A Stubborn Persistence: Is the Stability of Leverage Ratios Determined by the Stability of the Economy?

Jan Hanousek* and Anastasiya Shamshur**

Abstract

The choice of capital structure 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. This stability of leverage ratios is mainly generated by an unobserved firm-specific effect that is liable for the majority of the variation in capital structure. We demonstrate that even substantial changes in the economic environment do not affect the stability of firms' leverage due to the presence of credit 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 subsample 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.

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

---

* CERGE-EI, Charles University and the Academy of Sciences, Prague, Czech Republic; Anglo-American University, Prague; Center for Organizational Dynamics, University of Pennsylvania; e-mail: jan.hanousek@cerge-ei.cz.

** CERGE-EI, Charles University and the Academy of Sciences, Prague, Czech Republic; email: anastasiya.shamshur@cerge-ei.cz

Corresponding address: CERGE-EI, Politickych veznu 7, P.O. Box 882, 111 21 Prague, Czech Republic. Phone (+420) 224005119, fax: (+420) 224005333.

1. Introduction and Motivation

The choice of capital structure is an important decision for a firm because it affects the maximization of profit and impacts the firm's ability to successfully operate in a competitive environment. An extensive literature covers the choice of capital structure by firms and includes influential contributions by De Jong and Van Dijk (2007), Frank and Goyal (2009), Rajan and Zingales (1995), and Titman and Wessels (1988) to name a few.

According to a recent finding, the capital structure of firms remains almost unchanged during their lives, meaning that leverage ratios are significantly stable over time (Lemmon et al., 2008). The behavior of leverage ratios is to some extent driven by six determinants identified by Frank and Goyal (2009). However, the stability of the leverage ratios is mainly generated by an unobserved firm-specific effect that is liable for the majority of the variation in capital structure (Lemmon et al., 2008).

Specifically Lemmon et al. (2008) show that traditional leverage determinants explain a minor part of the variation in leverage (at most 30%), while 60% remains unexplained. As the authors focus on the US economy, which is relatively stable over time,[1] it is not clear whether leverage ratios exhibit a similar level of persistence when the economic environment changes rapidly over time. The impact of substantial changes in the economy on capital structure stability has not been studied yet.[2] To answer this question we will use data from European emerging markets that were exposed to a higher degree of instability due to a major transformation of their economies and several external shocks.[3] 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 central planning system to a market-oriented economy. They undertook massive privatization schemes that were the cornerstone of the reconstruction of their whole economic system (Estrin at al., 2009). Large-scale privatizations started the rebuilding of

[1] Lemmon et al. (2008) use a sample that consists of all non-financial firm-year observations between 1963 and 2003. This time span includes the US savings and loan crisis in the 1980s and the dot-com bubble. However, neither of these crises caused a deep recession in or depression of production and investment in the economy as a whole. The financial sector was stabilized and continued growing after the infusion of funds. So, neither crisis dramatically affected the capital structure of firms.

[2] In the US context, it could be investigated how the capital structure of firms changes in response to the financial crisis of 2008.

[3] The average leverage by country and over time is plotted on Figure 1. We 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 leads to a narrow leverage reduction (Rajan and Zingales, 1995). Therefore, our primary measure of leverage excludes trade credit. It can be seen from Figure 1 that leverage is more volatile than narrow leverage.

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 application of 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.[4]

The Russian financial crisis occurred in August 1998, and mostly hit 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 trade decline and exchange rate pressures. Second, the majority of firms were affected by an increase in interest rates and a decrease in equity prices. Figure 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 our primary leverage measure) that started roughly (depending on the country) in 1998 and continued till 2002.[5]

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[6] 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 our data: overall, the average leverage started to increase after EU accession. The positive dynamics persist in Latvia, Lithuania, and Poland (see Figure 1).

In terms of methodology, our approach differs from the existing studies by focusing on the question of capital structure stability and its sources.[7] We investigate whether the capital

[4] 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.

[5] Our 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.

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

[7] There are only a few papers that attempt to study the capital structure of firms in transition economies. For example, Cornelli, Portes, and Schaffer (1996); Delcoure (2007); and Joeveer (2006) focus on capital structure

structure of firms in Eastern and Central European countries exhibits a similar level of persistence as in the US or rather actively changes in response to economic evolution. We are aware that credit constraints and a lack of internal resources may restrain firms from changing their capital structure and pay special attention to this scenario. In addition, we attempt to investigate to what extent the ownership structure is able to explain the unexplained firm-specific variation in 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 firm capital structure in countries with concentrated ownership.

The paper is organized as follows. The next section describes the data sources and provides the summary statistics of the sample. The model and results are presented in Section 3, while Section 4 summarizes and concludes the paper.

2. 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. In this study we use data from a module containing about one million companies in 41 European countries. We focus on seven Eastern European countries (the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, and Slovakia) in 1996–2006.[8]

In our dataset, we require that all key variables have non-missing values. In addition, we keep only firms that have a leverage ratio between zero and one. 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, we 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.

---

determinants and found firms to behave differently, e.g., there are negative relations between asset tangibility and leverage. Haas and Peeters (2006) and Nivorozhkin (2005) employ a dynamic capital structure model and report firms to be significantly underleveraged.

[8] We would like to thank the Organizational Dynamics Graduate Studies Program at the University of Pennsylvania for access to this dataset.

Observations where capital is negative are excluded as well.[9] The definitions of all variables used are presented in the 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.

[INSERT TABLE 1 ABOUT HERE]

The mean leverage in all countries is in the 40 percent range, however, it is lower in Estonia (0.37) 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 in assets is larger than their median return. This implies that 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 firms in our sample is about 7 years.

3. Model and results

3.1. The Determinants of Leverage in Transition Economies

As a starting point for studying the determinants of leverage ratios we use cross-sectional regressions similar to those in Rajan and Zingales (1995) and Frank and Goyal (2009).

$$Y_{ijt} = \alpha + \beta X_{ijt-1} + \upsilon_t + \gamma_j + \varepsilon_{ijt}, \qquad (1)$$

where Y_{ijt} is the leverage[10] of firm i in country j at time t; X is a set of leverage determinants;[11] v is a time fixed effect and ε is a random error term. Since the residuals of a given firm can be correlated across years (unobserved firm effect) and the sample contains more firms than years, an appropriate method is to include dummy variables for each time period and each country and then cluster by firm. Using this approach requires year and firm effects to be unchanged over time. When the year effect is fixed, time dummies will remove the correlation

[9] If we consider as the full population firms without missing values in key financial indicators (capital, current assets, current liabilities, operating profit/loss, and tangible fixed assets), we would lose by the cleaning procedure about 19 percent of the sample size. However, if we consider as a realistic starting point only firms that have non-negative tangible fixed assets (or non-negative capital) our cleaning procedure would reduce the total sample size by less than 5 percent.

[10] In our choice of leverage definition we assume that in the region trade credit is a major component of the total liabilities that is not used for financing purposes. Hence the leverage measure used in the results presented below is a compromise between two leverage measures that are widely used in the literature: broad leverage and narrow leverage. Nevertheless, we also used broad leverage defined as total liabilities over total assets as a robustness check; the results were similar in terms of sign, magnitude, and significance. The results are available upon request.

[11] The leverage determinants suggested by the theory and by recent studies of capital structure as well as their expected signs in transition economies are summarized in Table 2.

between observations in the same time period and only the firm effect will be in the data. The assumption of a fixed firm effect is quite fair because we have a short panel where it is impossible to distinguish between permanent and temporary firm effects (Petersen, 2009).

[**INSERT TABLE 2 ABOUT HERE**]

Our results are presented in Table 3. To control for scale effects, all variables are divided by total assets. In addition, explanatory variables are lagged one period to control for potential endogeneity issues.[12]

[INSERT TABLE 3 ABOUT HERE]

In the first column we present the core determinants of firms' leverage ratios identified by previous studies (Frank and Goyal, 2009; Rajan and Zingales, 1995).[13] The six factors — size, tangibility, profitability opportunities, growth opportunities, industry median leverage, and expected inflation — account for only eight percent of the variation in capital structure. In general, the results are similar to previous studies on transition economies. The size of the firm and GDP growth have a positive and highly significant effect. Tangibility is positively related to leverage, but significant only at the 10% level. However, it appears that profitability is insignificant, while the industry median leverage and expected inflation have a strong positive effect on leverage.

In the second column we present a more extensive specification by adding firm age, maturity of assets, Corruption Perception Index (CPI), and a dummy for listed firms. The age of the firm is negatively related to the leverage ratio (contrary to Haas and Peeters, 2006 but consistent with Brav, 2009), nevertheless the overall effect we observe in our sample is relatively marginal. A negative sign might seem counterintuitive because in mature markets, which are usually characterized by low asymmetric information, older firms are better known and more transparent and also have a reputation and hence better access to credit. However, in the context of transition economies a negative sign could reflect increasing information asymmetries. In this case, older firms may choose to finance their operations from their internal sources, while the other firms have to employ expensive external sources. The listing dummy is negatively related to leverage and highly significant, which is consistent with Brav

[12] Related studies of leverage determinants in transition economies (Delcoure, 2007 and 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.

(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 in line with studies from developed economies, while expected inflation loses its significance.

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

In order to look at the differences in leverage between public and private firms, we conduct an analysis based on the firm's status. The results are presented in Table 4.

[INSERT TABLE 4 ABOUT HERE]

We 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 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

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

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.

3.2. How much of the Variation in Leverage is Firm-specific and 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 firm fixed effect regression explains about sixty percent of the variation. In order to investigate whether the fixed effect is responsible for the majority of the variation in leverage in transition economies, we run the following regression (Lemmon et al., 2008).

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

$$u_{ijt} = \rho u_{ijt-1} + w_{ijt}, \qquad (2)$$

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

We start with estimating the leverage regression by pooled OLS, fixed effect and random effect models for listed and unlisted firms. Table 5 contains the obtained results.

[INSERT TABLE 5 ABOUT HERE]

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) we do not see a strong economic significance. This suggests that the overall macro effect is captured primarily by the firm level effect and that 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, we 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 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, we proceed to further investigate the leverage stability sources.

3.3. Where Does the Stability Come from?

The traditional leverage model itself does not take into account that a firm could be heavily dependent on the availability of external finance 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 presence of credit constraints might be responsible for the observed stability in firms' capital structure, we separate between financially constrained and unconstrained firms using an endogenous switching regression

[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, there exists a threat that 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.

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).

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

$$\begin{aligned} Y_{1ijt} &= \beta_1 X_{ijt} + \varepsilon_{1ijt}, \\ Y_{2ijt} &= \beta_2 X_{ijt} + \varepsilon_{2ijt}, \\ y^*_{ijt} &= \delta Z_{ijt} + u_{ijt}, \end{aligned} \tag{3}$$

where Y_{ijt} is the 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 (3) are leverage regressions for constrained and unconstrained regimes, and the selection equation $y^*_{ijt} = \delta Z_{ijt} + u_{ijt}$ estimates the likelihood of the firm to operate in 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 regime occurs when y^*_{ijt} reaches a certain unobservable threshold value. So, the status of the firm might change over time.

The selection rule is defined as:

$$\begin{aligned} Y_{ijt} &= Y_{1ijt}, \text{ iff } y^*_{ijt} < 0, \\ Y_{ijt} &= Y_{2ijt}, \text{ iff } y^*_{ijt} \geq 0 \end{aligned} \tag{4}$$

The parameters β_1, β_2, and δ are 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.

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

where σ_u^2 is normalized to 1, because from the switching regression it is only possible to estimate δ/σ_u, not δ and σ_u separately. It is also assumed 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 7). 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 the 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 firm's regime is not directly observable we calculate the probabilities of the firm to be constrained or unconstrained:

$$\text{Prob}\,(Y_{ijt} = Y_{1ijt}) = \text{Prob}(\delta Z_{ijt} + u_{ijt} < 0) = \text{Prob}\,(u_{ijt} < -\delta Z_{ijt}) = \Phi(-\delta Z_{ijt}),$$

$$\text{Prob}\,(Y_{ijt} = Y_{2ijt}) = \text{Prob}(\delta Z_{ijt} + u_{ijt} \geq 0) = \text{Prob}\,(u_{ijt} \geq -\delta Z_{ijt}) = 1-\Phi(-\delta Z_{ijt}) \quad (5)$$

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

$$l_{ijt} = \Phi(-\delta Z_{ijt})\phi(\varepsilon_{1ijt} | u_{ijt} < -\delta Z_{ijt}) + [1-\Phi(-\delta Z_{ijt})]\phi(\varepsilon_{2ijt} | u_{ijt} \geq -\delta Z_{ijt}). \quad (6)$$

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

$$\ln L = \sum_{i=1}^{N}\sum_{j=1}^{M}\sum_{t=1}^{T} \ln \left\{ \Phi\left(\frac{-\delta Z_{ijt} - \frac{\sigma_{1u}}{\sigma_1^2}\varepsilon_{1ijt}}{\sqrt{1-\frac{\sigma_{1u}^2}{\sigma_1^2}}} \right) \phi\left(\varepsilon_{1ijt}, \sigma_1\right) + \left[1 - \Phi\left(\frac{-\delta Z_{ijt} - \frac{\sigma_{2u}}{\sigma_2^2}\varepsilon_{2ijt}}{\sqrt{1-\frac{\sigma_{2u}^2}{\sigma_2^2}}} \right) \right] \phi\left(\varepsilon_{2ijt}, \sigma_2\right) \right\}, \quad (7)$$

where $\phi(\cdot)$ is the normal density distribution and $\Phi(\cdot)$ is the normal cumulative distribution function.

We start with firm-specific factors that could be associated with the presence of financial constraints. The switching regression approach allows using multiple variables to predict whether a firm is constrained or unconstrained.[16] Following the existing investment literature we employed similar sets of variables as those used by Almeida and Campello (2007), Hobdari et al. (2009), and Hovakimian and Titman (2006) to identify financial constraints in the context of transition economies. Table 6 briefly summarizes the determinants we find 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 and the leverage regressions are estimated in first differences to account for fixed effects. Year dummies are also included to control for fixed-year effects. As in the previous sections the model is estimated over the period 1996–2006.

[16] 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 multiple indicators helps to assess the existence of credit constraints more carefully.

Table 7 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. 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.[17] Financially constrained firms receive help from the government in the form of direct government subsidies without the expectation of future repayment or in

[17] 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.

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 proposition we estimate a pooled OLS model which could be considered as the constrained model in the sense that the coefficients of two leverage regressions for two different regimes are equal.[18] In most cases the estimates of the pooled OLS model are between the 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.[19]

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.

3.4. Do Constrained and Unconstrained Firms Adjust their Capital Structures Differently?

In this section we attempt to analyze the differences in the adjustment speed between constrained and unconstrained firms. It has been shown that the determinants of capital structure differ across firms with respect to their access to external finance. When a 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 to one group and then estimate the dynamic capital structure model for each group separately.

[18] The results of the regression are not reported because of space considerations, but they are available upon request.

[19] We follow the suggestions of Goldfeld and Quandt (1976) and use $\chi 2$ 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 $\chi 2$ distribution at the 1% level with 38 degrees of freedom is 61.16 and the value of the likelihood ratio test is 89220.

We 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.

$$Y^*_{ijt} = \beta X_{ijt-1} + \upsilon_i, \quad (8)$$

where Y^*_{ijt} is a target or optimal leverage of the firm and vector X_{ijt-1} contains one-year lagged leverage determinants found to be important in transition economies. Specifically, we include size of the firm, firm age, the maturity of assets, tangibility, profitability, GDP, expected inflation, CPI, and the industry median leverage.[20] Firm fixed effects (υ_i) are included into the regression to capture the unobserved firm heterogeneity documented by Lemmon et al. (2008) for the US.

Second, to capture the dynamic adjustments in leverage ratios, a partial adjustment model is estimated (Flannery and Rangan, 2006; Hovakimian et al., 2001).

$$Y_{ijt} - Y_{ijt-1} = \lambda(Y^*_{ijt} - Y_{ijt-1}) + \varepsilon_{ijt}, \quad (9)$$

where $Y_{ijt} - Y_{ijt-1}$ is the actual change in a firm's leverage, $Y^*_{ijt} - Y_{ijt-1}$ is the distance between the firm's leverage and its target leverage, and λ captures the speed of adjustment to the target leverage ratio.

Combining (8) and (9) we get

$$Y_{ijt} = (\lambda\beta)X_{ijt} + (1-\lambda)Y_{ijt-1} + \lambda\upsilon_i + \varepsilon_{ijt}. \quad (10)$$

Equation (10) is estimated in first differences using GMM and the levels of all independent variables at the second lag are used as instruments. The dynamic panel estimation results are reported in Table 8. It is important to mention that we 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. (2008) 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 illustrates the ratio of the actual leverage of firms to their target leverage: the closer the ratio is to unity, the closer the

[20] For a detailed discussion of leverage determinants and their expected relationships with target leverage see Haas and Peeters (2006).

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.[21] 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.

3.5. 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.[22] These results could also bring into consideration a link between equity 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.[23]

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

[21] Haas and Peeters (2006) and Nivorozhkin (2004) do not separate constrained and unconstrained firms and find that firms in transition economies are substantially underleveraged.
[22] See Shleifer and Vishny (1986) for the motivation or Estrin at al. (2009) for a recent overview related to the situation in CEE countries.
[23] 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.

countries we distinguish four ownership categories: majority ownership (>50%); blocking minority ownership (in some countries >25, in some >33%, but in all cases <50%);[24] and legal minority ownership (in some cases >5%, in others >10%, but in all cases < 25 or <33%).[25] Let us note that we are using country-specific (blocking) minority and legal minority levels.[26]

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 dispersed, 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).[27]

Direct ownership data are available only for 2004. Descriptive statistics of the resulting subsample according to ownership concentration and domicile are presented in Table 9 and Table 10, respectively.

[INSERT TABLE 9 ABOUT HERE]

[24] According to corporate laws, the Czech Republic, Lithuania, and Slovakia have a 33% threshold and Estonia, Hungary, Latvia, and Poland have a 25% threshold.
[25] 5% in Hungary and Slovakia, while others have 10%. The thresholds are taken from corporate laws.
[26] As a robustness check we use 33% and 20% blocking minority thresholds for all countries and obtain qualitatively the same results.
[27] Because we have included the category unknown/dispersed ownership we 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 we were not able to distinguish between these two categories. We 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 our analysis we did not consider further identification of unknown/dispersed ownership and treated all firms in this category the same.

[INSERT TABLE 10 ABOUT HERE]

It can be seen from Table 9 and Table 10 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 we mentioned earlier, our primary motivation for extending the model by ownership category was to reflect the existence of significant and dominant owners in our 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, 2006 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 we run the following regression:

$$\eta_i = Ownership_i + \varepsilon_{i.}$$

Unfortunately, the AMADEUS database does not contain the full history of ownership; typically the most recent ownership is recorded. Therefore, we cannot study the dynamic effect of the ownership (change) on firm leverage. We 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 our results are based on information about (direct) firm control as of the end of 2004.[28]

Table 11 reports the obtained results.

[INSERT TABLE 11 ABOUT HERE]

We report estimates from the regression discussed above for constrained firms, unconstrained firms, and the full sample. As can be seen from Table 11, adding ownership categories explains only about 3% of the unobserved firm-specific variation. However,

[28] 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. We have performed a robustness check for those firms for which we have 2000 and 2004 ownership data and the results are similar. Hence we believe that using only 2004 ownership information does not create reverse causality issues.

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.

4. Conclusion

Inspired by the recent findings of Lemmon et al. (2008) concerning capital structure stability in the US, we use a comprehensive database of firms in transition countries to study whether the significant stability in the leverage ratios is determined by the stability of the economic environment. First, we 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 percentage 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 traditional determinants. However, listed companies represent only about 1% of the entire sample. The obtained coefficient estimates are in line with estimates reported in earlier studies in transition

economies (Delcoure, 2007; Joeveer, 2006). At the same time, the variation explained by traditional determinants in transition economies is lower than in developed economies.

Second, we focus on the question of capital structure stability. As mentioned above, leverage ratios are stable over time in the US economy. Obviously, transition economies are different from the US economy. They have experienced overwhelming transformation and exogenous shocks. Although Central and Eastern European firms went through a 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. This means that the capital structure of firms has not been affected by substantial economic transformations. 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 in capital structure. This is confirmed by studies of capital structure dynamics in transition countries, which report that firms in these economies tend to be underleveraged 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, we have demonstrated that unconstrained firms adjust their capital structure to the target much faster compared to their constrained counterparts and tend to be slightly overleveraged, 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 quality of its investment projects is 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, we analyzed 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 our analysis we found that direct ownership concentration categories (majority, monitored majority, and minority) can explain about 9% of the unexplained firm-level fixed effect. We speculate that that the overall ownership influence on the firm capital structure decision 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 higher leverage because financial organizations are more experienced in handling different kinds of risks. At the same time, industrial owners more likely will strive to minimize the risk of default, thus, they stick to the lower leverage level. Hence, further investigation of 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.

Appendix

Definitions of variables

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.

References

Almeida, H., Campello, M., 2007. Financial constraints, asset tangibility, and corporate investment. Rev. Financ. Stud. 20, 1429–1460.

Backe, P., Fidrmuc, J., 2000. The impact of Russian crisis on selected Central and Eastern European Countries, in: Komulainen, T., Korhonen, I. (Eds.), Russian Crisis and Its Effects. Kikimora Publications, Helsinki, pp. 199–238.

Bena, J., Hanousek, J., 2008. Rent extraction by large shareholders evidence using dividend policy in the Czech Republic? Finance Úver 58, 106–130.

Brailsford, T., Oliver, B., Pua, S., 2002. On the relation between ownership structure and capital structure. Account. Finance 42, 1–26.

Brav, O., 2009. Access to capital, capital structure, and the funding of the firm. J. Finance 64, 263–308.

Cornelli, F., Portes, R., Schaffer, M., 1996. The capital structure of firms in Central and Eastern Europe. CEPR Discussion Paper 1392.

De Jong, A., Van Dijk, R., 2007. Determinants of leverage and agency problems: a regression approach with survey data. Europ. J. Finance 13, 565-593.

Delcoure, N., 2007. The determinants of capital structure in transitional economies. Int. Rev. Econ. Finance 16, 400–415.

Demsetz, H., 1983. The structure of ownership and the theory of the firm. J. Law Econ. 26, 375–390.

Estrin, S., Hanousek, J., Kočenda, E., Svejnar, J., 2009. Effects of privatization and ownership in transition economies. J. Econ. Lit. 47(3), 1–31.

Faccio, M., Lang, L., Young, L., 2001. Dividends and expropriation. Amer. Econ. Rev. 91, 54–78.

Fan, J., Titman, S., Twite, G., 2008. An international comparison of capital structure and debt maturity choices. AFA 2005 Philadelphia Meetings.

Faulkender, M., Flannery, M., Hankins, K. and Smith, J., 2010. Cash flows and leverage adjustments. AFA 2008 New Orleans Meetings Paper.

Fazzari, S.R., Hubbard, G., Petersen, B., 2000. Investment-cash flow sensitivities are useful: a comment on Kaplan and Zingales, Quart. J. Econ. 115, 695–706.

Flannery, M., Rangan, K., 2006. Partial adjustment toward target capital structures. J. Financ. Econ. 79, 469-506.

Frank, M. Z., and Goyal, V. K., 2009. Capital structure decisions: which factors are reliably important? Finan. Manage. 38, 1-37.

Goldfeld, S., Quandt, R., 1976. Techniques for estimating switching regressions, in: Goldfeld, S., Quandt, R. (Eds.), Studies in Nonlinear Estimation. Ballinger Publishing Co., Cambridge, Mass., pp. 3-36.

Grosfeld, I., and Roland, G., 1997. Defensive and strategic restructuring in Central European enterprises. Journal of Transforming Economies and Societies 3, 21-46.

Gugler, K., 2003. Corporate governance, dividend payout policy, and the interrelation between dividends, R&D, and capital investment. J. Banking Finance 27, 1297–1321.

Gugler, K., Yurtoglu, B., 2003. Corporate governance and dividend pay-out policy in Germany. Europ. Econ. Rev. 47, 731–758.

Haas, R., Peeters, M., 2006. The dynamic adjustment towards target capital structure of firms in transition economies. Econ. Transition 14, 133-169.

Hanousek, J., Kočenda, E., Svejnar, J., 2007. Origin and concentration: corporate ownership, control and performance in firms after privatization. Econ. Transition 15 (1), 1-31.

Heyman, D., Deloof, M., Ooghe, H., 2008. The financial structure of private held Belgian firms. Small Bus. Econ. 30, 301-313.

Hobdari, B., Derek, C. J., Mygind, N., 2009. Capital investment and determinants of financial constraints in Estonia. Econ. Systems 33, 344-359.

Hol, S. and N. Van der Wijst, 2008. The financial structure of nonlisted firms. Appl. Finan. Econ. 18, 559-568.

Hovakimian, A., Opler, T., Titman, S., 2001. Debt-equity choice. J. Financ. Quant. Anal. 36, 1-24.

Hovakimian, G., Titman, S., 2006. Corporate investment with financial constraints: sensitivity of investment to funds from voluntary asset sales. J. Money, Credit, Banking 38, 357-374.

Jensen, M. C., 1986. Agency costs of free cash flow, corporate finance, and takeovers. Amer. Econ. Rev. 76, 323-329.

Jensen, M.C., Meckling, W., 1976. Theory of the firm: managerial behavior, agency costs and ownership structure. J. Financ. Econ. 3, 305-360.

Joeveer, K., 2006. Sources of capital structure: evidence from transition countries. CERGE-EI Working Paper 306.

Kaplan, S., Zingales, L., 1997. Do investment-cash flow sensitivities provide useful measures of financing constraints? Quart. J. Econ. 112, 169-215.

Konings, J., Rizov, M., Vandenbussche, H., 2003. Investment and financial constraints in transition economies: micro evidence from Poland, the Czech Republic, Bulgaria and Romania. Econ. Letters 78, 253-258.

Leary, M., Roberts, M., 2005. Do firms rebalance their capital structures? J. Finance 60, 2575-2619.

Lemmon, M. L., Roberts, M. R., Zender, J. F., 2008. Back to the beginning: persistence and the cross-section of corporate capital structure. J. Finance 63, 1575-1608.

Lizal, L., Svejnar, J., 2002. Investment, credit rationing, and the soft budget constraint: evidence from Czech panel data. Rev. Econ. Statist. 84, 353-370.

Maddala, G. S., Nelson, F., 1994. Switching regression models with exogenous and endogenous switching, in: Maddala, G. S. (Ed.), Econometric Methods and Applications, vol. 2. Edward Elgar, Aldershot, pp. 369-372.

Moyen, N., 2004. Investment-cash flow sensitivities: constrained versus unconstrained firms. J. Finance 59, 2061-2092.

Myers, S. C., 1977. Determinants of corporate borrowing. J. Financ. Econ. 5, 147-175.

Nivorozhkin, E., 2004. The dynamics of capital structure in transition economies. Econ. Planning 37, 25-45.

Nivorozhkin, E., 2005. Financing choices of firms in EU accession countries. Emerg. Market. Rev. 6, 138-169.

Oliner, S., Rudebusch, G., 1992. Sources of the financing hierarchy for business investment. Rev. Econ. Statist. 74, 643-654.

Petersen, M., 2009. Estimating standard errors in finance panel data sets: comparing approaches. Rev. Financ. Stud. 22 (1), 435-480.

Rajan, R. G., Zingales, L., 1995. What do we know about capital structure: some evidence from international data. J. Finance 50, 1421-1460.

Shamshur, A., 2009. Is the Stability of Leverage Ratios Determined by the Stability of the Economy? CERGE-EI Working Paper 393.

Schiantarelli, F., 1995. Financial constraints and investment: a critical review of methodological issues and international evidence. Oxford Rev. Econ. Pol. 12, 70-89.

Shleifer, A., Vishny, R., 1986. Large shareholders and corporate control. J. Polit. Econ. 94, 461–488.

Shleifer, A., Vishny, R., 1989. Management entrenchment: the case of manager-specific investments. J. Financ. Econ. 25, 123–139.

Shleifer, A., Vishny, R., 1997. A survey of corporate governance. J. Finance 52, 737–783.

Titman, S., Wessels, R., 1988. The determinants of capital structure choice. J. Finance 43, 1-21.

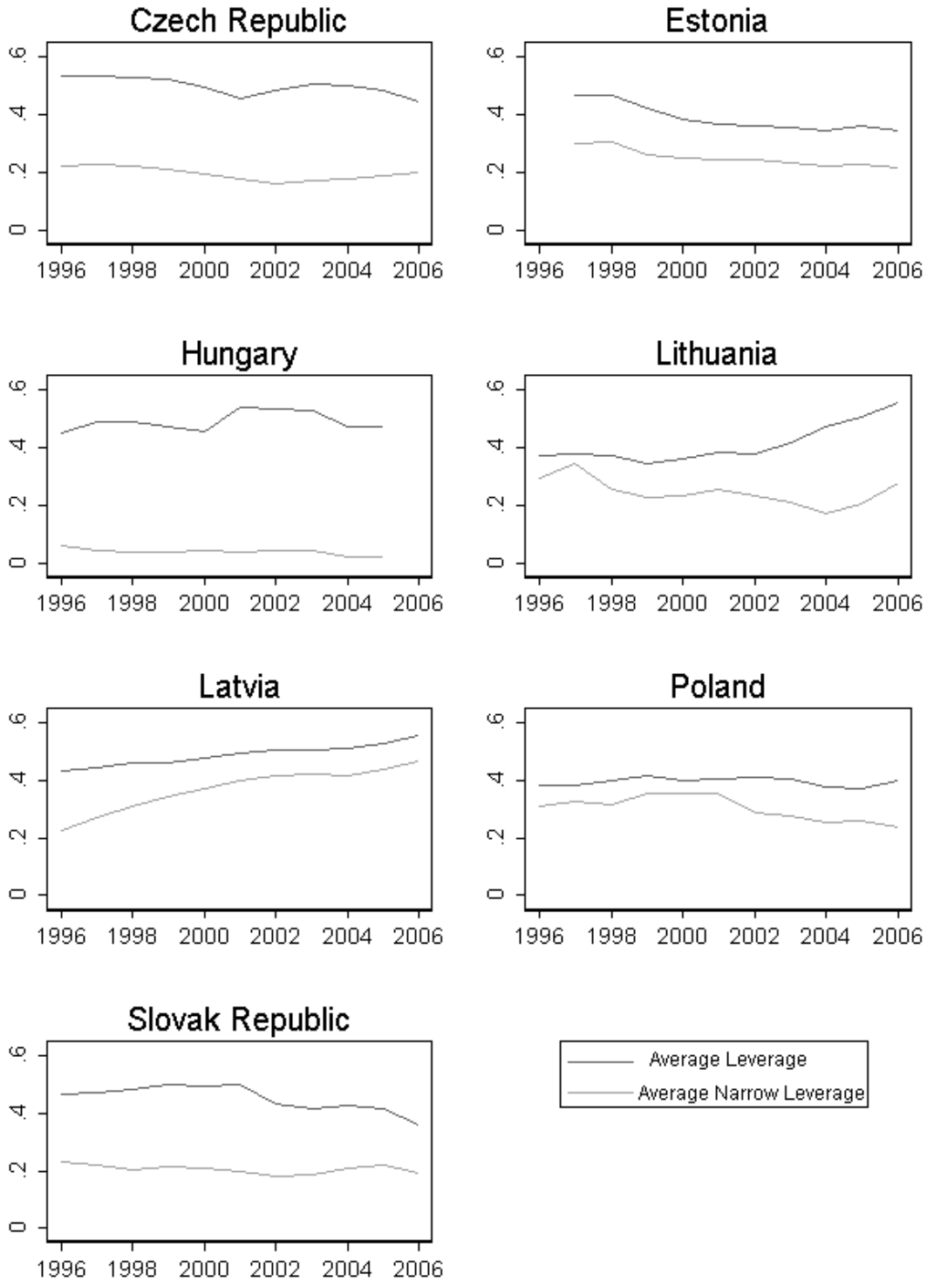

Figure 1: Average leverage by country and over time

Table 1: Summary Statistics

Country	Obs	Leverage	Total assets	ROA	Tangibility	Age
Czech Republic	153410					
Mean		0.5	7057	0.09	0.34	7.5
Median		0.49	697	0.05	0.28	7
St. dev.		0.29	8687	2.72	0.38	4.6
Estonia	203394					
Mean		0.37	687	0.09	0.39	6
Median		0.32	57	0.07	0.33	5
St. dev.		0.3	9417	0.59	0.3	6.1
Hungary	486698					
Mean		0.48	1570	0.11	0.38	5.6
Median		0.48	62	0.05	0.29	5
St. dev.		0.29	101490	11.42	12.18	3.9
Lithuania	23347					
Mean		0.44	3015	0.1	0.33	6.7
Median		0.41	651	0.07	0.28	7
St. dev.		0.27	22150	0.23	0.24	3.8
Latvia	26150					
Mean		0.5	3550	0.11	0.35	6.6
Median		0.5	572	0.08	0.31	6
St. dev.		0.28	21711	0.2	0.25	3.6
Poland	98328					
Mean		0.39	14496	0.09	0.38	17.5
Median		0.36	2468	0.07	0.33	10
St. dev.		0.26	107163	0.26	2.1	25.3
Slovak Republic	23459					
Mean		0.43	10122	0.07	0.38	9
Median		0.4	1708	0.05	0.37	8
St. dev.		0.28	88404	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 thousands of USD.

Table 2: Leverage Factors in Transition Economies

Leverage Factors	Expected Sign	Previous literature
Profitability	Negative	Haas and Peeters (2006), Joeveer (2006), Rajan and Zingales (1995)
Growth Opportunities	Positive/Negative	Haas and Peeters (2006), Jensen (1986)
Size	Positive	Delcoure (2007), Haas and Peeters (2006), Joeveer (2006)
Tangibility of Assets	Positive/	Rajan and Zingales (1995)
	Negative	Haas and Peeters (2006), Joeveer (2006)
Maturity of Assets		Hol and Wijst (2008)
Corruption Perception Index (CPI)		Fan et al. (2008)
Age	Positive	Haas and Peeters (2006), Joeveer (2006)
Industry Median Leverage	Positive	Frank and Goyal (2009)

Table 3: 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[a]	(0.000)	0.016[a]	(0.000)	0.015[a]	(0.000)
Tangibility	0.003[c]	(0.002)	0.002[c]	(0.001)	0.006[b]	(0.003)
Profitability	-0.0001	(0.000)	-0.0001	(0.000)	-0.005[c]	(0.003)
GDP growth	0.001[a]	(0.000)	0.0009[a]	(0.000)	-0.0005	(0.000)
Industry median	0.64[a]	(0.008)	0.64[a]	(0.008)	0.62[a]	(0.009)
Expected inflation	0.002[a]	(0.000)	0.0003	(0.000)	0.0004	(0.000)
Log(Age)			-0.051[a]	(0.001)	-0.05[a]	(0.001)
Maturity of Assets			-0.029[a]	(0.002)	-0.022[a]	(0.004)
CPI			0.01[a]	(0.002)	0.015[a]	(0.002)
Quoted			-0.092[a]	(0.010)	-0.095[a]	(0.01)
cons	-0.017[b]	(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	706,704		706,704		524,270	
R^2	0.080		0.096		0.107	

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, i.e., $Leverage = \frac{debt}{debt + equity}$. 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.

a, b, and c denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 4: Determinants of Leverage and the Status of the Firm: Pooled OLS

Variable	Book leverage			
	Listed firms		Unlisted firms	
Log(Total Assets)	0.016 [a]	(0.006)	0.016[a]	(0.000)
Tangibility	0.045	(0.051)	0.002[c]	(0.001)
Profitability	-0.003[b]	(0.001)	-0.0001	(0.000)
GDP growth	-0.009 [a]	(0.003)	0.0008[a]	(0.000)
Industry median	0.37 [a]	(0.073)	0.64[a]	(0.008)
Expected inflation	-0.004 [b]	(0.002)	0.0003	(0.000)
Log(Age)	-0.026 [b]	(0.012)	-0.051[a]	(0.001)
Maturity of Assets	0.15 [b]	(0.060)	-0.030[a]	(0.002)
CPI	0.015	(0.015)	0.0097 [a]	(0.002)
Cons	-0.19	(0.152)	0.005	(0.010)
Industry FE	Yes		Yes	
Year FE	Yes		Yes	
Country FE	Yes		Yes	
Obs	2,401		704,303	
R^2	0.226		0.096	

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). We distinguish between listed and unlisted firms. The dependent variable is leverage defined as debt over debt plus equity, where debt is equal to total liabilities minus trade credit, i.e., $Leverage = \frac{debt}{debt + equity}$. Independent variables are lagged one period. Tangibility is defined as tangible assets to 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.

a, b, and c denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 5: Three Different Estimators of Leverage

Book leverage	Pooled OLS		Fixed Effect		Random Effect	
			Panel A. Unlisted firms			
Log(Total Assets)	0.016 [a]	(0.000)	-0.014 [a]	(0.001)	0.012 [a]	(0.000)
Tangibility	0.002[c]	(0.001)	0.00001	(0.000)	0.0004[b]	(0.000)
Profitability	-0.0001	(0.000)	-0.00006 [a]	(0.000)	-0.00002	(0.000)
GDP growth	0.0008 [a]	(0.000)	-0.0009 [a]	(0.000)	-0.001 [a]	(0.000)
Industry median	0.64 [a]	(0.008)	0.30 [a]	(0.008)	0.57 [a]	(0.004)
Expected inflation	0.0003	(0.000)	-0.001 [a]	(0.000)	-0.0003	(0.000)
Log(Age)	-0.051 [a]	(0.001)	-0.002	(0.007)	-0.047 [a]	(0.001)
Maturity of Assets	-0.030 [a]	(0.002)	-0.009 [a]	(0.002)	-0.034 [a]	(0.001)
CPI	0.0097 [a]	(0.002)	0.007 [a]	(0.002)	0.003 [a]	(0.001)
cons	0.005	(0.010)	0.023 [a]	(0.002)	0.16 [a]	(0.007)
Hausman test			3897	(0.000)		
Obs	704,303		458,259		704,587	
AR(1)			0.515		0.515	
R^2	0.096					
			Panel B. Listed firms			
Log(Total Assets)	0.016 [a]	(0.006)	0.007	(0.011)	0.011[b]	(0.004)
Tangibility	0.045	(0.051)	0.11[b]	(0.046)	0.015	(0.031)
Profitability	-0.003[b]	(0.001)	-0.0015	(0.001)	-0.0016	(0.001)
GDP growth	-0.009 [a]	(0.003)	0.001	(0.003)	-0.008 [a]	(0.002)
Industry median	0.37 [a]	(0.073)	0.063	(0.053)	0.21 [a]	(0.043)
Expected inflation	-0.004[b]	(0.002)	-0.0007	(0.002)	-0.005 [a]	(0.002)
Log(Age)	-0.026[b]	(0.012)	-0.06	(0.065)	0.007	(0.010)
Maturity of Assets	0.15[b]	(0.060)	0.059	(0.038)	0.071[b]	(0.029)
CPI	0.015	(0.015)	0.050 [a]	(0.018)	0.021[b]	(0.011)
Cons	-0.19	(0.152)	0.013	(0.030)	0.021	(0.087)
Hausman test			63.91	(0.000)		
Obs	2,401		1,994		2,401	
AR(1)				0.520		0.520
R^2	0.226					

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, i.e., $Leverage = \frac{debt}{debt + equity}$. 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 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.

a, b, and c denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 6: 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 7: Switching Regression Model

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

Panel B. The Selection equation (Probit, Unconstrained=1)			
			Marginal effects
Const	-3.59[a]	(0.001)	n/a
Log(Total Assets)	0.23[a]	(0.002)	0.091
Log(Age)	0.45[a]	(0.004)	0.179
Tangibility	1.17[a]	(0.004)	0.469
Soft Budget Constraint	-0.22[a]	(0.000)	-0.089
Short-run Leverage	-1.07[a]	(0.000)	-0.426
Long-run Leverage	0.12[b]	(0.000)	0.047
Financial Slack	1.20[a]	(0.006)	0.478
Growth Opportunities	-0.01[a]	(0.001)	-0.002
Quoted	-0.06	(0.080)	-0.022
Observations	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, i.e., $Leverage = \frac{debt}{debt + equity}$. 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.

a, b, and c denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 8: Adjustment Speed and Credit Constraints

Book Leverage	Constrained		Unconstrained	
Lag of leverage	0.745[a]	(0.018)	0.612[a]	(0.038)
Log(Total Assets)	0.057[a]	(0.014)	0.058[c]	(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[a]	(0.046)	-0.016	(0.084)
GDP growth	-0.001	(0.001)	-0.00003	(0.005)
Expected inflation	-0.003[a]	(0.001)	-0.003	(0.004)
Industry median	0.340[a]	(0.037)	0.352[b]	(0.164)
CPI	0.005	(0.005)	-0.010	(0.021)
Wald test	3187.86[a]		448.76[a]	
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 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.

a, b, and c denote statistical significance at the 1%, 5%, and 10% levels, respectively.

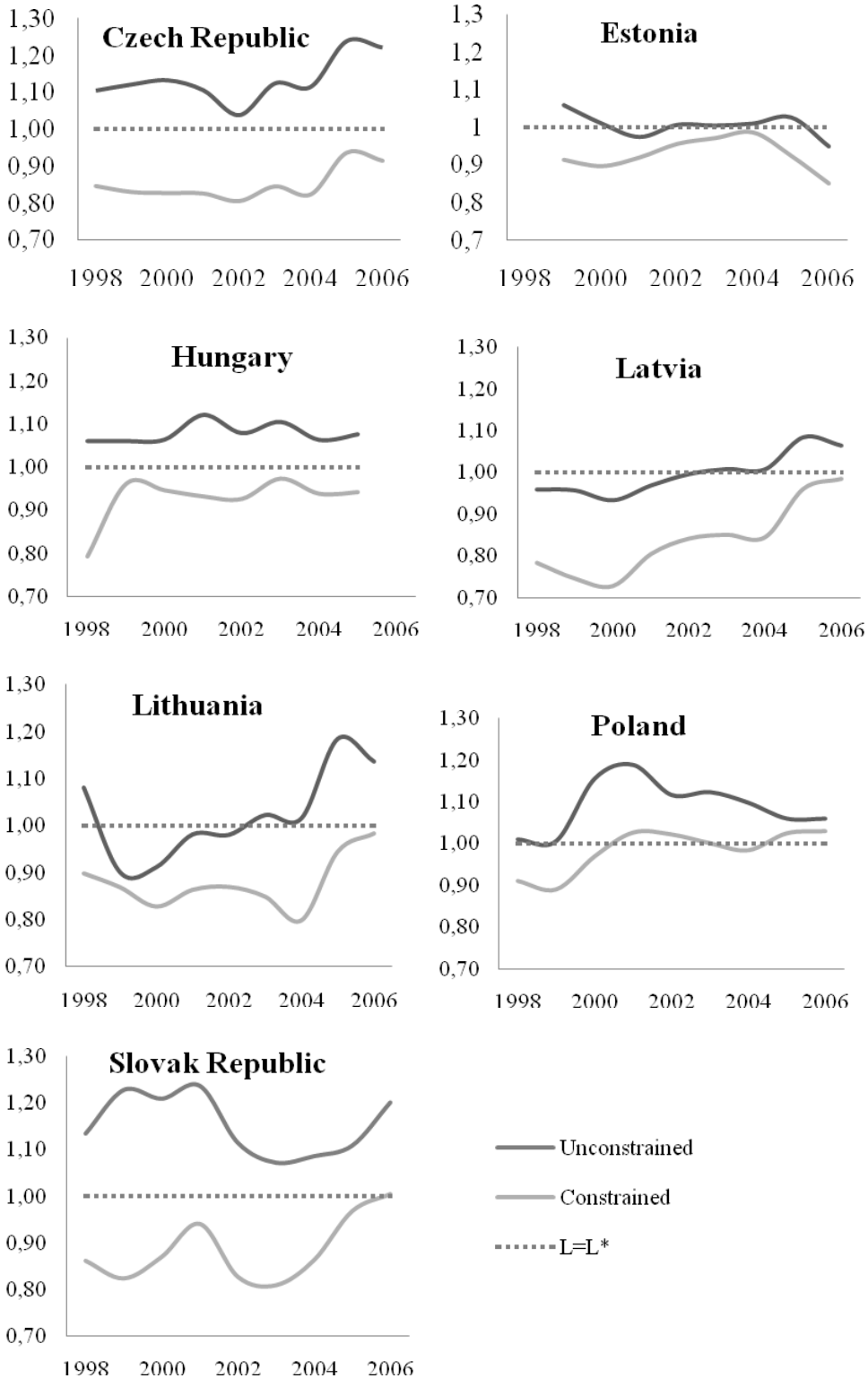

Figure 2: Leverage to target ratio (L/L*) by country and over time

Table 9: Summary Statistics by Concentration

		Mean	Median	Std	Obs
Total assets (thousands of USD)	Majority	28476	3771.4	180000	6,082
	Monitored	9662.65	915.5	75706.8	3,404
	Majority 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	0.47	0.46	0.26	3,404
	Majority 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	0.09	0.07	0.21	3,404
	Majority 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	0.35	0.31	0.26	3,404
	Majority Minority	0.37	0.35	0.25	2,300
	Dispersed	0.38	0.37	0.26	1,469

Table 10: Summary Statistics by Domicile

		Mean	Median	Std	Obs
Total assets (thousands of USD)	Domestic	15455.1	1517.66	150000	11,530
	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 11: Fixed Effect and Ownership Structure of the Firm

FE	Constrained		Unconstrained		Total	
Majority	0.016[a]	(0.003)	0.063[a]	(0.005)	0.032[a]	(0.003)
Monitored Majority	0.028[a]	(0.005)	0.066[a]	(0.006)	0.049[a]	(0.004)
Legal Minority	-0.004	(0.006)	0.026[a]	(0.008)	0.003	(0.005)
Dispersed	-0.003	(0.008)	0.044[a]	(0.010)	0.017[b]	(0.006)
R^2	0.0082		0.0868		0.0311	
Obs	7796		5459		13255	
Majority*domestic	-0.002	(0.008)	0.059[a]	(0.020)	0.002	(0.008)
Majority*foreign	0.047[a]	(0.007)	0.060[a]	(0.019)	0.042[a]	(0.007)
Majority*unknown	0.009[b]	(0.005)	0.069[a]	(0.006)	0.036[a]	(0.004)
Monitored Majority *domestic	-0.018	(0.017)	-0.064[b]	(0.030)	-0.044[a]	(0.015)
Monitored Majority *foreign	-0.009	(0.023)	-0.047	(0.048)	-0.036[c]	(0.021)
Monitored Majority *unknown	0.029[a]	(0.008)	0.104[a]	(0.009)	0.066[a]	(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[a]	(0.005)	0.084[a]	(0.006)	0.059[a]	(.004)
Dispersed*domestic	-0.022	(0.015)	-0.069[b]	(0.031)	-0.045[a]	(.014)
Dispersed *foreign	-0.028	(0.023)	-0.072	(0.050)	-0.045[b]	(.021)
Dispersed *unknown	0.007	(0.007)	0.049[a]	(0.009)	0.025[a]	(.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 effect on ownership structure. Standard errors are corrected for heteroskedasticity and correlation within firms (reported in parentheses). The dependent variable is firm fixed effect. Independent variables are ownership dummies:
a, b, and c denote statistical significance at the 1%, 5%, and 10% levels, respectively.