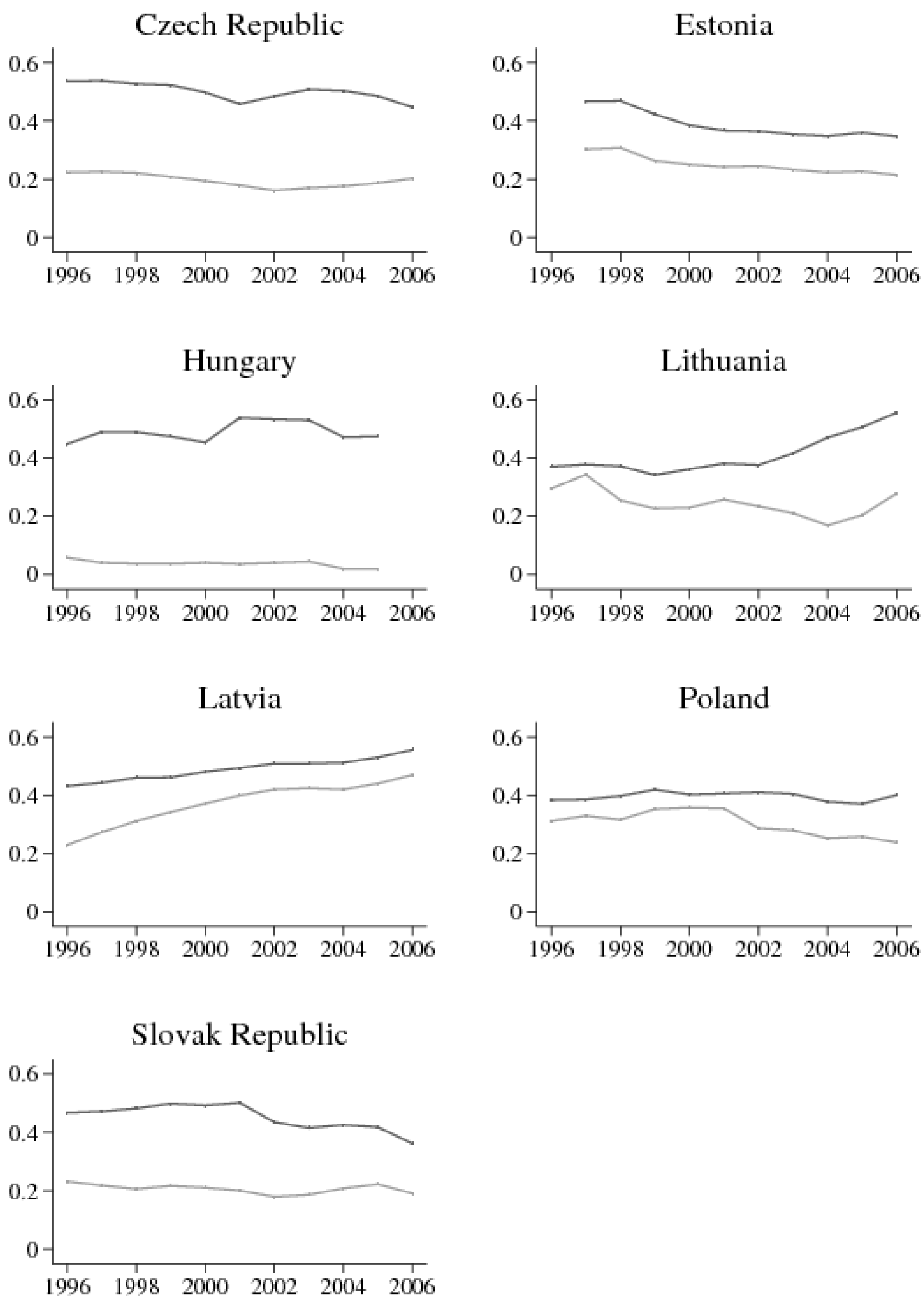

Table 1.1: Summary Statistics

Country	Obs	Leverage	Total assets	ROA	Tangibility	Age
Czech Republic	153410					
Mean		0.50	7057.1	0.09	0.34	7.5
Median		0.49	696.5	0.05	0.28	7
St. dev.		0.29	86870.9	2.72	0.38	4.6
Estonia	203394					
Mean		0.37	686.9	0.09	0.39	6.0
Median		0.32	56.7	0.07	0.33	5
St. dev.		0.30	9417.3	0.59	0.30	6.1
Hungary	486698					
Mean		0.48	1569.5	0.11	0.38	5.6
Median		0.48	62.4	0.05	0.29	5
St. dev.		0.29	101490.0	11.42	12.18	3.9
Lithuania	23347					
Mean		0.44	3015.2	0.10	0.33	6.7
Median		0.41	651.0	0.07	0.28	7
St. dev.		0.27	22150.3	0.23	0.24	3.8
Latvia	26150					
Mean		0.50	3550.4	0.11	0.35	6.6
Median		0.50	572.2	0.08	0.31	6
St. dev.		0.28	21710.6	0.20	0.25	3.6
Poland	98328					
Mean		0.39	14495.5	0.09	0.38	17.5
Median		0.36	2467.5	0.07	0.33	10
St. dev.		0.26	107162.9	0.26	2.10	25.3
Slovak Republic	23459					
Mean		0.43	10122.1	0.07	0.38	9.0
Median		0.40	1707.9	0.05	0.37	8
St. dev.		0.28	88404.4	0.28	0.27	8.3

Note: The table reports the summary statistics of the entire sample. Definitions of all variables are in the Appendix. Total assets are in the thousands of USD.

Table 1.2: Data Cleaning Procedure

Total number of firms*years		Percent	
w/o missing in key variables	1,480,207	100	
w/o missing tangible fixed assets	1,249,136	84.4	100
w/o negative capital	1,248,330	84.3	99.9
w/o (ncli+culi)<cred	1,243,418	84.0	99.5
w/o firms with gaps in fin history $>$ 3 years	1,194,200	80.7	95.6

Table 1.3: The determinants of Leverage in Transition Economies: Pooled OLS

Variable	Book leverage					
	(1)		(2)		(3)	
	All firms		All firms		Profitable firms	
Log(Total Assets)	0.011***	(0.000)	0.016***	(0.000)	0.015***	(0.000)
Tangibility	0.003*	(0.002)	0.002*	(0.001)	0.006**	(0.003)
Profitability	-0.0001	(0.000)	-0.0001	(0.000)	-0.005*	(0.003)
GDP growth	0.001***	(0.000)	0.0009***	(0.000)	-0.0005	(0.000)
Industry median	0.64***	(0.008)	0.64***	(0.008)	0.62***	(0.009)
Expected inflation	0.002***	(0.000)	0.0003	(0.000)	0.0004	(0.000)
Log(Age)			-0.051***	(0.001)	-0.05***	(0.001)
Maturity of Assets			-0.029***	(0.002)	-0.022***	(0.004)
CPI			0.01***	(0.002)	0.015***	(0.002)
Quoted			-0.092***	(0.010)	-0.095***	(0.010)
cons	-0.017**	(0.007)	0.005	(0.010)	-0.001	(0.011)
Industry FE	Yes		Yes		Yes	
Year FE	Yes		Yes		Yes	
Country FE	Yes		Yes		Yes	
Obs	706704		706704		524270	
R^2	0.0804		0.0961		0.1068	

Note: The table reports the parameter estimates from the pooled panel OLS regression of book leverage with corrected for heteroskedasticity and correlation within firms standard errors (reported in parentheses) on different specifications. The dependent variable is leverage defined as debt over debt plus equity, where debt is equal to total liabilities minus trade credit. Independent variables are lagged one period. Tangibility is defined as tangible assets to total assets. Profitability is defined as profit over total assets. Maturity of assets is computed as current assets over total assets. CPI is the corruption perception index ranging from 0 to 10 with a lower value indicating more severe corruption. The regressions include two-digit NACE code dummies, year dummies, and country dummies, which are not reported.
*,**, and *** denote statistical significance at the 10%, 5%, and 1% level correspondingly.

Table 1.4: The determinants of Leverage and the Status of the Firm: Pooled OLS

Variable	Book leverage			
	Listed firms		Unlisted firms	
Log(Total Assets)	0.016***	(0.006)	0.016***	(0.000)
Tangibility	0.045	(0.051)	0.002*	(0.001)
Profitability	-0.003**	(0.001)	-0.0001	(0.000)
GDP growth	-0.009***	(0.003)	0.001***	(0.000)
Industry median	0.37***	(0.073)	0.64***	(0.008)
Expected inflation	-0.004**	(0.002)	0.0003	(0.000)
Log(Age)	-0.026**	(0.012)	-0.051***	(0.001)
Maturity of Assets	0.15**	(0.060)	-0.030***	(0.002)
CPI	0.015	(0.015)	0.01***	(0.002)
cons	-0.19	(0.152)	0.006	(0.010)
Industry FE	Yes		Yes	
Year FE	Yes		Yes	
Country FE	Yes		Yes	
Obs	2401		704303	
R^2	0.2264		0.0961	

Note: The table reports the parameter estimates from the pooled panel OLS regression of book leverage with corrected for heteroskedasticity and correlation within firms standard errors (reported in parentheses) on different specifications. The dependent variable is leverage defined as debt over debt plus equity, where debt is equal to total liabilities minus trade credit. Independent variables are lagged one period. Tangibility is defined as tangible assets to total assets. Profitability is defined as profit over total assets. Maturity of assets is computed as current assets over total assets. CPI is the corruption perception index ranging from 0 to 10 with a lower value indicating more severe corruption. The regressions include two-digit NACE code dummies, year dummies, and country dummies, which are not reported.
*,**, and *** denote statistical significance at the 10%, 5%, and 1% level correspondingly.

Table 1.5: Three Different Estimators of Leverage

	Pooled OLS		Fixed Effect		Random Effect	
			Panel A. Unlisted firms			
Log(Total Assets)	0.016***	(0.000)	-0.014***	(0.001)	0.012***	(0.000)
Tangibility	0.002*	(0.001)	0.00001	(0.000)	0.0004**	(0.000)
Profitability	-0.0001	(0.000)	-0.00006***	(0.000)	-0.00002	(0.000)
GDP growth	0.0008***	(0.000)	-0.0009***	(0.000)	-0.001***	(0.000)
Industry median	0.64***	(0.008)	0.30***	(0.008)	0.57***	(0.004)
Expected inflation	0.0004	(0.000)	-0.001***	(0.000)	-0.0003	(0.000)
Log(Age)	-0.051***	(0.001)	-0.002	(0.007)	-0.047***	(0.001)
Maturity of Assets	-0.030***	(0.002)	-0.009***	(0.002)	-0.034***	(0.001)
CPI	0.0097***	(0.002)	0.007***	(0.002)	0.003***	(0.001)
cons	0.005	(0.010)	0.023***	(0.002)	0.16***	(0.007)
Hausman test			3897.15	0.0000		
Obs	704303		458259		704587	
$AR(1)$			0.5151		0.5151	
R^2	0.0961					
			Panel B. Listed firms			
Log(Total Assets)	0.016***	(0.006)	0.007	(0.011)	0.011**	(0.004)
Tangibility	0.045	(0.051)	0.11**	(0.046)	0.015	(0.031)
Profitability	-0.003**	(0.001)	-0.0015	(0.001)	-0.0016	(0.001)
GDP growth	-0.009***	(0.003)	0.001	(0.003)	-0.008***	(0.002)
Industry median	0.37***	(0.073)	0.063	(0.053)	0.21***	(0.043)
Expected inflation	-0.004**	(0.002)	-0.0007	(0.002)	-0.005***	(0.002)
Log(Age)	-0.026**	(0.012)	-0.06	(0.065)	0.007	(0.010)
Maturity of Assets	0.15**	(0.060)	0.059	(0.038)	0.071**	(0.029)
CPI	0.015	(0.015)	0.050***	(0.018)	0.021**	(0.011)
cons	-0.19	(0.152)	0.013	(0.030)	0.021	(0.087)
Hausman test			63.91	0.0000		
Obs	2401		1994		2401	
$AR(1)$		0.5196		0.5196		
R^2	0.2264					

Note: The table reports the parameter estimates from the pooled OLS, fixed effect, and random effect regressions. The dependent variable is leverage defined as debt over debt plus equity, where debt is equal to total liabilities minus trade credit. Independent variables are lagged one period. Definitions of all variables are in the Appendix. The pooled OLS regression includes year dummies, two-digit NACE code dummies, and country dummies, which are not reported. The pooled OLS standard errors are robust to heteroskedasticity and correlation within the firm. Fixed effect standard errors are robust to heteroskedasticity and serial correlation within firms. AR(1) is the estimated first-order serial correlation coefficient.
,**, and *** denote statistical significance at the 10%, 5%, and 1% level correspondingly.

Chapter 2

Access to Capital and the Capital Structure of the Firm[1]

Abstract

The paper examines the importance of financial constraints for firm capital structure decisions in transitions economies during 1996-2006 using an endogenous switching regression with an unknown sample separation approach. The evidence suggests that substantial changes in the economic environment do not affect the stability of the firms' leverage due to the presence of financial constraints. Financially unconstrained firms are more responsive to economic changes and adjust to the target substantially faster than constrained firms. Moreover, accounting for the ownership structure of firms boosts the explanatory power of the model in the sub-sample of unconstrained firms, suggesting that annual information on ownership and ownership changes together with financial constraints have the potential to be an answer to the puzzle of stability in capital structure.
JEL Codes: G32, C23
Keywords: Capital Structure, Financing Decisions, Credit Constraints, Eastern Europe

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Introduction

It is a documented fact that large investment projects are followed by equity and debt issues (Leary and Roberts, 2005; Alti, 2006). Undertaking a large investment project affects both the hurdle rate and cash flows thus the riskiness of the firm and its valuation are affected as well. Therefore, management is responsible for the identification of a capital structure that results in maximum firm value. Since there is a large body of literature that studies the importance of financial constraints in determining firms' investment behavior and confirms the existence of two distinct regimes, it is reasonable to expect that the resulting capital structure of financially constrained and unconstrained firms is likely determined by different factors.

Capital structure theories offer a number of determinants that are responsible for the variation in capital structure, while the empirical literature strives to find evidence that firms behave in accordance with the theoretical predictions. Scholars have identified a number of proxies that capture cost and benefits of debt financing and estimate the leverage of the firm as a function of firm-specific characteristics.[2] Firm characteristics are found to be important determinants of capital structure. They are responsible for up to 30% of the variation in the leverage, while 60% remain unexplained (Lemmon, Roberts, and Zender, 2008). However, Faulkender and Petersen (2006) point out that the supply of capital and a firm's ability to access capital markets also affect the capital structure.

The problem of access to capital was particularly evident in the Central and Eastern European (CEE) economies during the transition. For example, Haas and Peeters (2006), and Nivorozhkin (2005) report that firms in these economies tend to be significantly underlevered suggesting that they have limited access to external financing. It is not surprising since even now debt remains the main source of financing in many transition countries due to underdeveloped capital markets and the lack of equity capital.[3] Moreover, the majority of firms in these economies are private; thus, asymmetric information is particularly large for them, while the cost of collecting information about these firms for financial institutions is high.

At the same time, in central planning economies the vast majority of firms were initially state-owned. The period of central planning could be characterized by soft-budget constraints meaning that firms had access to formal or informal state subsidies. Access to financing was not performance-based and sometimes poor performing firms had easier access to external investment funds than the better per-

[2] This literature is fairly extensive and includes the contributions of Rajan and Zingales (1995), Titman and Wessels (1988) and Frank and Goyal (2009).

[3] According to a survey carried out by the European Commission in 2006, 66% of surveyed firms go to banks to obtain financing (Figure 2.1). However, the percentage depends on the region (Figure 2.2): 85% of Mediterranean firms go to banks to obtain financing, while in Central Europe this percentage is about 65% and in the Baltic states, it is only 53%.

forming ones (Grosfeld and Roland, 1997; Konings, Rizov, and Vandenbussche, 2003; Lizal and Svejnar, 2002). Then, in 1991 the transformation of economic systems together with privatization had started. These changes led to the evolution of the nature of budget constraints: privatized firms were experiencing hard credit constraints and were forced to rely mostly on their internal funds, while state-owned ones still had access to cheap financing.

Despite the credit constraint hardening process, the literature highlights a number of market imperfections that cause firms to be credit constrained (Stiglitz and Weiss, 1981; Hubbard, 1998). Specifically in transition economies, this is due to large asymmetric information, which hinders access to external sources of financing (even in cases when firms do not have sufficient internal sources); high transaction costs associated with an application for loans; state monopoly in credit markets; interest rate ceilings imposed by the government (Rizov, 2004); low returns on investment; high risk; and an underdeveloped financial market. The existence of problems with access to the credit markets is supported by the data. For example, according to the Business Environment and Enterprise Performance Survey (BEEPS) carried out by the European Bank for Reconstruction and Development (EBRD) in 2002, about a half of surveyed enterprises had difficulties with access to financing (Figure 2.3). These difficulties are well documented in Central European countries (about 50% of the firms in the Czech Republic, Hungary, Poland and Slovakia consider access to finance as a moderate or a major obstacle for their development) and less severe in the Baltic region (only 25% of firms have experienced difficulties with access to finance). The same survey reports that the major obstacle in obtaining financing is its cost (Figure 2.4). The cost of capital is particularly high in Poland (more than 70% of the respondents think that capital is too expensive), in the Czech Republic and Slovakia external capital is more affordable for firms (50% of firms consider the cost of capital as a serious obstacle), while in the Baltic States only 30% of firms suffer from high interest rates and other charges. Another survey that was carried out by the European Commission in 2006 focuses on small and medium enterprises (SME) accessing finance in the new EU-10 member states. Again, half of the surveyed firms experience difficulties with access to finance through banks: 44% of managers feel that access to loans granted by banks is difficult as oppose to 42% who see it as being easy (Figure 2.5). Although firms report that nowadays it is easier to obtain a bank loan than a few years ago (Figure 2.6), the numbers imply that the situation regarding access to external financing has hardly improved even after the countries became EU members. At the same time, the existence of two approximately equally sized groups of firms that differ in their access to capital provides an opportunity to address a number of questions: Do the capital structure decisions of financially constrained firms differ from the capital structure decisions of unconstrained firms? How do financial constraints affect the speed of adjustment to the target capital structure? Are the financial constraints at least partially responsible for the observed stability in capital structure? In addition, I attempt to investigate to what extent the ownership structure is able to explain the unexplained firm-specific variation in the leverage. The motivation for the inclusion of this factor into the model is based on the existing differences in ownership patterns between the US and Europe. In the US, dispersed ownership prevails, while in Europe it is more concentrated. Majority ownership not only grants the right to make important strategic decisions, but also creates strong incentives to monitor managers. The controlling share owner is directly interested in firm performance and is likely to take part in firm capital structure decisions. Thus, the ownership structure seems to be an important determinant of the firm capital structure in countries with concentrated ownership. This paper aims to address all the raised issues by analyzing the financial behavior of constrained and unconstrained firms in the transition countries during the period 1996-2006.

The paper proceeds as follows. The next section surveys the literature. In section 3, I describe the data sources and provide summary statistics of the sample. Section 4 explains the econometric methods and discusses the determinants of capital structure in two distinct regimes. Section 5 considers the effect of the financial constraint presence on the speed of adjustment to the target capital structure. In section 6, I analyze the importance of the ownership structure of the firm for capital structure choices. I summarize the paper and conclude in section 7.

Literature Review

Traditional capital structure theories assume that capital availability entirely depends on the characteristics of the firm. However, according to the credit channel literature, a firm's debt issue patterns depend on its access to financial markets. In theory, a firm is considered to be financially constrained if it does not have sufficient internal sources to undertake investment opportunities, and the cost of getting external financing is high. The main problem of the empirical literature is that the obtained results are highly dependent on the methodology used to identify whether a firm experiences credit constraints or not. For example, Fazzari, Hubbard, and Petersen (1988) use the annual Value Line database in 1969-1986, which covers manufacturing firms in the US to identify the presence of financial constraints based on the differential sensitivity of corporate investment to cash flow. The financing constraints are present if the coefficient on cash flow for relatively constrained firms is higher than for relatively unconstrained ones. The authors distinguish between firms based on the dividend payout ratio: the higher the dividend payout ratio, the less constrained the firm. This classification scheme is employed by a large number of studies. For example, Korajczyk and Levy (2003) study the effect of macroeconomic conditions on capital structure and categorize firms by their dividend level similar to Fazzari et al. (1988). In addition, the authors also condition on Tobin's Q to ensure that financially constrained firms are not financially distressed and have investment opportunities.

However, Kaplan and Zingales (1997) and Kaplan and Zingales (2000) question the validity of the classification scheme in Fazzari et al. (1988) and the interpretation of their empirical results. They offer a different classification based on the availability of funds and the demand for them using the firms' financial information and annual manager reports and show, providing theoretical and empirical arguments, that investment cash flow sensitivities are not good indicators of financing constraints. Kaplan and Zingales's (1997) results are confirmed by Cleary (1999), who finds that firms with a higher creditworthiness are extremely sensitive to internal funds availability than less creditworthy firms.

Moyen (2004) contributes to this debate by investigating different classification schemes (dividends payout policy, firms' cash flow, investment, and Cleary's index). She finds that depending on which identification criterion is applied, cash flow sensitivity of financially constrained firms could be higher or lower than that of financially unconstrained ones.

Alternatively, Vermeulen (2002) and Pal and Ferrando (2006) use balance sheet information and profit and loss accounts. Vermeulen (2002) uses a financial gap[4] to sort out firms into groups. The firm is defined as credit constrained when its financing gap is positive and the firm is not able to access external financing. Relatively constrained firms are those which despite the positive financing gap can afford expensive external sources. Firms are considered unconstrained if they have either a negative financing gap or are able to attract relatively cheap external financing. However, Schiantarelli (1995) argues that a single indicator is not sufficient to decide whether a firm is credit constrained or not. Pal and Ferrando (2006) take into account this shortcoming of the previous literature and rely on five criteria: total investments, financing gap, financial debt, new shares issuance, and the average interest payments on debt relative to interest rates charged in the local credit markets. These are related to the financing conditions of firms. The usage of several interrelated variables allows for the placement of a firm into the constrained, relatively constrained or unconstrained group utilizing all available information. For example, negative total investment (a decrease in fixed assets) signals that a firm has experienced credit constraints since it liquidates fixed assets. A positive financing gap indicates that the firm's total investment is higher than the current cash flow and that the firm needs external financing. If total in-

[4]The financial gap is defined as the nominal spending on fixed investment and cash flow.

vestments and the financing gap are both positive, firms need external financing. Firms are sorted into unconstrained and relatively constrained categories based on the price they pay to obtain necessary financing. Those firms, which are able to get financial debt at a lower price than the country-specific retail interest rates are defined as unconstrained. If the price is higher, a firm falls into the relatively constrained category. Firms under these conditions not attracting financing are defined as absolutely constrained. Finally, separate equations are estimated for each group of firms.

All the studies considered above use the exogenous classification of firms. This strategy makes the results highly sensitive to the point of sample separation because it could be problematic to decide to which group a firm belongs since the severity of financial constraints faced by the firm is not directly observable. Recent papers strive to overcome these problems using an endogenous sample separation methodology (Hovakimian and Titman, 2006; Hobdari, Derek, and Mygind, 2009). Hovakimian and Titman (2006) examine the role of financial constraints for firm investments by analyzing the relationship between investment expenditures and proceeds from voluntary asset sales. To avoid a priori sample separation, the authors apply an endogenous switching regression approach with unknown sample separation (Maddala and Nelson, 1994; Maddala, 1986). The advantage of this approach is that the likelihood of a firm to be financially constrained is endogenously determined by multiple firm characteristics, so that a firm is not fixed in one regime over time. Therefore, a firm switches the regime when its propensity of being in the constrained or in the unconstrained regime reaches a certain unobservable threshold value. To estimate the likelihood of a firm being financially constrained, Hovakimian and Titman (2006) use a number of factors, which are the firm's size, age, leverage, financial slack, market-to-book ratio, dummy variables for dividend payout and bond rating. However, Hobdari et al. (2009), who study capital investments and the determinants of financial constraints in Estonia in 1993-2002, offer a different composition of the sample separation criteria. They include both financial characteristics of the firm (the debt-to-capital ratio, the interest-payments-to-sales ratio and the liquid-financial-assets-to-capital ratio) and firm-specific factors (ownership concentration, the size of the firm and its age). In addition, the authors account for soft budget constraints that the firms may face during early transition years. Both Hovakimian and Titman (2006) and Hobdari et al. (2009) confirm the existence of two distinct regimes (constrained and unconstrained), which determine the firms' investment behavior.

It is necessary to stress that the literature on credit constraints is mostly focused on the relation between financing availability and investments. The effect of credit constraints on the firms' capital structure choice has not been studied.[5] This paper contributes to the academic literature in the following ways.

[5] To my knowledge there is only one paper by Korajczyk and Levy (2003), which studies how macroeconomic conditions affect capital structure choice. The authors conduct their analysis separately for financially constrained and unconstrained firms and

First, the paper studies how financial constraints affect the capital structure of firms and its determinants using the endogenous sample separation approach. The leverage of constrained firms appears to be more dependent on such determinants as the size of the firm, its tangibility and industry median leverage, while the leverage of unconstrained firms is responsive to macroeconomic factors because they are able to adjust their capital structures in accordance with economic changes. Second, the paper documents systematic differences in the speed of adjustment to a target leverage between financially constrained and unconstrained firms. Unconstrained firms adjust their leverage to the optimal level faster than constrained ones. Since unconstrained firms have more financial freedom, they do not drift away from their targets and make adjustments immediately, while constrained firms are usually underlevered and adjust to their targets when they have an opportunity to do so.

Data and Model

I consider non-financial firms over the 1996-2006 period with data available from the Amadeus database constructed by Bureau Van Dijk. Details concerning the cleaning procedure are presented in the data section in Chapter 1. The resulting sample of descriptive statistics is reported in Table 2.1.

Switching Regression Model

The standard empirical specification of the model can be summarized as follows

$$Leverage_{ijt} = f(\text{control variables}_{ijt-1}) + \epsilon_{ijt}, \tag{2.1}$$

where i stands for the firm, j stands for the country and t refers to the time period. Leverage is defined as debt over debt plus equity, where debt is equal to total liabilities minus trade credit.[6] Control variables contain the size of the firm proxied by logarithm of total assets, tangibility defined as tangible assets over total assets, profitability is profit over total assets, growth opportunities are proxied by GDP, expected inflation, maturity of assets defined as current assets to total assets, age of the firm and median industry leverage.

However, the model itself does not take into account that a firm could be heavily dependent on external finance availability and in that case would not be able to change its capital structure even if it was eager to do so. During the transition financial constraints were particularly severe. To find out whether the

find that unconstrained firms, in contrast to constrained, time their issue choice when macroeconomic conditions are favorable.

[6]In this case, according to the leverage definition, the numerator will be negative. For more details see Appendix.

presence of credit constraints might be responsible for the observed stability in firms' capital structure, I separate between financially constrained and unconstrained firms using an endogenous switching regression with unknown sample separation. This methodology helps to avoid the prior assignment of a firm into a particular group, because it could be quite subjective and the results depend heavily on the separation criterion applied (Moyen, 2004). Moreover, the proposed method allows allocating the observational units to a specific regime depending on the value of the latent decision variable relative to the threshold value (Maddala and Nelson, 1994).

I assume that a firm could either work in a constrained or unconstrained regime, but the points of structural change are not observable and will be estimated together with the leverage equation for each regime. Thus, the model is composed of the system of three equations estimated simultaneously:

$$\begin{aligned} Y_{1ijt} &= \beta_1 X_{ijt} + \epsilon_{1ijt}, \\ Y_{2ijt} &= \beta_2 X_{ijt} + \epsilon_{2ijt}, \\ y^*_{ijt} &= \delta Z_{ijt} + u_{ijt}, \end{aligned} \tag{2.2}$$

where Y_{ijt} is leverage of firm i in country j at time t, X_{ijt} are leverage determinants, and ϵ is a random error term. The first two equations in the system of equations (2) are leverage regressions for constrained and unconstrained regimes, and selection equation $y^*_{ijt} = \delta Z_{ijt} + u_{ijt}$ estimates the likelihood of the firm operating in either one regime or the other. Z_{ijt} contains the determinants of a firm's propensity of being in either regime at time t. The change of the regime occurs when y^*_{ijt} reaches a certain unobservable threshold value, so that the status of the firm may change over time.

The selection rule is defined as

$$\begin{aligned} Y_{ijt} &= Y_{1ijt}, \text{iff } y^*_{ijt} < 0, \\ Y_{ijt} &= Y_{2ijt}, \text{iff } y^*_{ijt} \geq 0. \end{aligned} \tag{2.3}$$

The parameters β_1, β_2 and δ will be estimated using maximum likelihood. It is necessary to assume that ϵ_{1ijt}, ϵ_{2ijt} and u_{ijt} are jointly normally distributed with zero mean and covariance matrix Σ.

$$\Sigma = \begin{pmatrix} \sigma_1^2 & \sigma_{12} & \sigma_{1u} \\ \sigma_{21} & \sigma_2^2 & \sigma_{2u} \\ \sigma_{u1} & \sigma_{u2} & \sigma_u^2 \end{pmatrix}, \tag{2.4}$$

where σ_u^2 is normalized to 1, because from the switching regression it is only possible to estimate δ/σ_u, but not δ and σ_u separately. I also assume that off-diagonal terms (the covariances) are not equal to zero, although σ_{12} is not estimable since it does not appear in the likelihood function (equation (2.8)). Still the non-zero covariance assumption is needed to allow the shocks of leverage to be correlated with the shocks to a firm's characteristics. This assumption is particularly important because Y_{1ijt} and Y_{2ijt} are included in y^*_{ijt} regressors meaning that they affect the classification of observations in the regimes. As σ_{1u} and σ_{2u} are different from zero, the switch is endogenous, thus, the endogenous switching model with unknown sample separation should be applied.

As the regime the firm is not directly observable, I calculate the probabilities of the firm to be constrained or unconstrained:

$$\begin{aligned} Prob(Y_{ijt} = Y_{1ijt}) = & Prob(\delta Z_{ijt} + u_{ijt} < 0) = \\ & = Prob(u_{ijt} < -\delta Z_{ijt}) = \Phi(-\delta Z_{ijt}), \end{aligned} \tag{2.5}$$

$$\begin{aligned} Prob(Y_{ijt} = Y_{2ijt}) = & Prob(\delta Z_{ijt} + u_{ijt} \geq 0) = \\ & = Prob(u_{ijt} \geq -\delta Z_{ijt}) = 1 - \Phi(-\delta Z_{ijt}). \end{aligned} \tag{2.6}$$

Then the likelihood density function for each observation Y_{ijt} is given by

$$\begin{aligned} l_{ijt} = & \Phi(-\delta Z_{ijt})\phi(\epsilon_{1ijt}|u_{ijt} < -\delta Z_{ijt}) + \\ & + [1 - \Phi(-\delta Z_{ijt})]\phi(\epsilon_{2ijt}|u_{ijt \geq -\delta Z_{ijt}}). \end{aligned} \tag{2.7}$$

And the log-likelihood function for all the observations subject to maximization is given by

$$\begin{aligned} lnL = \sum_{i=1}^{N}\sum_{j=1}^{M}\sum_{t=1}^{T} ln\Bigg\{ & \Phi\left(\frac{-\delta Z_{ijt} - \frac{\sigma_{1u}}{\sigma_1^2}\epsilon_{1ijt}}{\sqrt{1 - \frac{\sigma_{1u}^2}{\sigma_1^2}}}\right)\phi(\epsilon_{1ijt}, \sigma_1) + \\ & + \left[1 - \Phi\left(\frac{-\delta Z_{ijt} - \frac{\sigma_{2u}}{\sigma_2^2}\epsilon_{2ijt}}{\sqrt{1 - \frac{\sigma_{2u}^2}{\sigma_2^2}}}\right)\right]\phi(\epsilon_{2ijt}, \sigma_2)\Bigg\}, \end{aligned} \tag{2.8}$$

where $\phi(\cdot)$ is the normal density distribution and $\Phi(\cdot)$ is normal cumulative distribution functions. I start with firm-specific factors which could be associated with the presence of financial constraints. The switching regression approach allows the use of multiple variables to predict whether a firm is constrained or unconstrained.[7] Following the existing investment literature I use the sets of variables including those used by Hovakimian and Titman (2006), Almeida and Campello (2007), and Hobdari et al. (2009), to identify financial constraints in the context of transition economies. Table 2.2 briefly

[7]The literature on financing conditions demonstrates that the obtained results depend on the a-priori criteria used to assign a firm to a particular category (Schiantarelli, 1995). Using the multiple indicators helps to assess the existence of credit constraints more carefully.

summarizes the determinants I find to be relevant for firms operating in transition economies and their expected signs. All these variables are included into the selection equation in lagged form.

The next step is the estimation of the endogenous switching regression model with unknown sample separation. The model is estimated by maximum likelihood. As recent research revealed the necessity to control for firm-specific fixed effects (Lemmon et al., 2008), the leverage regressions are estimated in first differences. I also include year dummies to control for fixed-year effects. The model is estimated over the 1996-2006 period.

Table 2.3 presents the regression results. Panel A demonstrates that the firms' capital structure decisions are different in the two regimes. These differences are well pronounced for all leverage determinants. In both regimes the size of the firm, its tangibility and industry median leverage are positively related to leverage. However, the changes in the size and tangibility of the firm generate a much greater increase in the leverage of constrained firms. This finding is quite intuitive because financial institutions consider the total assets of the firm and tangible assets in particular as collateral. The industry median leverage has a significantly higher impact on the leverage of constrained firms. Constrained firms have few opportunities to borrow, thus they strive to adjust their leverage to the median industry leverage, while unconstrained firms might focus on their own target level rather than the common benchmark.

Note that the age of the firm is a highly significant determinant of the capital structure of the firm. It is negatively related to the leverage of constrained and unconstrained firms, indicating that old firms prefer to finance their activities by themselves. The same logic applies for the change in the profitability of constrained firms. An increase in the profitability of these firms leads to a decrease in leverage since under large information asymmetries between firms and financial institutions, banks might use high interest rates to protect themselves, therefore, profitable firms will choose to use their internal sources and demand less credit, while less profitable firms still have to borrow, since they lack internal alternatives. Negative relations between leverage and profitability hold also for subsample of unconstrained firms, but they substantially weaker and economically insignificant, which is expected since unconstrained firms do not experience problems with external financing and can virtually borrow any time if they eager to do so. This negative relation is consistent with pecking order theory and supported by previous findings for small firms (Heyman et al., 2008) and for transition economies (Delcoure, 2007; Haas and Peeters, 2006; Shamshur, 2009).

The estimates of the selection equation are reported in Panel B. All the characteristics except firm status (public/private) play an important role in determining the likelihood of the firm belonging to a particular regime. Constrained firms tend to be smaller and younger, and have smaller tangible assets. Constraints are associated with higher short-term debt and lower long-term debt, as long-term debt entails higher information costs than short-term debt because stronger proof of creditworthiness is needed, only unconstrained firms could obtain it. Constrained firms also have higher growth opportunities and lower levels of financial slack. It is interesting yet understandable that higher soft budget constraints are associated with higher financial constraints.[8] Financially constrained firms receive help from the government in the form of direct government subsidies without the expectation of future repayment or in the form of tax reductions, trade credits, and cheap bank credit. These financial flows are mostly used for survival rather than investment, restructuring, or optimizing capital structure purposes (Grosfeld and Roland, 1997; Konings et al., 2003; Lizal and Svejnar, 2002).

The obtained results seem to support the idea of the existence of two different regimes. In order to formally test this preposition I estimate a pooled OLS model which could be considered as the constrained model in the sense that coefficients of two leverage regressions for two different regimes are equal. The results are summarized in Table 2.4 and Figure 2.7. In most cases the estimates of the pooled OLS model are between constrained and unconstrained regimes coefficients. In general, the pooled OLS estimates are closer to the constrained firms' estimates from the switching regression. Formally, a likelihood ratio test with likelihood values for the switching model and OLS is performed. Under the restriction that the coefficients of the two leverage equations for the two different regimes are equal, the parameters of the selection equation in the switching model are not identified, which complicates the calculation of the degrees of freedom. Based also on a formal test, it can be concluded that the data are better characterized by two different regimes than by only one regime.[9]

To test the robustness of the results I estimate the separate leverage regressions using a priori classification of the sample into subsamples of constrained and unconstrained firms. Estimations are performed separately for each regime.

A. In every year over the 1996-2006 period firms are sorted into subsamples based on growth opportunities they face and financial slack they have: firms that face high (low) growth opportunities and keep low (high) amount of cash are classified as financially constrained (unconstrained).

B. In every year over the 1996-2006 period firms are ranked based on their tangibility and profitabil-

[8]The situation when a firm is for some period not generating any profit (or accumulating losses) but still receives positive financial flows has three main explanations: it is 1) a promising startup company, 2) a foreign-owned local entity, or 3) a local firm with government support or ownership. In all three cases accumulating debt while not having good prospects for profit would eventually cause the firm to become financially constrained. Since we analyze firms from CEE countries, we have chosen to name the variable "soft budget constraint" to reflect the main stream of the existing literature.

[9]I follow the suggestions of Goldfeld and Quandt (1976) and use χ^2 distribution to conduct a likelihood ratio test by defining the degrees of freedom as the sum of the number of constraints and the number of unidentified parameters. There are 38 degrees of freedom in the model. The critical value of the χ^2 distribution at the 1% level with 38 degrees of freedom is 61.16 and the value of the likelihood ratio test is 89220.

ity. Firms which are in the bottom (top) three deciles of tangibility and profitability distributions are assigned to the financially constrained (unconstrained) group.

The results from these estimations are reported in Table 2.5. In general, they are similar, but substantially weaker. The potential problem with artificial sample separation is that assignment of a firm into a particular group is based on one or two variables, while many factors affect the ability of the firm to attract external financing. Coming back to the question of capital structure stability in the financial-constraints framework, an unobservable firm-specific component is responsible for about 70% of the variation in the leverage of constrained firms and 59% of the variation in the leverage of unconstrained firms. This finding is consistent with the financing constraints literature, which suggests that financially unconstrained firms should be more responsive to changes in the economic environment.

Financing Constraints and Capital Structure Adjustment Speed

In this section I attempt to analyse the differences in the adjustment speed between constrained and unconstrained firms. As I have shown the determinants of capital structure differ across firms with respect to their access to external finance. When the switching model is estimated, the obtained results can be used to calculate the probabilities of the firm to be in either the constrained or unconstrained regime. These probabilities help to assign firms in either one group or the other and then estimate the dynamic capital structure model for each group separately.

I employ a partial adjustment model with firm fixed effects as suggested by Flannery and Rangan (2006). The authors demonstrate that this type of model fits the data very well.

First, the target leverage of the firm must be estimated.

$$Y^*_{ijt} = \beta X_{ijt-1} + \nu_i, \tag{2.9}$$

where Y^*_{ijt} is a target or optimal leverage of the firm, vector X_{ijt-1} contains one-year lagged leverage determinants found to be important in transition economies. Specifically, I include size of the firm, its age, maturity of assets, tangibility, profitability, GDP, expected inflation and industry median leverage.[10] Firms' fixed effects (ν_i) are included into the regression to capture the unobserved firms' heterogeneity documented by Lemmon et al. (2008) for the US and Shamshur (2009) for Central and Eastern European economies.

Second, to capture dynamic adjustments in leverage ratios, the partial adjustment model will be esti-

[10]For the detailed discussion concerning leverage determinants and their expected relationship with target leverage see Haas and Peeters (2006), Shamshur (2009).

mated (Hovakimian et al., 2001; Flannery and Rangan, 2006).

$$Y_{ijt} - Y_{ijt-1} = \lambda(Y^*_{ijt} - Y_{ijt-1}) + \epsilon_{ijt}, \tag{2.10}$$

where $Y_{ijt} - Y_{ijt-1}$ is an actual change in firm's leverage, $Y^*_{ijt} - Y_{ijt-1}$ is the distance between firm's leverage and its target leverage, and λ captures the speed of adjustment to the target leverage ratio. Combining (2.9) and (2.10) I get

$$Y_{ijt} = (\lambda\beta)X_{ijt} + (1-\lambda)Y_{ijt-1} + \lambda\nu_i + \epsilon_{ijt}. \tag{2.11}$$

When estimating equation (2.11) several econometric problems might be faced. First, firm fixed effect should be taken into account because time-invariant firm characteristics are more likely correlated with the explanatory variables. Ignoring the unobserved firm heterogeneity may cause the estimates to be biased and inconsistent (Wooldridge, 2002). Second, the presence of lagged dependent variable in the regression equation makes the inclusion of firm fixed effect into the model problematic. If first-differencing is applied, the firm-, industry- and country-specific effects are removed, because they do not vary over time, however, this kind of transformation creates a correlation between the transformed lagged dependent variable and the error term. The degree of inconsistency from using the fixed effect when the strict exogeneity assumption fails is of order T^{-1} (Wooldridge, 2002). In panels with large time dimension the correlation of the error term with the lagged dependent variable will be insignificant (Roodman, 2006), however, my dataset has a short time dimension and a large firm dimension, thus, bias will be substantial (Wooldridge, 2002; Baltagi, 2005).

The short panel bias could be addressed in a number of ways. The most common way to deal with the problem is to instrument the lagged dependent variable with an appropriate instrumental variable (IV). This approach is employed by Flannery and Rangan (2006) to estimate the speed of adjustment to the target leverage. The authors use a lagged book debt ratio to instrument the lagged dependent variable which is the market debt ratio. Unfortunately, this instrument is not applicable in my case because the majority of firms in my panel is private and market leverage ratio cannot be calculated for them.

Another way to address the short panel bias problem is to apply the Arellano-Bond estimator which has been designed for small-t large-n panels (Wooldridge, 2002). This Generalized Method of Moments (GMM) estimator uses lag levels to instrument for the first differences of endogenous variables, but Blundell and Bond (1998) emphasize that with highly persistent data first-differenced IV or GMM estimators may suffer of the small sample bias due to weak instruments. Blundell and Bond system GMM estimator is designed for persistent panel data and in addition to the lagged level observations uses lagged first differenced observations as instruments for the levels variables. One set of instruments deals with endogeneity of explanatory variables and another set with the correlation between lagged dependent variable and the error term. At the same time, according to Baltagi (2005), the GMM coefficient estimates are only consistent in the absence of second order serial correlation in the differenced residuals. Given that there is no second order serial correlation in my data, I estimate equation (2.11) in first differences using GMM and use the levels of all independent variables at the second lag as instruments.

The dynamic panel estimation results are reported in Table 2.6. It is important to mention that I focus on firms that did not switch between regimes and did not have gaps in their financial history. The estimated speed of adjustment is different for constrained firms (25.5%) and unconstrained firms (38.8%). As expected, unconstrained firms adjust substantially faster towards their targets. This result is consistent with Faulkender et al. (2010) and Leary and Roberts (2005), who argue that the adjustment is not costless. Certainly, unconstrained firms face lower adjustment costs and adjust their leverage frequently, not to drift far away from their targets. A higher adjustment speed for those firms supports this statement. At the same time, it is problematic and costly to attract external financing for constrained firms. They cannot afford to adjust their capital structure frequently and the speed of adjustment is significant: one and a half times lower than for unconstrained firms. This is supported by the data. Figure 2.8 illustrates the ratio of the actual leverage of firms to their target leverage: the closer the ratio is to unity, the closer the firms are to their targets. The ratio pattern of constrained firms reflects the findings of previous studies for transition economies, in particular, that firms in these economies are significantly underleveraged. However, after 2004 when CEE countries became EU members even constrained firms were able to better adjust (not completely, but significantly) their leverage to the optimal level. In the majority of cases we can see an increase in the average leverage of firms, which can be due to the availability of new capital markets.

Ownership Structure of the Firm as a Determinant of Firm Capital Structure

Besides analyzing the stability of capital structure and the variation explained by previously identified determinants, we suggest looking at the ownership structure of the firm as a potentially important determinant of capital structure. The potential link between ownership structure and financial efficiency has been widely accepted.[11] These results could also bring into consideration a link between equity

[11] See Shleifer and Vishny (1986) for the motivation or Estrin et al. (2009) for a recent overview related to the situation in CEE countries.

ownership, firm value, and leverage (see also Brailsford et al. (2002) and Demsetz (1983)). Let us note that US-based studies regarding ownership mostly consider management position as an owner and a reduction of managerial opportunism in the case of managerial share ownership (ibid). On the other hand, studying European firms, for example, could raise ownership concentration issues. European firms tend to be controlled by a majority owner and the remaining shares are held by small investors. The majority owner of the firm is directly interested in the firm's performance and tries to reduce the risk of default through financing choices. Obviously, higher debt levels are more likely to lead to default. However, Shleifer and Vishny (1989) argue that the overall effect of large shareholders on firms could be ambiguous and has to be tested empirically. The main hypothesis explored in the literature is that the key agency costs in firms with concentrated ownership shift from the traditional principal-agent conflict to the dominant shareholder's incentive to consume private benefits at the expense of other minority shareholders.[12]

In order to study the impact of ownership control on leverage, we consider several ownership concentration categories whose impact on firms in CEE markets has been established by Hanousek et al. (2007). Based on an overlap in corporate laws in transition countries we distinguish four ownership categories: majority ownership ($> 50\%$); blocking minority ownership (in some countries > 25, in some $> 33\%$, but in all cases $< 50\%$);[13] and legal minority ownership (in some cases $> 5\%$, in others $> 10\%$, but in all cases < 25 or $< 33\%$).[14] Let us note that we are using country-specific (blocking) minority and legal minority levels.[15]

The ownership categories defined above were not chosen ad hoc. The categories represent certain positions and ownership rights. For example, blocking minority owners have veto rights with respect to the decisions of the majority shareholder concerning changes in assets and the firm's activities. Legal minority ownership gives the possibility to delay or completely block the implementation of larger shareholders' decisions through lengthy court proceedings (Hanousek et al., 2007). Thus, the extent of ownership control has the potential to interfere with firm capital structure.

The concentration of ownership dummies and their interactions reflect the standard conflicts of control between the basic categories of ownership. Therefore, we consider the following interaction categories: 1) majority ownership when a firm is controlled by a majority owner and the remaining shares are dis-

[12]See Shleifer and Vishny (1997) for the first systematic survey of the costs and benefits of large shareholders. Also see Faccio et al. (2001) for the systematic behavioral patterns of outside shareholders in Western Europe and East Asia and Gugler (2003), Gugler and Yurtoglu (2003), and Bena and Hanousek (2008) for studies of the ownership role in firm dividend policy in CEE countries.

[13]According to corporate laws, the Czech Republic, Lithuania, and Slovakia have a 33% threshold and Estonia, Hungary, Latvia, and Poland have a 25% threshold.

[14]5% in Hungary and Slovakia, while others have 10%. The thresholds are taken from corporate laws.

[15]As a robustness check we use 33% and 20% blocking minority thresholds for all countries and obtain qualitatively the same results.

persed, 2) monitored majority ownership when the majority owner is controlled by at least one (legal) minority owner, 3) minority ownership when either a blocking or legal minority owner is the largest owner, 4) dispersed ownership when all shareholders hold less than the legal minority level of equity and some of those shareholders are known, and finally 5) unknown/dispersed ownership when no information on firm ownership has been available. The unknown/dispersed ownership category is chosen as a base (and its effect is in the constant term).[16]

Direct ownership data are available only for 2004. Descriptive statistics of the resulting subsample according to ownership concentration and domicile are presented in Table 2.7 and Table 2.8, respectively. It can be seen that firms with dispersed ownership and foreign firms are the largest in terms of total assets. In fact, median total assets are significantly lower compared to their mean value. This fact suggests that total assets are positively skewed. In other words, the total assets of most firms are low, while the total assets of a few firms are high. However, in terms of profitability, tangibility and leverage level, there are no big differences with respect to ownership concentration or domicile. As I mentioned earlier, the primary motivation for extending the model by ownership category was to reflect the existence of significant and dominant owners in the sample. In the EU context, the interaction between (relatively dispersed) owners and managers widely studied in the literature is transferred to a conflict between different owners characterized by their extent of control. As is shown by several studies, the different extent of control affects EU firm behavior, for example, from a cash flow theory point of view (see Bena and Hanousek (2008) and Gugler and Yurtoglu (2003) among others). To estimate how much of the firm-specific time-invariant component could be explained by the ownership structure of the firm I run the following regression:

$$\eta_i = Ownership_i + \epsilon i, \tag{2.12}$$

Unfortunately, the Amadeus database does not contain the full history of ownership; typically the most recent ownership is recorded. Therefore, I cannot study the dynamic effect of the ownership (change) on firm leverage. I can only estimate the static behavior using the last known ownership concentration as the explanatory variable. The employed version of Amadeus fully covers direct ownership data as of 2004, hence the results are based on information about (direct) firm control as of the end of

[16]Because I have included the category unknown/dispersed ownership I do not have missing observations in the ownership category. Missing information in the original ownership database could have two reasons. It could be due to dispersed ownership or missing information on the ownership structure. Obviously it is not possible to distinguish between these two categories. I can only speculate that for publicly traded firms the missing information would likely be related to dispersed ownership, while for smaller unlisted firms it would likely mean missing information on the actual owners. Nevertheless, for the purpose of this analysis I did not consider further identification of unknown/dispersed ownership and treated all firms in this category the same.

2004.[17]

As can be seen from Table 2.9, adding ownership categories explains only about 3% of the unobserved firm-specific variation. However, accounting for firm ownership structure significantly improves (by 8.7%) the explanatory power of the model in a subsample of unconstrained firms. Moreover, ownership domicile enhances the R^2 by an additional 1%. The story is different for the subsample of constrained firms: ownership adds only 0.8% to the explanatory power of the model. This result is expected, though. Owners of unconstrained firms make capital structure decisions that are optimal and stimulate firms' growth and prosperity, while owners of constrained firms are restricted in their choices by such external forces as credit constraints. This story is also supported by our previous finding of the lower adjustment speed for constrained firms. We are aware of the data limitation that the information on ownership structure available in the database is only the current or latest known. Nevertheless, the latest available ownership structure captures almost 9% of the unexplained firm-specific (fixed effect) variation in leverage, meaning that using annual information on ownership and ownership changes could only increase the portion of the explained unobserved variation. For the robustness check, we impute ownership for 2006, combining the current version of Amadeus with the information we already have, and get almost identical results (available upon request). The total number of observations increased from 13,255 to 23,804 due to better coverage in recent years and the percentage of explained variation by the ownership categories for unconstrained firms is 9.96%. So we believe that the pattern we found is relatively robust. Therefore, it can be concluded that ownership structure in CEE countries plays a quite important role in determining the capital structure decisions of firms.

Conclusion

It has been demonstrated in Chapter 1 that leverage ratios are stable over time even in transition economies that have experienced overwhelming transformation and exogenous shocks (CEE firms went through a transition from central planning to a market economy, privatization, the Russian financial crisis, and EU membership). This paper addresses the impact of credit constraints on capital structure decisions. It has been shown that credit constraints are partially responsible for this surprising stability. Constrained firms are more dependent on firm-specific characteristics that show their ability to repay debt. So, credit constraints restrain firms from significant changes to their capital structure. This is

[17] Using only 2004 ownership data could potentially reverse the causality direction. However, the most complete set of the ownership data are close to the end of the period studied. I have performed a robustness check for those firms for which I have 2000 and 2004 ownership data and the results are similar. Hence I believe that using only 2004 ownership information does not create reverse causality issues.

confirmed by studies of capital structure dynamics in transition countries, which report that firms in these economies tend to be under-leveraged compared to their optimal leverage level and tend to adjust their capital structures more slowly than firms in developed economies (Haas and Peeters, 2006; Nivorozhkin, 2005). Moreover, I find that unconstrained firms adjust their capital structure to the target much faster compared to their constrained counterparts and tend to be slightly over-leveraged, but still close to their target leverage. Constrained firms that are struggling with large asymmetric information often may not be able to raise sufficient capital to run promising projects because financial institutions are eager to have full information about the firm to which they are lending money. However, the quality of the firm and the quality of its investment projects are not always easy to verify. This process often takes time; thus, firms prefer to rely on internal sources, which implies a certain rigidity in their leverage.

Finally, as the majority of the unexplained variation comes from unobserved time-invariant firm characteristics, I analyze the effect of ownership on firm leverage. The typical US/UK firm has a large number of shareholders, but no one investor owns a controlling share of the firm's stock. Thus, no one has control over a given firm and cannot directly monitor or replace the management. In contrast, European firms tend to be managed by a majority owner and the remaining shares are typically held by small investors. In this analysis, I found that direct ownership concentration categories (majority, monitored majority, and minority) can explain about 9% of the unexplained firm-level fixed effect. I speculate that the overall ownership influence on firm capital structure decisions could be even higher. The reason for this could be that direct ownership is likely quite different from ultimate ownership. These differences in the ownership and control patterns might have important implications for firm level decisions. In addition, capital structure decisions might be affected by the type of majority owner. For example, firms owned by a bank may have a higher leverage because financial organizations are more experienced in handling different kinds of risks. At the same time, industrial owners will more likely strive to minimize the risk of default; thus, they stick to the lower leverage level. Hence, a further investigation on the role of ultimate ownership, type of majority owner, and credit constraints in firm capital structure decisions is needed. All of these considerations will need extended data work but can shed light on the role of owners in capital structure decisions.

Notes

Leverage = debt/(debt + equity), where debt=total liabilities - trade credit.

Broad leverage = total liabilities/total assets.

Narrow leverage = debt(long-term and short-term credit)/(debt + shareholder funds).

GDP growth is a proxy for the growth opportunities of the firm.

Age = Log($Year_t$ - year of incorporation).

Log(total assets) is the natural logarithm of the total assets.

Tangibility is tangible assets to total assets.

Profitability is profit to total assets.

Maturity of assets is current assets to total assets.

Corruption Perception Index (CPI) is an index ranging from 0 to 10. A lower value indicates more severe corruption.

Soft Budget Constraints (SBC) equals 1 if the firm is not profitable, but receives positive net bank financing.

Short-run Leverage is short-term debt to total assets.

Long-run Leverage is long-term debt to total assets.

Financial Slack is cash over 1-year lagged total assets.

Growth Opportunities is the percentage change in total assets from the previous to the current year.

Quoted is a dummy variable for listed firms.

Ownership dummies

Majority ownership=1: the firm is solely controlled by a majority owner, no other significant minority owner exists (any minority shareholders control less than 10%).

Monitored Majority ownership=1: in addition to a majority owner, at least one minority owner controls more than 10% of the company.

Minority ownership=1: either a blocking or legal minority owner is the largest owner.

Dispersed ownership=1: no shareholder controls more than 10% of shares.

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Figure 2.1: Institutions firms go to for financing

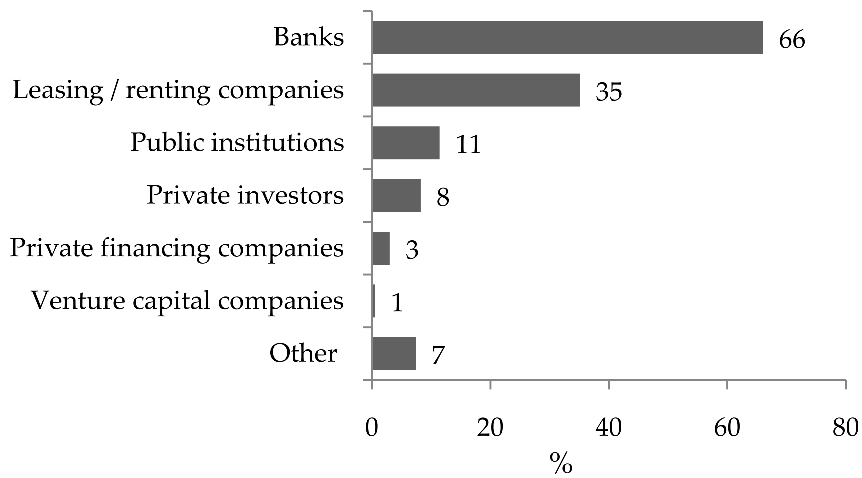

Figure 2.2: The percentage of firms in new EU-10 countries that go to banks to obtain financing by regions

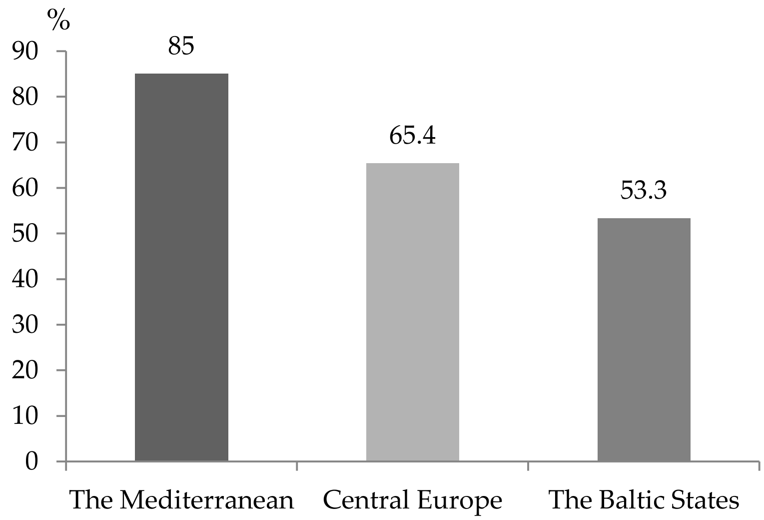

Figure 2.3: Access to financing by countries

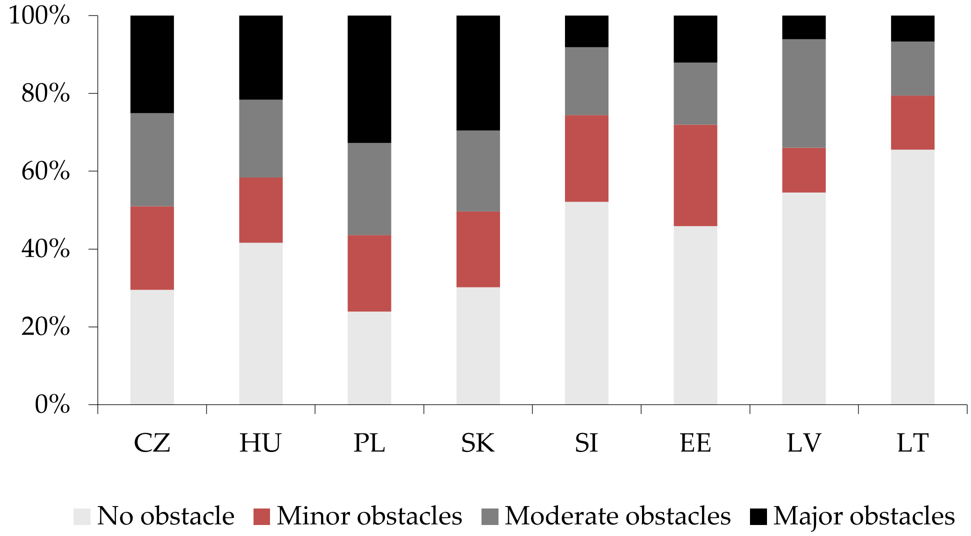

Figure 2.4: The cost of financing by countries

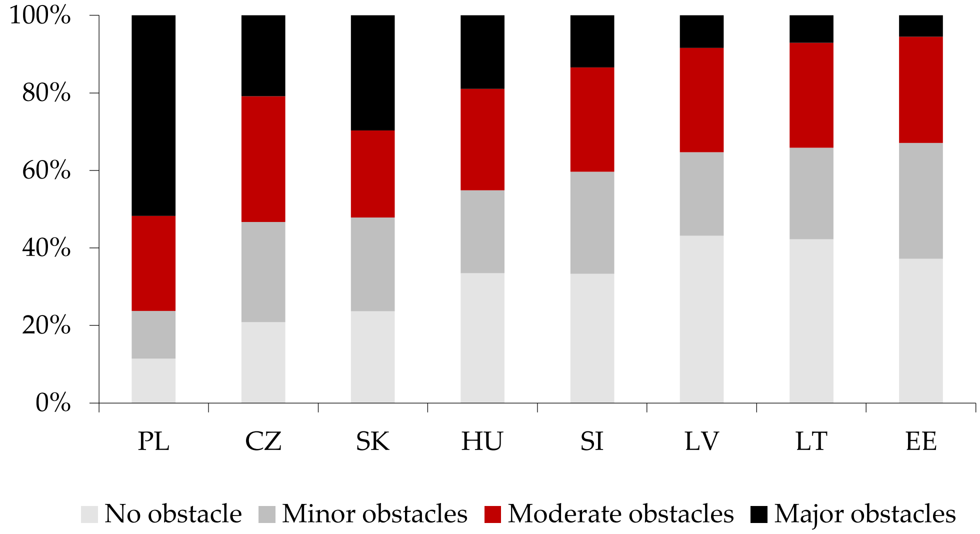

Figure 2.5: Access to finance through banks in new EU-10 countries

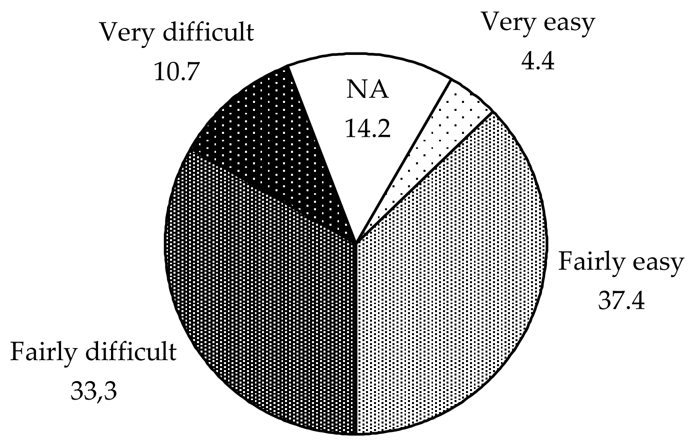

Figure 2.6: Changes in access to finance through banks

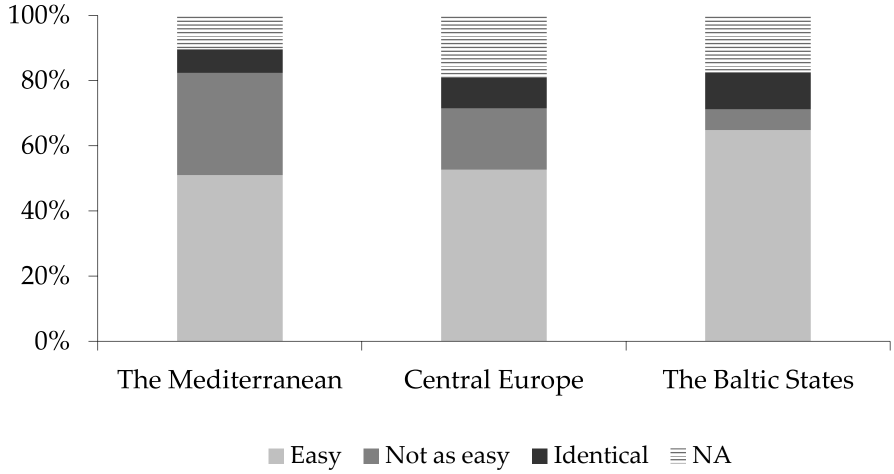

Table 2.1: Summary statistics of principal variables by countries

		Czech Republic	Estonia	Hungary	Lithuania	Latvia	Poland	Slovak Republic
Leverage	Mean	0.50	0.37	0.48	0.44	0.50	0.39	0.43
	St. dev.	0.29	0.30	0.29	0.27	0.28	0.26	0.28
Total Assets	Mean	7.06	0.69	1.57	3.02	3.55	14.50	10.12
	St. dev.	86.87	9.42	101.49	22.15	21.71	107.16	88.40
Profitability	Mean	0.08	0.09	0.09	0.10	0.11	0.09	0.07
	St. dev.	0.20	0.31	0.34	0.17	0.19	0.19	0.16
Tangibility	Mean	0.34	0.39	0.36	0.33	0.35	0.37	0.38
	St. dev.	0.29	0.30	0.28	0.24	0.25	0.27	0.27
Maturity of Assets	Mean	0.63	0.57	0.62	0.64	0.62	0.58	0.58
	St. dev.	0.39	0.30	0.29	0.25	0.26	0.28	0.28
Financial Slack	Mean	0.21	0.32	0.42	0.15	0.14	0.13	0.16
	St. dev.	0.42	0.65	0.84	0.39	0.38	0.31	0.41
Growth Opportunities	Mean	1.32	1.54	1.59	1.63	1.60	1.27	1.32
	St. dev.	1.77	2.41	2.55	2.18	2.39	1.27	1.75
Short-run Leverage	Mean	0.04	0.10	0.01	0.06	0.10	0.07	0.05
	St. dev.	0.10	0.17	0.06	0.11	0.15	0.11	0.09
Long-run Leverage	Mean	0.07	0.08	0.00	0.08	0.16	0.09	0.06
	St. dev.	0.16	0.17	0.03	0.15	0.21	0.14	0.13
Age	Mean	7.48	6.02	5.58	6.69	6.61	17.47	9.03
	St. dev.	4.60	6.08	3.92	3.82	3.56	25.26	8.30

The table reports the summary statistics of the entire sample by countries. Total assets are in millions of USD.

Table 2.2: Sample Separation Criteria

Criteria	Expected effect	Reference
Size	Negative effect	Almeida and Campello (2007) Hobdari et al. (2009) Hovakimian and Titman (2006) Myers and Majluf (1984) Oliner and Redebusch (1992)
Age	Negative effect	Almeida and Campello (2007) Hobdari et al. (2009) Hovakimian and Titman (2006)
Leverage	Positive effect	Almeida and Campello (2007) Hobdari et al. (2009) Hovakimian and Titman (2006) Jensen and Meckling (1976) Myers (1977)
Financial Slack	Positive/ Negative effect	Almeida and Campello (2007) Fazzari et al. (2000) Hovakimian and Titman (2006) Kaplan and Zingales (1997)
Growth Opportunities	Positive effect	Almeida and Campello (2007) Hovakimian and Titman (2006)
Tangibility	Negative effect	Almeida and Campello (2007)
Soft budget constraints	Negative effect	Hobdari et al. (2009)
Quoted	Negative effect	Brav (2009)

Table 2.3: Switching Regression Model

Panel A. Leverage regressions					
	Constrained		Unconstrained		Differences in coefficients (*p-value*)
Log(Total Assets)	0.131***	(0.001)	0.080***	(0.001)	[.000]
Log(Age)	-0.104***	(0.003)	-0.044***	(0.002)	[.000]
Maturity of Assets	0.038***	(0.007)	0.017***	(0.004)	[.012]
Tangibility	0.137***	(0.007)	0.058***	(0.004)	[.000]
Profitability	-0.241***	(0.002)	-0.0004***	(0.000)	[.000]
GDP	0.002***	(0.000)	0.001***	(0.000)	[.015]
Expected inflation	0.010***	(0.000)	0.001***	(0.000)	[.000]
Industry median	0.355***	(0.013)	0.147***	(0.006)	[.000]
CPI	0.024***	(0.003)	-0.002***	(0.001)	[.000]

Panel B. The Selection equation (Probit, Unconstrained=1)			
			Marginal effects
Const	-3.59***	(0.001)	n/a
Log(Total Assets)	0.23***	(0.002)	0.091
Log(Age)	0.45***	(0.004)	0.179
Tangibility	1.17***	(0.004)	0.469
Soft Budget Constraint	-0.22***	(0.000)	-0.089
Short-run Leverage	-1.07***	(0.000)	-0.426
Long-run Leverage	0.12**	(0.000)	0.047
Financial Slack	1.20***	(0.006)	0.478
Growth Opportunities	-0.01***	(0.001)	-0.002
Quoted	-0.06	(0.080)	-0.022
Obs	356,516		

Note: The table reports the parameter estimates from the endogenous switching regression model with unknown sample separation. The book leverage regressions are estimated in first differences and include year dummies to control for fixed-year effects. The leverage is defined as debt over debt plus equity, where debt is equal to total liabilities minus trade credit. Tangibility is defined as tangible assets to total assets. Profitability is equal to profit over total assets. Maturity of assets is current assets over total assets. Median industry leverage is measured as the median leverage of the group defined by the industry code (NACE double digit) and by year. The selection equation is estimated by a probit model, where the dependent variable is an indicator taking a value of one for firms classified as financially unconstrained and zero for firms classified as financially constrained. All independent variables are one-year lagged. A firm is assumed to face soft budget constraints if it is not profitable but receives positive net bank financing. Short-run leverage and long-run leverage are defined as short-term debt and long-term debt, respectively, over total assets. Financial slack is calculated as cash over 1-year lagged total assets. Growth opportunities are proxied by the percentage change in total assets from the previous to the current year. Quoted is a dummy variable for listed firms.
The p-values for the coefficient differences in the two regimes are based on the Wald test.
***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 2.4: Pooled OLS vs. Switching Regression Model

	Pooled OLS		Switching regression			
			Constrained		Unconstrained	
Log(Total Assets)	0.103***	(0.0025)	0.131***	(0.0011)	0.080***	(0.0012)
Log(Age)	-0.117***	(0.0051)	-0.104***	(0.0029)	-0.044***	(0.0023)
Maturity of Assets	0.035***	(0.0090)	0.038***	(0.0067)	0.017***	(0.0043)
Tangibility	0.107	(0.0088)	0.137***	(0.0068)	0.058***	(0.0042)
Profitability	-0.003***	(0.0020)	-0.241***	(0.0021)	0.000***	(0.0001)
GDP	0.001***	(0.0003)	0.002***	(0.0004)	0.001***	(0.0002)
Expected inflation	0.002***	(0.0003)	0.010***	(0.0004)	0.001***	(0.0002)
Industry median	0.272***	(0.0087)	0.355***	(0.0133)	0.147***	(0.0056)
CPI	0.013***	(0.0018)	0.024***	(0.0027)	-0.002***	(0.0012)

Note: The table reports parameter estimates from pooled OLS model and endogenous switching regression models with unknown sample separation. The book leverage regressions are estimated in first differences and include year dummies to control for fixed-year effects. Leverage is defined as debt over debt plus equity, where debt is equal total liabilities minus trade credit. Tangibility is defined as tangible assets to total assets. Profitability is equal to profit over total assets. Maturity of assets is current assets over total assets. The median industry leverage is measured as the median leverage of the group defined by the industry code (NACE double digit) and by year.
***, **, and * denote statistical significance at the 1%, 5%, and 10% level correspondingly.

Figure 2.7: Difference in coefficients

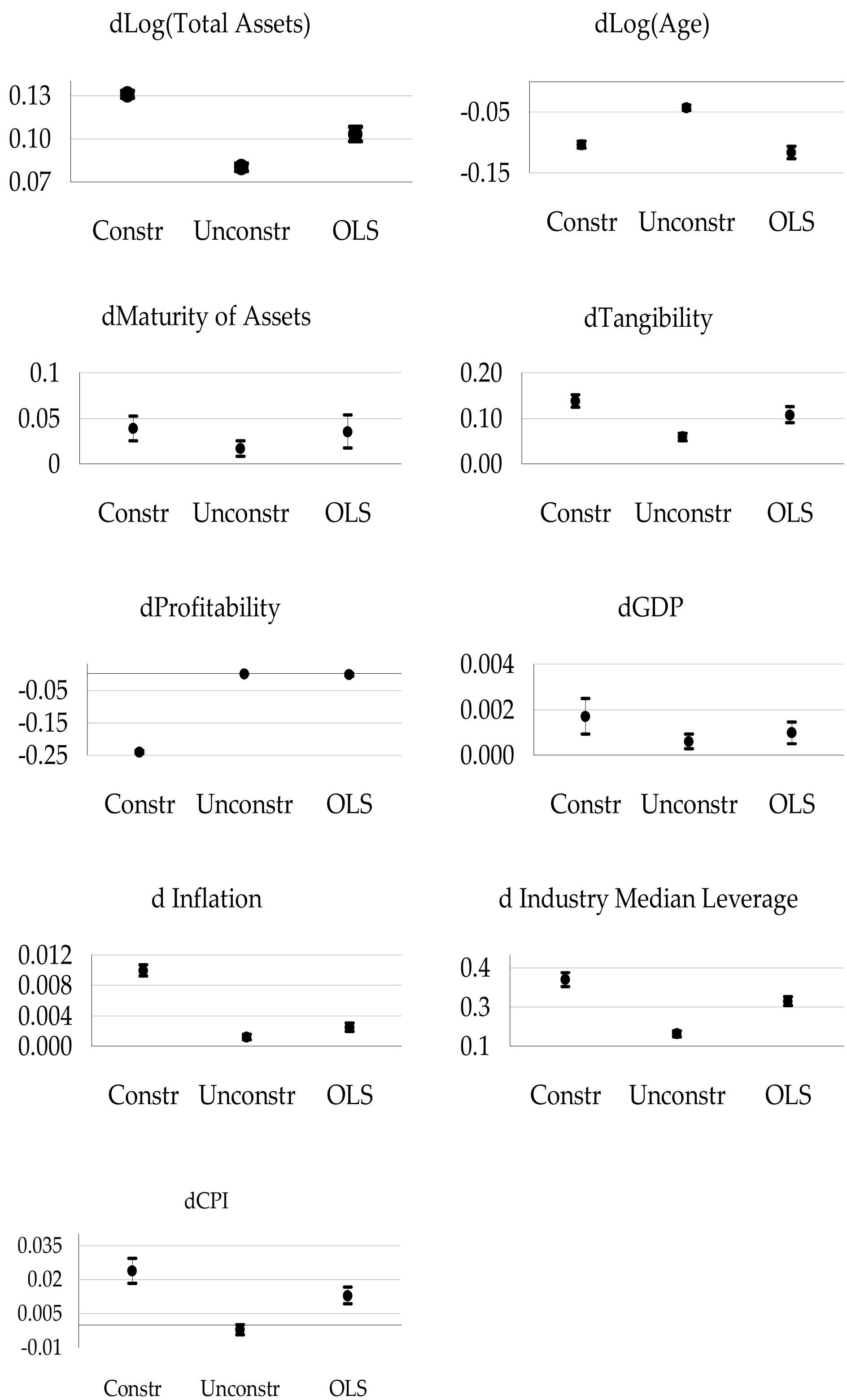

Table 2.5: Pooled OLS regression with *a priori* artificial sample separation

Leverage	Constrained		Unconstrained	
	Panel A			
Log(Total Assets)	0.100***	0.002	0.087***	0.003
Log(Age)	-0.067***	0.004	-0.020***	0.007
Maturity of Assets	0.029**	0.012	-0.034	0.026
Tangibility	0.065***	0.012	0.090***	0.027
Profitability	-0.056**	0.023	-0.002	0.003
GDP	0.001***	0.000	-0.001	0.001
Expected inflation	0.006***	0.000	0.004***	0.001
Industry median	0.220***	0.015	0.251***	0.033
CPI	-0.011***	0.003	-0.003	0.008
Obs	93711		35269	
	Panel B			
Log(Total Assets)	0.091***	0.003	0.133***	0.004
Log(Age)	-0.057***	0.005	-0.032***	0.005
Maturity of Assets	0.035**	0.013	-0.044**	0.019
Tangibility	0.129***	0.015	0.092***	0.018
Profitability	-0.002	0.002	-0.006	0.007
GDP	0.001	0.001	-0.001**	0.001
Expected inflation	0.006***	0.001	0.005***	0.001
Industry median	0.253***	0.030	0.211***	0.023
CPI	-0.001	0.006	0.021***	0.005
Obs	52030		42350	

Note: The table reports parameter estimates from the pooled OLS model. Firms are artificially separated into constrained and unconstrained. The book leverage regressions are estimated in first differences and include year dummies to control for fixed-year effects. Leverage is defined as debt over debt plus equity, where debt is equal to total liabilities minus trade credit. Tangibility is defined as tangible assets to total assets. Profitability is equal to profit over total assets. Maturity of assets is current assets over total assets. Median industry leverage is measured as the median leverage of the group defined by the industry code (NACE double digit) and by year.
***, **, and * denote statistical significance at the 1%, 5%, and 10% level correspondingly.

Table 2.6: Adjustment Speed and Credit Constraints

Book Leverage	Constrained		Unconstrained	
Lag of leverage	0.745***	(0.018)	0.612***	(0.038)
Log(Total Assets)	0.057***	(0.014)	0.058*	(0.027)
Log(Age)	-0.007	(0.012)	-0.005	(0.019)
Maturity of Assets	0.114	(0.122)	-0.275	(0.329)
Tangibility	0.114	(0.115)	-0.215	(0.310)
Profitability	0.152***	(0.046)	-0.016	(0.084)
GDP growth	-0.001	(0.001)	-0.00003	(0.005)
Expected inflation	-0.003***	(0.001)	-0.003	(0.004)
Industry median	0.340***	(0.037)	0.352**	(0.164)
CPI	0.005	(0.005)	-0.010	(0.021)
Wald test	3187.86***		448.76***	
2nd order serial correlation	0.59		0.19	
Obs	52657		43523	
Firms	16,229		19,662	
Adjustment speed	25.5%		38.8%	

Note: The table reports the parameter estimates from a partial adjustment model with firm fixed effects as suggested by Flannery and Rangan (2006). Firms are assigned to constrained and unconstrained categories using the calculated probabilities of the firm to be in either regime from the estimated switching model. The model is estimated in first differences using a GMM, the levels of all independent variables at the second lag are used as instruments. The book leverage regressions are estimated in first differences and include year dummies to control for fixed-year effects. Leverage is defined as debt over debt plus equity, where debt is equal to total liabilities minus trade credit. Tangibility is defined as tangible assets to total assets. Profitability is equal to profit over total assets. Maturity of assets is current assets over total assets. Median industry leverage is measured as the median leverage of the group defined by the industry code (NACE double digit) and by year.
***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Figure 2.8: Leverage to target ratio (L/L*) by country and over time

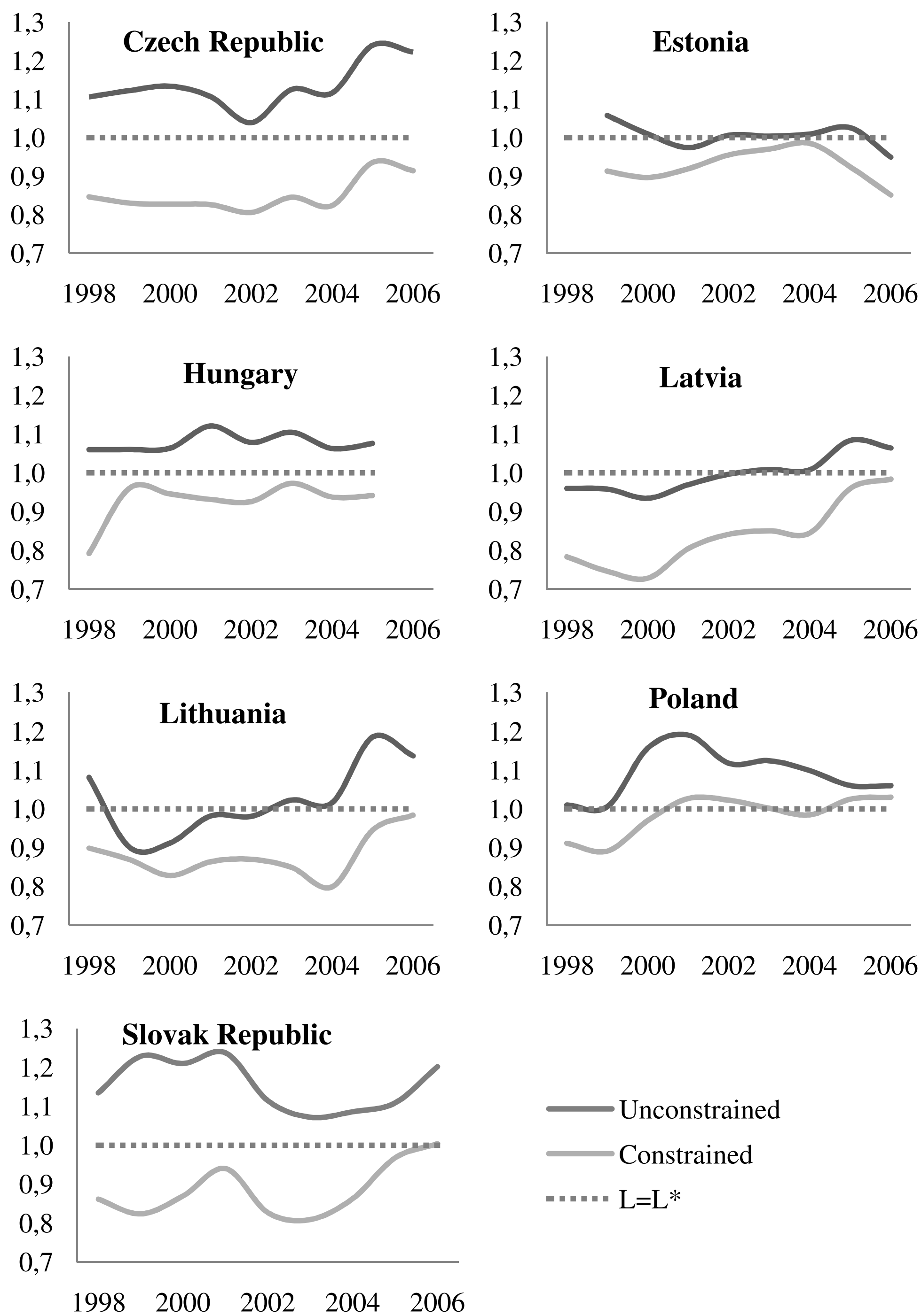

Table 2.7: Summary Statistics by Concentration

		Mean	Median	Std	Obs
Total assets	Majority	28476	3771.4	180000	6,082
(thousands of USD)	Monitored Majority	9662.65	915.5	75706.8	3,404
	Minority	12063.8	1804.11	98145.9	2,300
	Dispersed	32433.2	1751.94	380000	1,469
Leverage	Majority	0.42	0.4	0.26	6,082
	Monitored Majority	0.47	0.46	0.26	3,404
	Minority	0.43	0.41	0.25	2,300
	Dispersed	0.45	0.45	0.25	1,469
Profitability	Majority	0.08	0.06	0.16	6,082
	Monitored Majority	0.09	0.07	0.21	3,404
	Minority	0.09	0.07	0.16	2,300
	Dispersed	0.07	0.06	0.18	1,469
Tangibility	Majority	0.39	0.37	0.28	6,082
	Monitored Majority	0.35	0.31	0.26	3,404
	Minority	0.37	0.35	0.25	2,300
	Dispersed	0.38	0.37	0.26	1,469

Table 2.8: Summary Statistics by Domicile

		Mean	Median	Std	Obs
Total assets	Domestic	15455.1	1517.66	150000	11,530
(thousands of USD)	Foreign	59870.4	11358.8	330000	1,725
Leverage	Domestic	0.44	0.43	0.26	11,530
	Foreign	0.42	0.4	0.26	1,725
Profitability	Domestic	0.08	0.06	0.18	11,530
	Foreign	0.1	0.08	0.15	1,725
Tangibility	Domestic	0.38	0.35	0.27	11,530
	Foreign	0.37	0.37	0.25	1,725

Table 2.9: Financing Constraints and Ownership Structure of the Firm

FE	Constrained		Unconstrained		Total	
Majority	0.016***	(0.003)	0.063***	(0.005)	0.032***	(0.003)
Monitored Majority	0.028***	(0.005)	0.066***	(0.006)	0.049***	(0.004)
Legal Minority	-0.004	(0.006)	0.026***	(0.008)	0.003	(0.005)
Dispersed	-0.003	(0.008)	0.044***	(0.010)	0.017**	(0.006)
R^2	0.0082		0.0868		0.0311	
Obs	7796		5459		13255	
Majority*domestic	-0.002	(0.008)	0.059***	(0.020)	0.002	(0.008)
Majority*foreign	0.047***	(0.007)	0.060***	(0.019)	0.042***	(0.007)
Majority*unknown	0.009**	(0.005)	0.069***	(0.006)	0.036***	(0.004)
Monitored Majority *domestic	-0.018	(0.017)	-0.064**	(0.030)	-0.044***	(0.015)
Monitored Majority *foreign	-0.009	(0.023)	-0.047	(0.048)	-0.036*	(0.021)
Monitored Majority *unknown	0.029***	(0.008)	0.104***	(0.009)	0.066***	(0.006)
Legal Minority *domestic	-0.014	(0.015)	0.023	(0.030)	-0.013	(.013)
Legal Minority *foreign	0.016	(0.023)	-0.055	(0.046)	-0.006	(.021)
Legal Minority *unknown	0.031***	(0.005)	0.084***	(0.006)	0.059***	(.004)
Dispersed*domestic	-0.022	(0.015)	-0.069**	(0.031)	-0.045***	(.014)
Dispersed*foreign	-0.028	(0.023)	-0.072	(0.050)	-0.045**	(.021)
Dispersed*unknown	0.007	(0.007)	0.049***	(0.009)	0.025***	(.006)
R^2	0.0128		0.0969		0.0382	
Obs	7,796		5,459		13,255	

Note: The table reports the parameter estimates from the pooled panel OLS regression of firm fixed effects on ownership structure. Standard errors are corrected for heteroskedasticity and correlation within firms (reported in parentheses). The dependent variable is a firm fixed effect. Independent variables are ownership dummies.
***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Chapter 3

Do mergers and acquisitions affect (change) the capital structure of the firm?[1]

Abstract

Recent research reveals the significant stability of the firm capital structure over long periods of time. This paper assesses the question of capital structure stability in the context of M&A activities. In particular, I focus on the changes in the leverage of acquiring and acquired firms associated with M&As using the difference-in-differences propensity score matching approach. The analysis is based on UK M&As from 1999 to 2007. I find that there are no changes in the leverage of target firms generated by M&As, while the leverage of acquirers increases after the acquisition. This result is expected since acquirers often have to attract additional financing sources to complete the acquisition.

JEL Codes: G32, G34
Keywords: Capital Structure, M&A

[1] All errors remaining in this text are the responsibility of the author.

Introduction

Merger and acquisition (M&A) activities are usually studied from the gains obtained by the target and bidding firms point of view. Scholars mostly concentrate on motives that increase firm profitability, market power, and the firm value as a whole. For example, such capital structure motives as tax benefits, changing capital requirements or a lower cost of capital, wealth transfers and financial slack could incentivize firms to merge. The existing literature provides a good intuition concerning M&A decisions. However, the question of changes in the capital structure of both acquirers and targets induced by M&A activities has not been studied.[2]

Capital structure is believed to be determined by firm-specific characteristics. These six factors are size, growth opportunities, tangibility, profitability, industry median leverage and expected inflation and account for about 27% of the variation in leverage (Frank and Goyal, 2009). At the same time, recent literature argues that the remaining part of unexplained variation is generated by an unobservable firm-specific effect that is liable for remarkable persistence of firm's leverage (Lemmon, Roberts, and Zender, 2008) meaning that the firms' capital structure does not change much over long periods of time. This stability in capital structure is not affected even by the process of becoming an IPO. However, the authors do not consider the case when the firm is acquiring (or acquired by) another company. To demonstrate the point, I consider the following example. In 2005, Telefonica bought the leading fixed line operator in the Czech Republic: Cesky Telecom. Starting from 2006, Cesky Telecom and the mobile operator Eurotel Praha merged into a single telecommunications organization: Telefonica O2 Czech Republic. Telefonica O2 Czech Republic is part of Telefonica O2 Europe within the global Telefonica group. As Telefonica group itself is very high-leveraged (leverage ratio[3] was about 0.82 in 2006 and 0.78 in 2007), it will be reasonable to expect the Head company to move a certain part of leverage to its low-leveraged subsidiary (Telefonica O2 Czech Republic). This leverage transfer will decrease the bankruptcy risk of the Head Company which is consistent with risk diversification behavior. However, the leverage ratio of the acquired company remained virtually unchanged (0.27 in 2007 compared to 0.25 in 2006, and 0.24 in 2005). This example of the Telefonica group suggests that the stability of leverage ratios is mainly not affected by M&A activity, the evidence is not sufficient to jump to conclusions though. Therefore, in this paper I attempt to investigate the question of changes in financial leverage generated by M&As. The existing literature on the topic mostly uses descriptive tests, comparing the

[2]There are a few papers that investigate the question of changes in capital structure due to M&A activities (Shrieves and Pashley, 1984; Bruner, 1988; Ghosh and Jain, 2000). Authors mostly focus on mergers (the resulting leverage of firms is estimated as a weighted average of the acquirer and target) and look at the differences in the leverage between treated and control groups.

[3]The leverage ratio is defined as total debt to total assets.

means of M&A-involved and not involved groups and focuses mostly on mergers (Shrieves and Pashley, 1984; Bruner, 1988; Ghosh and Jain, 2000). Tests provide only informative evidence, which is not conclusive. To estimate the effect of the acquisition on the leverage of both acquiring and target firms, I apply a propensity score matching methodology combined with a difference-in-differences approach to account for unobservable time-invariant, firm-specific characteristics.

The paper proceeds as follows. The next section surveys the literature. In section 3, I describe the data sources and provide summary statistics of the sample. Section 4 explains the econometric methods and discusses the results. I conclude in section 5.

Literature review

The literature on mergers and acquisitions is extensive. Scholars mostly concentrate on merger motives that increase firm profitability, market power, and firm value on the whole. For example, such capital structure motives as tax benefits, changing capital requirements or a lower cost of capital, wealth transfers, and financial slack could incentivize firms to merge. The existing literature provides a good intuition concerning merger and acquisition decisions. However, there are only a few papers that investigate the question of changes in the capital structure of the firm induced by merger and acquisition activity.[4] The question was addressed by Morellec and Zhdanov (2008), who develop a theory that examines the link between capital structure and takeovers. According to their finding, the capital structure of a bidder determines the outcome of the acquisition contest. Specifically, they find that in equilibrium, the bidder with the lowest leverage wins the takeover contest. Other bidders enjoy tax benefits from higher debt. The model also predicts that the leverage of the winning bidder is lower than the average industry leverage but starts increasing after the takeover. Theoretical predictions of the model are consistent with the empirical findings of Bruner (1988); Ghosh and Jain (2000); and Uysal (2010). For example, Uysal (2010) studies the role of deviation from the firm's target leverage ratio in making an acquisition decision. The author uses firm-level data from the Standard and Poor's Compustat Annual files, SDC Mergers and Acquisitions Database (1991-2004) and applies a two-step estimation procedure to estimate the likelihood of making an acquisition, the number of acquisitions and the ratio of transaction value to total assets using a leverage deficit (the difference between the target and actual leverage ratio). He finds that deviations from the target leverage ratio affect the likelihood of acquisition (i.e., an increase in the target leverage ratio decreases the probability and frequency of acquisitions). However, Uysal (2010) does not answer the question whether the leverage of the firm changes after the

[4]Morellec and Zhdanov (2008); Shrieves and Pashley (1984); Bruner (1988); Ghosh and Jain (2000); and Uysal (2010).

merger/acquisition.

The question of changes in leverage induced by mergers has been addressed by Auerbach and Reishus (1988c); Shrieves and Pashley (1984); Bruner (1988); and Ghosh and Jain (2000). Auerbach and Reishus (1988a) test the idea that the merger decision is driven by the potential tax benefits; thus, the leverage is expected to increase after the merger. The authors calculated the leverage ratio (long term debt to sum of long-term debt and equity) for two years before and after the merger and find only a slight increase in the resulting leverage ratio (from 30 to 31.9%). Of course Auerbach and Reishus (1988b) did not separate between changes related to a merger and economy-wide decrease in leverage. However, Auerbach and Reishus's (1988c) paper takes into account this shortcoming and employs a control group of pseudo mergers (similar firms that were not merged). The authors report that the difference between means of treated and control groups is not significant, except for a subset where firms acquire similar-sized targets. For this subset, merged firms have a higher leverage than non-merged.

Shrieves and Pashley (1984) test the latent debt capacity, the increased debt capacity, and the coinsurance wealth transfer theories that predict an increase in leverage after the merger. They consider three leverage measures[5] calculated for each of the three years before and after the merger. Then leverage is compared across acquiring and merged firms. Moreover, they introduce three control groups and match firms by time period, industry category (SIC) and asset size. This allows to control for industry factors and capital market conditions that might have an effect on the leverage. Shrieves and Pashley (1984) find that for the treated group of merging firms, the leverage did not increase, and at the same time, for the control group of merging firms, leverage decreases. The relative leverage increase in the treated group compared to the control group is consistent with the latent debt capacity and coinsurance wealth transfer theories. However, the authors find no significant differences in the means between the treated and control groups of acquired firms in the pre-merger period. This finding contradicts the latent debt capacity hypothesis that predicts lower leverage ratios for acquired firms.

Both the Auerbach and Reishus (1988c) and Shrieves and Pashley (1984) studies support the idea of the existence of merger-related incentives associated with the increase of financial leverage. They mention tax benefits but do not isolate tax considerations on leverage from the effect of other determinants. Bruner (1988) sets up a hypothesis that an attempt to adjust capital structure could be considered as a motive for a merger. The author investigates whether the leverage of acquiring firms and targets differ and whether acquiring firms change their leverage around the merger. He finds that acquiring firms

[5] (1) the ratio of long-term debt to total assets, (2) the ratio of long-term debt plus the debt portion of current liabilities to total assets, and (3) the ratio of interest expense to earnings before depreciation, interest, and taxes.

are significantly under-leveraged[6], but target firms are significantly over-leveraged before the merger compared to the control sample.

The finding of Bruner (1988) that acquiring firms are significantly under-leveraged before mergers compared to control firms is consistent with Ghosh and Jain (2000); Uysal (2010); and Harford, Klasa, and Walcott (2009). Ghosh and Jain (2000) investigate whether the firms' financial leverage increases after the merger. They consider the increase in leverage due to (1) an increase in debt capacity or/ and (2) a utilization of unused debt capacity of both a target and an acquiring firm before the merger. The authors report that financial leverage increases significantly after the merger. This increase is mainly explained by an increase in debt capacity. Merged firms fully utilize an increase in debt capacity by taking on more debt. There is only weak support that the increase in leverage is explained by exhausting unused debt capacity in the period before the merger. Harford et al. (2009) also find a positive relation between the merger and the actual leverage of the firm but explain the increase in the leverage of the combined firm by a change in its optimal (target) leverage. The authors report that the resulting firm adjusts its capital structure to the optimal level within several years after the merger.

The existing literature provides an exhaustive analysis of changes in the leverage generated by mergers. They find the leverage of a combined firm to be higher than the leverage of a firm from the control sample. However, it is not clear whether this increase in leverage is generated by excessive borrowing of the acquirer to complete the acquisition or by the additional borrowing of target right after the acquisition. In this paper, I address the question of changes in leverage induced by M&As from both the acquirer and target sides using their unconsolidated financial information before and after the M&A treatment.

Data

Data on M&As are obtained from the Zephyr database collected by the Bureau van Dijk. The database contains M&A, IPO and venture capital deals with links to detailed financial company information. There is information on over 140,000 transactions with approximately 60,000 new deals added per year. Moreover, there is no minimum deal value for a transaction to be included into the database. Zephyr has five years of global coverage but has pan-European deals going back to 1997. Analysis is based on UK M&As from 1999 to 2007. As the main purpose of the study is to estimate the effect of M&A on the leverage stability, I omit firms which participated in multiple M&As and those which were both an acquirer and a target during the considered period. Further I combine the information from Zephyr with the firm-level data from Amadeus to collect the accounting data of acquirers and targets before

[6]This finding contradicts earlier studies; for example, Shrieves and Pashley (1984).

and after the acquisition. Again, to estimate the effect of M&A activities on the capital structure of the firm, I keep only those treated firms that continue to report their unconsolidated financial information after the acquisition.

Moreover, I exclude from the sample firms with missing financial information for key variables. To control for possible outliers all key variables are winsorized at 1% and 99%. Holding companies, public sector firms as well as financial firms are also excluded due to their specific liability structure and output and/or sales definition. The resulting sample of M&As is presented in Table 3.1 and contains 587 acquirers and 649 targets, while the control group of domestic firms that have not been the target nor the acquirer is 706,953 firms.

The acquiring firms on average are bigger in size, older, have higher leverage and lower sales than both the target firms and the firms from the control group, while the target firms are less leveraged and profitable. This observation is consistent with the theory: credit constrained firms with low liquidity and no profitable investment opportunities can be subject to takeover (Powell, 1997; Stevens, 1973). At the same time, acquiring firms are the oldest in the sample and most likely lack growth opportunities. To compensate for the lack of growth, they may decide to acquire rapidly growing firms that lack financial resources. Table 3.2 reports the descriptive statistics for the acquiring, target, and control firms.

Estimation and Results

Means Differences

The effect of M&A activities on the capital structure of a firm could be investigated in a number of ways. I start with studying changes in the leverage around M&As. I compare the leverage of targets and acquirers in the pre-acquisition period with their corresponding leverage after the acquisition. The results are summarized in Table 3.3. It can be seen that for acquirers the mean leverage is 0.32 and it stays relatively stable prior to acquisition (year t). However after year t, it increases to 0.37. Formal testing of three- and two-year averages of the leverage before and after the acquisition confirms that the differences are statistically significant. A different pattern is observed for the leverage of targets. There are no big differences before and after the acquisition, only a slight decrease around year t. Formal testing of leverage averages (three- and two-year) confirms that takeover does not generate significant differences in the leverage of the target.

To take into account that the leverage can be affected by industry-specific factors (e.g. some industries are more capital-intensive than the others) and trends, I analyze the industry-adjusted leverage (Table 3.4). The mean leverage of acquirers before the acquisition is slightly lower than the industry mean; however, right after, it rises significantly. Conducted t-tests for three- and two-year averages also confirm the observed pattern. Unlike acquirers, the leverage of targets does not seem to change over time. Targets stay significantly under-leveraged compared to the industry average leverage. No significant differences between three- and two-year averages of the targets' leverage before and after the acquisition are detected by t-tests.

These tests provide us with a broad picture on the changes in leverage generated by M&A activities. However, this informative evidence is not plausible because the M&A decisions are not made at random, but rather they are considered decisions. To evaluate the impact of M&A activities on the capital structure of the firm, I would like to compare the leverage of the firm that participated in M&A with an identical firm with no M&A activity.

Difference-in-differences Matching Estimation

Let $A \in 0, 1$ be an indicator equal to 1 for the acquired firms and equal to 0 for non-acquired firms. Let y^1_{it+s} then be the leverage of a firm participating in M&A (a target or acquiring firm) at time $t + s$ (s periods after the acquisition, $s \geq 0$) and y^0_{it+s} be the leverage of the non-acquired/ non-acquiring firm. Then, the effect of the acquisition will be $y^1_{it+s} - y^0_{it+s}$. The problem is both states cannot be observed at the same time. However, under the assumption that there are no differences between M&A-treated and non-treated firms unless there is a takeover, the average effect of the M&A activities on the treated firms' leverage (the average treatment effect on the treated) will be defined as

$$\begin{aligned} E[y^1_{it+s} - y^0_{it+s}|A = 1] = E[y^1_{it+s}|A = 1] - E[y^0_{it+s}|A = 0] - \\ - (E[y^0_{it+s}|A = 1] - E[y^0_{it+s}|A = 0]), \end{aligned} \tag{3.1}$$

where $(E[y^0_{it+s}|A = 1] - E[y^0_{it+s}|A = 0]) = 0$ if the assignment to the treatment is random. As I noted earlier, M&A decisions are highly unlikely to be made randomly, and I use the propensity score matching technique to match firms that participated in M&As with non-participants based on the observable characteristics. The underlying assumption under this procedure is called the conditional independence assumption or selection on observables.

$$E[y^0_{it+s}|Z, A = 1] = E[y^0_{it+s}|Z, A = 0] = E[y^0_{it+s}|Z], \tag{3.2}$$

where Z is the vector of observable characteristics.

A large vector of observable characteristics might be a problem if 'exact' matching is applied; however, the adoption of the propensity score method reduces the dimensionality problem (Rosenbaum and Rubin, 1983). The propensity score is estimated by probit.

$$P(A = 1) = F(Z_{it-1}), \tag{3.3}$$

where Z is a vector of observable firm characteristics prior to the acquisition.[7] Despite firm-specific characteristics, I also include industry dummies (2-digit NACE codes) to control for differences in technological opportunities (e.g. innovations) and other industry-specific characteristics and time dummies to control for macroeconomic factors (e.g. exchange rate fluctuations), and waves of M&As that may affect M&A activity.

The results of probit in Table 3.6 indicate that the probability of acquisition increases with the size and amount of intangible assets. This is consistent with the theory, larger firms usually have better access to financial sources but lack growth opportunities, and to compensate for this, they acquire rapidly growing and financially constrained firms. This claim is also supported by the negative relations between the probability of making an acquisition and sales because growing sales may imply higher growth opportunities (Paleru, 1986). High leverage also contributes negatively to the acquisition likelihood. In some sense, the leverage of the firm is an indicator of its financial health, and high leverage signals that the firm is not profitable enough to finance its own activities. The same holds for targets: The probability of being acquired decreases with a firm's leverage. High leverage reduces a target's ability to issue additional debt, which means lower gains from an acquisition. Also, the likelihood of being acquired decreases with increase in sales, liquidity, and age.

When the propensity score is estimated meaning that all the observable differences between M&A-affected and control groups are taken into account, the wise choice of matching the algorithm becomes essential. There are methods that construct the counterfactual outcome using only few observations from the control group (nearest neighbor and caliper matching) and those that use the one-to-many matching algorithm that weights untreated observations depending on the closeness of the match (kernel and local linear regression matching). There is no algorithm which dominates in all data situations, and the choice involves the trade-off between bias and efficiency and largely depends on the data

[7] In the choice of firm-specific variables that may affect M&A activity, I rely on previous empirical studies. For the comprehensive surveys of M&A motives literature see Hughes, Mueller, and Singh (1980); Jensen and Ruback (1983) and Scherer and Ross (1990). Firm-specific characteristics I use for matching and their expected signs are summarized in Table 3.5.

sample.[8] However, Frolich (2004) shows that kernel and LLR matching are more precise than other matching methods and are relatively insensitive to the underlying data distributions because more information is used to construct a counterfactual outcome (leverage).

In my analysis, I focus on LLR matching because, according to Fan and Gubels (1996), LLR is asymptotically more efficient than kernel matching. The propensity score is included to the conditional expectations function to control for its slope. This is important when parts of the function are highly sloped, which can bias the counterfactual (Reynolds and DesJardins, 2009). So, LLR reduces bias but does not increase the variance. Moreover, it avoids the boundary effect of the kernel regression (Fan, 1992).

In the next step, I combine matching with difference-in-differences (DID) analysis. Smith and Todd (2005b) demonstrate that the DID matching estimator performs substantially better than cross-sectional matching estimators because the differences in outcomes can be determined by the presence of time-invariant unobservable characteristics, which affect the choice of firm for acquisition, i.e., technological or organizational advantages, but they are successfully eliminated by using the DID matching estimator. Moreover, this estimator does not assume a functional form on estimating the conditional expectation of the outcome variable, and the weights of the observations are computed using kernel matching or a local linear weight function. Being a matching estimator, it does not require exogeneity of regressors, separability of outcomes nor exclusion restrictions.

However, the disadvantage of the DID propensity score matching estimator is the longitudinal data requirement. The data should be available before and after the treatment. In addition, the biggest problem of all matching estimators is their sensitivity to the choice of conditioning variables. The wrong choice of conditioning variables may result in even larger bias. To minimize potential bias, it is necessary to test the basic assumptions underlying the propensity score matching. One way to do it is to examine the standardized differences which are defined as follows (Rosenbaum and Rubin, 1985; Smith and Todd, 2005a):

$$SDIFF(Z_k) = 100\frac{\frac{1}{n_1}\sum_{i\in I_1}[Z_{ki} - \sum_{j\in I_0} w(i,j)Z_{kj}]}{\sqrt{\frac{var_{i\in I_1}(Z_{ki}) + var_{j\in I_0}(Z_{ki})}{2}}} \tag{3.4}$$

where n_1 is the number of firms participating in M&As.

The standardized differences measure the differences between the treated and matched comparison groups scaled by the average variances of the considered variable in the original samples. The success of the matching procedure is documented in Table 3.8 and Table 3.9 for acquirers and targets respectively. p-values for matched variables indicate that the equality of treated and control groups hypothesis can not be rejected. Therefore, there is no significant differences in the distribution of chosen observable

[8]For a detailed discussion of different matching techniques, see Caliendo and Kopeinig (2008) and Smith and Todd (2005b).

characteristics after matching.

The difference-in-differences LLR matching is performed using the psmatch2 procedure implemented by Leuven and Sianesi (2003). Standard errors are obtained using bootstrapping methods.

Table 3.7 reports the average treatment effect on treated firms or, in other words, the effect of M&A on the leverage of firms participating in M&As compared to the leverage of firms with no M&A activities. There are two types of treated firms. Acquirers are firms, who initiate the acquisition and targets are firms that have been acquired. It can be seen that, in line with previously conducted mean tests, the leverage of acquirers significantly increases and stays elevated in subsequent years after the acquisition. This finding is consistent with the theoretical prediction of the Morellec and Zhdanov (2008) model, as well as Bruner (1988) and Ghosh and Jain's (2000) and Uysal's (2010) empirical findings. The increase in the leverage of acquirers is directly connected to the acquisition financing decision that includes not only additional borrowing to purchase the target's stock, but also additional borrowing over the integration period. For example, one year subsequent to the acquisition, acquiring firms have leverage 0.0503 times higher when compared to non-acquiring firms. The difference decreases slightly in three years after the acquisition to 0.0415. Harford et al. (2009) confirm that acquisitions financed with debt lead to acquirers being over-leveraged subsequently to the deal, but then in five years, they significantly reduce leverage back toward their target level. At the same time, the acquisition-related increase in leverage does not increase a firm's riskiness as total assets of an acquired firm could be used as collateral (Lewellen, 1971). Moreover, additional debt may also help to reduce agency costs (Jensen and Meckling, 1976) and stimulate improved managers' performance (Jensen, 1986) that translates into better firm performance. This claim is confirmed by Yook (2003) and Ghosh and Jain (2000), who find that debt-financed acquisitions yield higher returns.

The result is different for the leverage of targets. The acquisition does not generate any significant changes in their leverage. The same conclusion has been drawn when analyzing the sub-sample of target firms using mean tests. This finding should be interpreted with a caution. On the one hand, the result is expected and consistent with the Telefonica example because it confirms the stability of the capital structure despite the treatment. On the other hand, target firms considered in the analysis are quite specific. In essence even after the acquisition, they remain free-standing entities, some of them remain listed on the stock market and continue to publish their unconsolidated financial reports. Taking into account the specific nature of these target firms, one can speculate about the intentions of firms buying them. In addition to strategic motives well-explored in the M&A literature (see Gaughan, 2010, pp. 125-180 for the review), M&As could also pursue more prosaic goals such as the risk of default reduction. As could be seen from Table 3.2, the average leverage of acquiring firms is higher than the leverage of targets (0.35 compared to 0.27). Therefore, an acquisition of a low-leveraged target may cause only a slight increase or even a reduction in the consolidated leverage of a combined firm.[9] An acquired target also generates free cash redistributed by the controlling company. The literature reveals that this process is usually accompanied by an expropriation of small shareholders (income shifting, Morck, Stangeland, and Yeung (2000), tunneling Johnson et al. (2000)) and the entrenchment of large shareholders. However, free cash extraction could be seen as a part of the corporate control story. Similar to debt, the reduction of free cash at a manager's disposal lowers his/her incentives to engage in non-maximizing activities, increases the pressure to perform (Jensen, 1986) and prevents him/her from empire building (Stulz, 1990). Extracted cash could be used by a controlling firm to pay its debt and lower its leverage level to improve the survival and stability of the controlling firm.

Conclusion

The paper analyzes the effect of M&A activities on the capital structure of UK firms in 1999-2006 and provides empirical evidence on the changes in the leverage of firms associated with those activities. Changes in the leverage of both acquiring and acquired firms are studied. Using the Zephyr database merged with Amadeus, I identify those firms which even after an acquisition continue to report their unconsolidated financial information. This is important because only the combined firm leverage has been analyzed by previous studies. I find that M&A activity causes a significant increase in the leverage of acquiring firms. It is possible that the increase in leverage is the result of additional borrowing needed to complete the acquisition and to incorporate a target into the organizational structure of the acquirer. Higher post-acquisition leverage though does not increase the probability of default due to increased debt capacity. In other words, to insure debt repayment, the acquiring firm could use the assets of its target as collateral.

At the same time, acquisitions are found to have no effect on the leverage of targets meaning that a controlling company is not interested in changing the target's capital structure. At the same time, the controlling company is definitely interested in the target's performance. According to the theory, additional debt helps to stimulate performance. Most likely, additional debt is considered dangerous since the acquiring firm is already over-leveraged. Therefore, the controlling firm could also reduce the amount of free cash at a manager's disposal to increase the pressure on management to perform. Free cash redistribution helps the controlling company to repay its debt as well as increase the per-

[9] Unfortunately, I cannot assess the question of consolidated leverage changes due to the lack of data.

formance of the target. From this perspective, it is interesting to study whether M&A activity affects consolidated leverage when the acquiring firm is a part of a business group. Business groups are quite specific because they have an internal capital market and could redistribute profit within the group. Moreover, they likely maximize the value of the group and optimize its capital structure. Therefore, making acquisitions could be a part of the leverage rebalancing process to its optimal level.

Notes

Leverage = (long-term debt + short-term debt)/Total Assets

Size=Log(Total Assets)

Sales=Sales/Total Assets

Free Cash Flow=cash flow/total assets

Liquidity = (current assets - stocks)/current liabilities

Tangibility = tangible fixed assets/total assets

Intangibility=intangible assets/total assets

Age=year-year of incorporation

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Table 3.1: The number of M&A deals by year

year	Acquirers	Targets	Control group
1999	10	15	61508
2000	16	45	68242
2001	48	64	72033
2002	92	95	78 864
2003	75	8	84 425
2004	77	88	85 669
2005	103	93	88 397
2006	90	114	85 699
2007	76	51	82 116
Total	587	649	706 953

Table 3.2: Descriptive Statistics

	Acquiring Firms			Control Firms			Target Firms		
Variable	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Leverage	587	0.35	0.26	706 953	0.33	0.29	649	0.27	0.24
Size	587	16.68	1.70	706 953	13.37	2.37	649	15.94	1.56
Liquidity	565	1.47	2.31	692 013	2.43	6.50	631	1.65	3.72
Sales	452	0.004	0.01	487 087	0.02	0.05	544	0.01	0.01
Age	587	25.49	22.40	706 953	16.48	17.74	649	21.96	22.01
Free Cash Flow	544	0.10	0.15	583 902	0.18	0.33	616	0.10	0.21
Intangibility	564	0.04	0.11	665 316	0.02	0.09	631	0.03	0.10
Tangibility	582	0.25	0.25	669 807	0.37	0.33	642	0.30	0.28
Profit	587	0.05	0.19	706 953	0.08	0.48	649	0.04	0.27

Table 3.3: A comparison of leverage around M&A: Unadjusted leverage

	Acquiring Firms				Target Firms			
Year	Obs	Mean leverage	Median leverage	StDev	Obs	Mean leverage	Median leverage	StDev
t-3	367	0.32	0.28	0.25	336	0.28	0.23	0.24
t-2	462	0.32	0.27	0.25	460	0.29	0.23	0.24
t-1	577	0.33	0.30	0.26	630	0.28	0.21	0.24
t	587	0.35	0.32	0.26	649	0.27	0.19	0.24
t+1	502	0.37	0.33	0.26	582	0.27	0.21	0.25
t+2	357	0.36	0.33	0.26	372	0.29	0.23	0.26
t+3	233	0.36	0.33	0.26	238	0.30	0.23	0.25
Averages:								
	Period -3 to -1		0.33		Period -3 to -1		0.28	
	Period +1 to +3		0.36		Period +1 to +3		0.28	
		T-statistics	-3.5369***		T-statistics		-0.1907	
	Period -2 to -1		0.33		Period -2 to -1		0.28	
	Period +1 to +2		0.36		Period +1 to +2		0.28	
		T-statistics	-3.0322***			T-statistics	0.0474	

Table 3.4: A comparison of leverage around M&A: Industry-adjusted leverage

	Acquiring Firms				Target Firms			
Year	Obs	Mean leverage	Median leverage	StDev	Obs	Mean leverage	Median leverage	StDev
t-3	367	-0.01	-0.04	0.25	336	-0.04	-0.09	0.24
t-2	462	-0.01	-0.04	0.25	460	-0.04	-0.08	0.24
t-1	577	0.01	-0.04	0.26	630	-0.05	-0.10	0.24
t	587	0.03	-0.01	0.25	649	-0.05	-0.11	0.24
t+1	502	0.05	0.02	0.26	582	-0.04	-0.10	0.25
t+2	357	0.04	0.02	0.25	372	-0.03	-0.08	0.26
t+3	233	0.04	0.01	0.25	238	-0.02	-0.08	0.26
Averages:								
	Period -3 to -1		-0.001		Period -3 to -1		-0.042	
	Period +1 to +3		0.045		Period +1 to +3		-0.032	
		T-statistics	-4.4759***		T-statistics		-0.9965	
	Period -2 to -1		0.001		Period -2 to -1		-0.042	
	Period +1 to +2		0.045		Period +1 to +2		-0.036	
		T-statistics	-3.7494***			T-statistics	-0.5710	

Table 3.5: The determinants of M&A activity

Determinant	Likelihood that a firm acquires	Sign	Likelihood that a firm is acquired	Sign
Firm size: Total Assets Sales	The likelihood of making an acquisition increases with firm size (Blonigen and Taylor, 2000 and Lehto and Lehtoranta, 2003).	+	The transaction costs associated with an acquisition increase as size of the target increases (Paleru 1986, Powell 1997). Financing constraints also may prevent firms from being taken over (Rege, 1984; Machlin, Choe, and Miles, 1993; Dickerson, Gibson, and Tsakalotos, 2002). However, Dickerson et al. (2002), Ali-Yrkko et al. (2005) report positive relations.	±
Leverage	The probability to make an acquisiton decreases as the leverage of the acquirer increases because high debt limits the ability of the acquirer to raise financing when it is necessary to complete the acquisition or effectively integrate the target to the acquirer's organizational structure, etc. (Hall, 1990a, 1994; Hoskisson and Hitt, 1994: 65-66; Hitt et al., 1996), while better performing firms with strong financial positions are more likely to acquire (Jensen, 1988; Lehto and Lehtoranta, 2004).	−	The high leverage of target reduces a target's ability to issue additional debt, which might be to the acquirer's interest. Also, debt covenants may restrain the power of the acquiring firm in managing target's assets. All these consequences of high leverage negatively affect the gain from the acquisition and decrease the likelihood of acquisition (Stulz, 1988).	−

Agency costs: Free cash flow Liquidity	According to Jensen (1988), better performing firms will also have a higher cash flow. An excess of free cash flow or high liquidity will cause managers to engage in unprofitable acquisitions at shareholders' expense. The empirical literature confirms that cash rich firms are more likely to make value decreasing diversifying acquisitions (Harford, 1999; Seth, Song, and Pettit, 2000; Uysal, 2007; Martynova and Renneboog, 2008). However, Stevens (1973) reports negative relations, and Powell (1997) and Dickerson et al. (2002) find no statistically significant relations.	$\pm$, 0	Low liquidity of the firm is associated with a higher probability of takeover because it needs external funds to finance its working capital requirement and the acquirer could be the source of these funds (Powell, 1997). However, firms with an excess of cash and no profitable investment opportunities can be an easy target for takeover (Stevens, 1973; Simkowitz and Monroe, 1971).	$\pm$
Tangible Assets	High tangibility means a high debt capacity (Stulz and Johnson, 1985): The likelihood of acquisition increases as tangible assets can be used as collateral to obtain credit.	$+$	A high ratio of tangible assets means greater debt capacity (Stulz and Johnson, 1985) of the firm and makes it a more desirable target for the acquirer. At the same time, tangible assets could be easily valued, which rules away disagreement about the value of the firm making it more expensive for acquisition. Empirical evidence of the effect of tangibility on the likelihood of acquisition is mixed. Ambrose and Megginson (1992), Powell (1997), Ali-Yrkko et al. (2005) report a positive correlation, while Dickerson et al. (2002) find a negative relation.	$\pm$

Intangible Assets	A firm with large intangible assets (e.g. know-how) may decide to get involved in acquisition in cases where the sale or lease of such knowledge is inefficient (Seth et al., 2000). Inefficiency comes from extensive transaction costs that reduce the value of information (e.g., Williamson, 1971; Rugman, 1982; Casson, 1987). Therefore, a firm may decide in favour of expansion to use proprietary information within the organization.	$+$	Unlike tangibles, intangible assets are difficult to value and this disagreement about the value of the firm and the potential high returns through the acquisition will drive M&A activity (Gort, 1969).	$+$
Firm Maturity: Age	Mature firms are more wealthy and are more likely decide to obtain innovations through an acquisition rather than make innovations themselves (Lehto and Lehtoranta, 2004).	$+$	Mature firms are less attractive for acquisitions especially if the acquirer seeks for the growth (Schwartz, 1982). At the same time, a mature target requires less monitoring; thus, the probability of being acquired may increase with age (Lehto, 2004).	$\pm$

Table 3.6: Propensity Score Estimation

	Targets		Acquirers	
	dy/dx	Std. Err.	dy/dx	Std. Err.
Size	0.000193***	(0.000)	0.000217***	(0.000)
Leverage	-0.000733***	(0.000)	-0.000305***	(0.000)
Liquidity	-0.000074***	(0.000)	-0.000040***	(0.000)
Sales	-0.011663***	(0.003)	-0.003913*	(0.002)
Age	-0.000010***	(0.000)	0.000002	(0.000)
Age^2	0.000000***	(0.000)	-0.00000004	(0.000)
Free Cash Flow	-0.000146	(0.000)	0.000079	(0.000)
Intangibility	0.000255	(0.000)	0.000341**	(0.000)
Tangibility	-0.000077	(0.000)	-0.000330***	(0.000)
Observations	315,308		311,755	
N firms	103130		101967	
Pseudo R^2	0.1204		0.1534	

The model is estimated by probit. All determinants are lagged one year to avoid a potential endogeneity problem. Industry and time dummies are also included but not reported. For the determinant definitions see Appendix.
***, **, and * denote statistical significance at the 1%, 5%, and 10% level correspondingly.

Table 3.7: The average effect of M&A activities on firms' leverage

		Acquirers		Targets	
t+1		0.0503***	(0.008)	-0.0109	(0.010)
	N treated	398		458	
	N untreated	246,434		249,141	
t+2		0.0421***	(0.012)	-0.0046	(0.013)
	N treated	277		329	
	N untreated	173,451		180,489	
t+3		0.0415***	(0.014)	0.0040	(0.015)
	N treated	192		226	
	N untreated	121,475		126,127	

Table 3.8: Balancing Test: Acquirers

		Mean		% reduct		t-test	
Variable	Sample	Treated	Control	% bias	|bias|	t	p-value
_pscore	Unmatched	0.008	0.002	97.6		37.13	0.000
	Matched	0.008	0.008	0.0	100.0	0.00	**0.999**
Size	Unmatched	16.561	13.66	144.4		25.80	0.000
	Matched	16.561	16.523	1.9	98.7	0.30	**0.766**
Leverage	Unmatched	0.327	0.325	0.6		0.11	0.911
	Matched	0.327	0.319	2.7	-379.5	0.38	**0.702**
Liquidity	Unmatched	1.339	1.607	-9.6		-1.42	0.155
	Matched	1.339	1.244	3.4	64.8	1.17	**0.243**
Sales	Unmatched	0.005	0.016	-64.7		-10.03	0.000
	Matched	0.005	0.004	4.5	93.0	1.14	**0.255**
Age	Unmatched	26.45	19.477	34.1		7.38	0.000
	Matched	26.45	25.369	5.3	84.5	0.73	**0.467**
Age^2	Unmatched	1182.1	733.44	25.4		5.73	0.000
	Matched	1182.1	1035.4	8.3	67.3	1.16	**0.247**
Free Cash Flow	Unmatched	0.103	0.172	-30.4		-4.72	0.000
	Matched	0.103	0.099	1.5	95.2	0.34	**0.736**
Intangibility	Unmatched	0.041	0.023	17.7		3.90	0.000
	Matched	0.041	0.039	1.3	92.5	0.17	**0.869**
Tangibility	Unmatched	0.267	0.371	-37.6		-6.79	0.000
	Matched	0.267	0.274	-2.4	93.6	-0.38	**0.707**

Table 3.9: Balancing Test: Targets

		Mean		% reduct		t-test	
Variable	Sample	Treated	Control	% bias	|bias|	t	p-value
_pscore	Unmatched	0.006	0.002	96.4		28.00	0.000
	Matched	0.006	0.006	0.0	100.0	0.00	**1.000**
Size	Unmatched	15.877	13.672	112.8		21.02	0.000
	Matched	15.877	15.862	0.8	99.3	0.13	**0.894**
Leverage	Unmatched	0.281	0.325	-17.4		-3.53	0.000
	Matched	0.281	0.278	1.3	92.4	0.21	**0.830**
Liquidity	Unmatched	1.243	1.611	-13.2		-2.09	0.037
	Matched	1.243	1.272	-1.0	92.2	-0.34	**0.732**
Sales	Unmatched	0.006	0.016	-58.5		-9.75	0.000
	Matched	0.006	0.006	1.6	97.2	0.42	**0.675**
Age	Unmatched	22.854	19.392	16.8		3.95	0.000
	Matched	22.854	21.945	4.4	73.8	0.62	**0.536**
Age^2	Unmatched	1019.700	726.160	16.1		4.05	0.000
	Matched	1019.700	967.030	2.9	82.1	0.38	**0.706**
Free Cash Flow	Unmatched	0.108	0.171	-27.4		-4.61	0.000
	Matched	0.108	0.100	3.8	86.1	1.02	**0.308**
Intangibility	Unmatched	0.036	0.023	13.5		3.05	0.002
	Matched	0.036	0.032	3.7	72.7	0.52	**0.605**
Tangibility	Unmatched	0.324	0.371	-16.1		-3.24	0.001
	Matched	0.324	0.321	1.1	92.9	0.18	**0.859**