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Financing choices of firms in EU accession countries☆

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Abstract

The paper presents evidence on dynamics in actual and target capital structures of firms in five EU accession countries of Central and Eastern Europe and the former Soviet Union (Bulgaria, the Czech Republic, Poland, Romania and Estonia). We investigate and compare the determinants of firms' target capital structure and the speed of leverage adjustments. The average levels of debt–equity ratios of companies in advanced transition economies are found to be rather close to those observed for companies in several EU countries. The firms in the transition countries also tend to adjust their capital structure at the similar pace as their western counterparts. The determinants of target capital structure of firms in transition countries appear to be similar to what has been observed in EU countries.

JEL classification: G30; G32; O12; O52

Keywords: EU; Transition countries; Capital structure; Dynamic adjustment model

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1. Introduction

Corporate and financial system restructuring have been one of the most daunting challenges faced by economic policymakers in transition countries of Central and Eastern Europe and the former Soviet Union (Djankov and Murrell, 2002). The failures and shortcomings of these reforms resulted in substantial fiscal costs and forgone economic growth for most of the economies in the region, and has thus made the "accession readiness" of enterprises in these countries a focal concern in the expansion of the EU (Carlin et al., 1999).

Access of firms to finance in transition economies, a central discussion in reform of the enterprise and bank sectors, has had two aspects. On one hand, market reforms have been expected to impose hard-budget constraints on the loss-making state-owned enterprises (SOEs), and include such corrective measures as the elimination of "soft" credits from banks to firms and breaking up the collusion between banks and firms (e.g. Dewatripont and Maskin, 1995). On the other hand, most transition economies have continued to lack the medium- and long-term finance needed for restructuring and growth of most private companies. Corporate credit and capital markets remained thin, segmented and under-developed by western standards in the most transition countries throughout the 1990s (EBRD, 1998, 1999). In general, measures to solve the problems of SOEs and banks did not include efforts at alleviating financial constraints on private firms.

This paper attempts to gain some insights into the financial constraints facing private companies in transition economies and hopefully shed light on how the characteristics of firms in accession countries compare with firms in EU countries. We present evidence about the relative importance of equity, debt, and inter-firm financing for a large and diverse set of enterprises from five transition economies using a panel of firms from Bulgaria, the Czech Republic, Estonia, Poland and Romania. These countries represent diverse geographical parts of Europe: Central and Eastern Europe, South-eastern Europe and the Baltic Region. More importantly, these countries have had different experiences and degrees of success with market reforms. In addition to covering the representative cross-section of firms, our dataset spans a reasonably long period from 1997 to 2001.

Existing empirical studies of firms' capital structure have focused almost exclusively on static relationship between leverage and its determinants.[1] The novelty of this paper is an adoption of a dynamic modelling framework to analyze the determinants of the target capital structures for the companies. A dynamic approach to modelling capital structure have received a renewed attention in several recent empirical studies (e.g. Shyam-Sunder and Myers, 1999; Baker and Wurgler, 2002; Roberts, 2002; Fama and French, 2002; Frank and Goyal, 2003; Banerjee et al., in press; Welch, 2004; Leary and Roberts, 2004). These papers question a traditional view of instantaneous adjustments of firms' capital structure to an optimum and find that firms' debt ratios tend to adjust slowly toward their targets (e.g. Fama and French, 2002). An interpretation of slow adjustment of firms' leverage

[1] Some examples include Friend and Lang (1998), Titman and Wessels (1988), Rajan and Zingales (1995), Mackie-Mason (1995), Berger et al. (1997), Kim and Sorensen (1986), Moh'd et.al. (1998), Agrawal and Mandelker (1987), Castinias (1983), and Graham (1996).

differs across papers. Some authors argue that the presence of adjustment costs of rebalancing capital structure makes it sub-optimal for firms to respond immediately to capital structure shocks (Leary and Roberts, 2004).[2] Others propose a view of so-called "inertia" in capital structure adjustments where firms are indifferent towards capital structure (Welch, 2004).

The model employed in this paper specifies both the adjustment parameter and target leverage to be functions of firm characteristics. Unlike many recent papers sited above we do not attempt to formally test alternative capital structure theories. Nevertheless, the introduction of an endogenous adjustment factor and target leverage helps avoid the shortcomings of many capital structure studies. First, these studies explain the variation in observed leverage, while theoretical models relate to optimal (target) capital structure. Second, most studies do not attempt to capture the nature of dynamic capital structure adjustments.

Furthermore, majority of the existing papers study almost exclusively the dynamics in capital structure of listed U.S. firms. One might expect, however, that slow capital structure adjustments found in developed markets can be even more pronounced in developing markets of transition economies due to less developed financial systems and persistent supply-side market imperfections.

The literature on choice of capital structure in transition economies was fairly limited until recently. Hussain and Nivorozhkin (1997) and Cornelli et al. (1998) document surprisingly low levels of leverage for firms in Poland and Hungary in the first half of the 1990s. Both papers examine the determinants of capital structure and conclude that the low levels of debt financing are most likely a supply-side phenomenon. Nivorozhkin (2002) studies developments in the Hungarian capital markets during 1992–1995 and investigates the determinants of the capital structures of companies listed on the Budapest Stock Exchange. The results support the earlier finding that Hungarian firms were financially constrained. This situation apparently was the result of the combination of the financial incentives of firms and credit rationing within the financial environment. Revoltella (2001) investigates the effects of firm specific variables on leverage in the Czech Republic during the first years of transition. Supply factors are found to significantly determine the financial choices of enterprises. The paper also suggests evidence of a transformation in credit allocation policies. Klapper et al. (2002) analyze small and medium-size enterprise (SME) financing in Eastern Europe in 1999. The authors find that the SME sector comprises relatively young, highly leveraged, and relatively profitable firms. The financial constraints are found to impede the access of firms to long-term financing and their ability to grow.

The model similar to the one used in this paper was employed in Nivorozhkin (2004) to investigate the dynamics of capital structure of companies in the Czech Republic and Bulgaria during 1993–1997. Our paper extends the results of Nivorozhkin (2004) in several important dimensions. First, the paper looks at a larger set of countries, which

[2] The transaction costs of altering capital structure are often ignored in the existing finance literature, i.e. most papers accept the Modigliani–Miller Proposition I, which assumes that transaction costs are second order (Miller and Modigliani, 1958).

allows more general conclusions. Second, the set of explanatory variables is extended to include the ownership information of companies. Third, the paper touches upon the determinants of cross-country variations in the capital structures of companies. Finally, our paper looks at a different time period, i.e. 1997–2001. The greater macroeconomic stability and synchronization of policies for the purpose of EU accession during that period adds credibility to the cross-country comparison and makes the analysis somewhat policy oriented.

Our results show that on average, the leverage of companies in the transition countries remained lower than in EU countries during the period we studied. Nevertheless, the average levels of debt–equity ratios of companies in advanced transition economies of Estonia, Poland and the Czech Republic were close to those observed in several EU countries. We also obtain evidence indicating that the firms in the countries we study adjust their capital structure at the similar pace as their western counterparts. The determinants of target capital structure of firms in transition countries appear to be very similar to what has been observed in EU countries. The effects of conventional factors on companies' leverage could not in general be explained by institutional differences between transition countries. Nevertheless, some factors, like availability of collateral, seem to affect capital structure of firms in a different fashion in advanced transition economies and less advanced ones. Finally, we find that, on aggregate level, capital structure choice of companies in transition countries tend to be affected by the same macroeconomic and institutional factors as in other countries.

The remainder of the paper is organized as follows: in Section 2, we provide some background information on the transition economies investigated in the paper. In Section 3, we look at the relative leverage of firms in different countries; Section 4 analyzes macroeconomic influences on capital structure. In Section 5, we describe the dynamic adjustment model of capital structure. In Section 6, we proceed with the selection of dependent and explanatory variables of the model. Section 7 contains the discussion of the data set and estimation procedure. In Section 8, we describe the results of the dynamic adjustment model estimation. Section 9 concludes.

2. Countries in transition: some background information

2.1. Bulgaria

Bulgaria made very slow progress in reforms throughout most of the 1990s. Weak financial discipline and poor corporate governance of Bulgarian firms and banks led to widespread asset stripping and insider lending in the first half of the 1990s. General economic instability and ineffective recapitalization helped precipitate a major financial crisis in 1996–1997. After a number of failed stabilization attempts, Bulgaria introduced a currency board arrangement on July 1, 1997.

In the wake of the crisis and the post-crisis period, measures to promote financial discipline and create incentives for restructuring have been fairly ineffective due to weak bankruptcy law, insider ownership, underdeveloped markets for corporate control and the lack of new commercial credit (EBRD, 2000).

In 1996, the Bulgarian authorities launched a program of liquidation and rehabilitation of the largest loss-making state-owned enterprises, which were responsible for most of the losses. The program was largely completed by mid-2000. Bulgarian mass privatization started in late 1996, and 78% of state-owned assets (excluding infrastructure) had been sold to the public by the end of 2000.

Since 1997, the Bulgarian banking sector has experienced consolidation and improvements in regulation and supervision. Privatization of banks encountered setbacks, but nevertheless was nearly complete by 2001, when only three banks remained in state ownership. Bank intermediation remained limited in the post-crisis period. As a result, the domestic credit to the private sector averaged only 13.62% of GDP during 1997–2000. Banks were unwilling to engage actively in commercial lending, despite the efforts of the Bulgarian authorities to strengthen creditors' rights and simplify collateral collection.

The role of the Bulgarian securities market has remained limited since its establishment. Despite a large number of listed companies on Bulgarian Stock Exchange, the trading volumes have been very low. The first corporate bond issues took place in 1999.

2.2. The Czech Republic

Czech privatization occurred in two waves in 1992 and 1995. The second wave of the Czech Republic's voucher privatization program boosted the share of the domestic product generated by the private sector to 70%. Large-scale privatization was revived in 2000 and increased the private sector share of GDP to 80%.

While generally considered a successful transition economy, the Czech Republic has faced problems similar to less-advanced countries in the area of enterprise and banking sector reform. In 1999, inefficient bankruptcy law and poor enforcement resulted in over 3000 bankruptcy cases pending in the courts, over 10,000 companies were technically insolvent and about one-third of Czech companies were estimated to have overdue debts (EBRD, 2000).

The government gained some traction on the problem of insolvency of large industrial conglomerates in the late 1990s, only to encounter fiscal pressure as the amount of state guarantees increased. Some of the government's liability arose from indirect guarantees on bad loans placed with the Consolidation Bank.

A small number of foreign-owned banks came to dominate the sector after privatization and consolidation of Czech banks. In mid-2001, after the government sold off the last state-owned bank, the share of foreign-owned banks exceeded 90% of total banking assets. Despite attempts to clean up the portfolios of banks ahead of privatization, the share of bad loans in total loans of the banks remained around 20% through the late 1990s.

The Czech Republic's healthy investment climate resulted in the highest cumulative flows of FDI per capita in the region. The share of industrial output produced by foreign-owned firms increased from 15% in 1997 to about 40% in 2001. Positive structural changes in the Czech economy in the late 1990s also resulted in strong investment-led growth and rising employment. This, in turn, led to a gradual recovery from the 1997 recession. Domestic credit to the private sector remained high and on average was 57% of GDP during 1997–2000.

The role of the Czech securities market represented by the Prague Stock Exchange declined during the 1990s. There were no initial public offerings since the stock market was established in 1992 and the market did not serve a source of capital for listed companies. The market was illiquid with only six stocks actively traded in 2001.

2.3. Estonia

Small-scale privatization began in Estonia immediately after the country gained independence from Soviet Union in 1991. The following year, large-scale privatization commenced, accompanied by liberalization of most consumer prices and introduction of a currency board arrangement. The privatization program was structured to attract foreign strategic investment. The private sector's share in GDP increased gradually and reached 70% in 1996. Privatization of industrial companies was largely completed by 1999.

Successful enterprise reform made Estonia the most competitive transition country by 1999 (EBRD, 2001).

The privatization of Estonian banks proceeded briskly after the first state-owned bank was privatized in 1995. The share of state bank assets went from 0% to 7.8% in 1998 after the re-nationalization of insolvent Optiva bank. State bank assets returned to zero in 2000. During the 1990s, the banking sector was characterized by active consolidation through mergers and by entry of foreign banks. The share of non-performing loans on banks' books averaged just 2.6% during 1997–2000. The domestic credit to the private sector remained stable and averaged at 26% of GDP during 1997–2000.

The legal environment for companies constantly improved, and included measures to strengthen corporate governance and promote competition.

The Tallinn stock exchange was established in 1996. By 2000, the stock market capitalization had reached 35% of GDP. The example of a successful floatation was the public offering of Eesti Telekom in the beginning of 1999.

2.4. Poland

Small-scale privatization in Poland began in 1990 and was followed by a mass privatization in 1993. Despite a fast pace of privatization, there were still 2863 state-owned enterprises in 1998, the assets of which had a book value of 30–35% of GDP (EBRD, 1998). Indeed, about three-quarters of the top Polish companies by turnover were state-owned. Many of state-owned firms were in such critical sectors as defence, coal mining, steel and chemicals. They required constant infusion of public funds. Stiff union resistance, demands for redundancy compensation and limited interest of strategic investors also impeded privatization and restructuring of enterprises until the end of the 1990s.

Poland's strong growth during the second part of the 1990s was primarily driven by the rapid expansion of the new private sector (mainly SMEs) and large FDI inflows.

The privatization of Polish banks began in 1993. Bank privatization proceeded rather slowly. Restrictions on the entry of foreign banks also limited competition in the banking sector. The state-owned banks held over 50% of total bank assets up to 1998. By 2000, the Polish government controlled only two banks and only intervened in the governance of

privatized banks through its remaining direct or indirect ownership stakes. The banking sector consolidated in the late end of 1990s with foreign strategic investors obtaining control of about 50% of banks' assets. The share of bad loans in total loans of banks decreased from around 30% in the first half of the 1990s to around 13.5% in the late 1990s. The change reflected the policy of the authorities to rehabilitate and recapitalize banks prior to privatization. Domestic credit to private sector rose in the second part of 1990s, and averaged 21.5% of GDP.

The Warsaw Stock Exchange was the largest central European bourse at the end of 1990s. By the end of the 1990s, its market capitalization approached levels of small EU exchanges. The number of listed companies increased to 200 by the end of 2000. Stock market liquidity was adversely affected by the Russian crisis, but improved thereafter.

2.5. Romania

Despite a mass voucher privatization in 1991, Romania's progress with privatization was much slower than in most other CEE countries. At the end of 1996, over 75% of assets allocated to the State Ownership Fund (SOF) were still owned by the state. The privatization of both small- and large-scale companies accelerated in 1998 with the sale of 1015 small- and medium-sized companies and the sale of telecommunications provider Romtelecom. In general, the restructuring and liquidation of loss-making state enterprises has moved at a snail's pace. By the middle of 1998, inter-enterprise and tax arrears amounted to 13% and 8% of GDP, respectively. The government's problems with enterprise arrears grew over the years after several unsuccessful state attempts to deal with them.

Bank privatization did not begin until 1998 and proceeded slowly with the share of state-owned bank assets exceeding 50% through the late 1990s. The largest state-owned banks were overburdened with non-performing loans, which reached 70% of total loans for some banks. Some 2% of GDP was allocated for bank restructuring in 1999. Government support for banks substantially increased domestic debt.

Foreign direct investment in Romania remained low relative to other countries of Central and South-eastern Europe. The major obstacles were taxes, regulations, policy instability and corruption.

Domestic credit to private sector remained low, averaging 12% of GDP during 1996–2000.

3. Capital structures of firms in transition economies

We first look at the average levels of indebtedness of companies in our sample (see Section 7 for the data description). Leverage, measured by the ratio of total debt to the sum of debt and shareholders' equity, remained quite low by western standards throughout the entire period. The cross-country average remained stable every year at around 23%, although the dispersion remained high. The leverage ratios ranged from 9% in Bulgaria in 1997 to 34% in Estonia in 1998. The lowest mean values of leverage for the period were

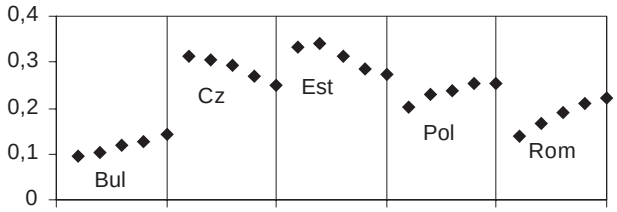

Fig. 1. Mean leverage ratios during 1997–2001. The leverage ratios are the ratios of debt to the sum of debt and shareholders equity averaged across firms for each year and each country. The following notation is adopted for the countries considered: "Bul" stands for Bulgaria, "Cz" is for the Czech Republic, "Est" is for Estonia, "Pol" is for Poland, and "Rom" is for Romania.

observed in Bulgaria and Romania (average ratios of 12% and 19%, respectively). Estonia, Poland, and the Czech Republic were at the top of the range with the average debt–equity ratios of 24–31%. Between 1997 and 2001, the leverage increased in three countries with the lowest leverage (Bulgaria, Romania, and Poland) and decreased in two countries with the highest leverage (Estonia and the Czech Republic), ranging from a 255% relative increase in Bulgaria to a 20% decrease in the Czech Republic. The absolute changes in leverage between 1997 and 2001 were in the range of 5–8%.

Distribution of the leverage of firms remained skewed to the left for all countries during the entire period. Indeed, most Bulgarian firms in the sample had no debt in 1997 and 1998. Nevertheless, the proportion of companies with no debt decreased over time for all countries except the Czech Republic. The largest decreases in the proportion of "debt-free" companies were in Bulgaria and Romania, countries with the lowest leverage. Fig. 1 illustrates a seeming tendency during the observed period for the convergence in capital structures across countries: the average debt–equity ratios of firms in the countries with highest leverage decrease, while the average ratios of firms in the countries with the lower leverage increase. Clearly, the differences in capital structures of firms in the various countries we consider (except Bulgaria) had become miniscule by the end of 2001 (see Fig. 1).

None of the evidence presented so far contradicts what has been found for the transition countries in the first half of 1990s. On average, the leverage of companies in the transition countries remained low during the period 1997–2001 and a large proportion of companies were not leveraged at all. Nevertheless, the average level of debt–equity ratios of companies in advanced transition economies of Estonia, Poland and the Czech Republic approached the average ratio of 40% reported for companies in Germany, France, Italy and the UK (Rajan and Zingales, 1995).

Firms' leverage seems to change substantially in Poland during the 1990s. Cornelli et al. (1998) report 6% ratios of total bank debt to assets for Poland and Hungary in 1992. The ratio corresponding to the one used in this paper was not reported, but we must infer it was somewhat greater.[3] Our results indicate that corporate leverage substantially increased in Poland during the 1990s. The leverage of Czech firms we find is quite similar to that reported in Revoltella (2001) for 1995 and Nivorozhkin (2004) for the period 1993–1997.

[3] The denominator of the ratio would decrease if we use debt to shareholders' equity. The nominator of the ratio can also increase, because total debt can exceed bank debt.

The countries we investigate are characterized by varying degrees of success with reforms. Poland, the Czech Republic and Estonia can be described as advanced transition economies (which was manifested in their EU accession status) while Bulgaria and Romania have had less success with reform and lagged behind the other countries in our group. The relative magnitude of leverage across countries suggests that the relative success with macroeconomic and institutional reforms could be reflected in the availability of debt financing.

4. Macroeconomic influences on capital structure choice

An interesting question related to our study is whether the variation in the aggregate capital structure can be explained by the capital markets developments, macroeconomic aggregates, and institutional characteristics of countries. We generate these conclusions by pooling the data for the countries in the sample and running panel regressions in which dependent variable is the mean value of leverage for firms in each country and each year and the independent variables are various country characteristics.[4] The obvious caveat to the results in Table 1 is that with only 25 country–year observations and correlated independent variables, the standard errors of the coefficients tend too be too large for the coefficients to be judged significant at normal levels when we include all independent variables in the same model. To overcome this problem we run separate models for grouped independent variables. Although the results should be taken with caution, several interesting observations emerge.

If the sample of firms we selected for each country is representative for general population of firms we would expect to find a positive association between the magnitude of the credit flows in the economy (more highly developed debt market) and the aggregate leverage level of companies. The results in Table 1 support our expectations indicating that the aggregate leverage ratio is positively related to the domestic credit to private sector as a proportion of GDP (CRTPS) and the ratio of domestic credit provided by banking sector as a proportion of GDP (DCBS). The leverage ratio vary negatively with the equity market capitalization (MCAP) indicating that more developed equity markets may become a viable option for corporate financing potentially reducing firms reliance on debt financing. Demirguc-Kunt and Maksimovic (1996) and Booth et al. (2001) find similar results with respect to the relationship between aggregate leverage ratios and the level of development of equity and debt market. The greater inflow of foreign direct investments (FDI) decreases the degree of leverage, which can be attributed to the reliance of companies on equity financing represented by FDI.

Similar to Demirguc-Kunt and Maksimovic (1996) we find that leverage is positively related to indicators of banking sector development and banks solvency. The aggregate leverage level is positively associated with the ratio of bank liquid reserves to total assets (BankLR) and the proportion of non-performing loans in total loans (NPL).

[4] The explanatory variables are taken from the 2002 World Development Indicators CD-ROM provided by the World Bank and EBRD Transition Report 2002.

Table 1
Panel regressions of mean values of leverage

Variable	Model I Coefficient (t-value)	Model II Coefficient (t-value)	Model III Coefficient (t-value)	Model IV Coefficient (t-value)	Model V Coefficient (t-value)
CRTPS	0.0029*** (5.96)		0.003*** (16.2)		0.003*** (10.7)
INFL	−0.0022*** (−7.58)				
BankLR	0.0022*** (26.6)				
NPL		−0.0011*** (−7.42)	−0.0010*** (−7.92)		
DCBS		0.0014*** (3.38)			
INVGDP		0.0069*** (8.34)			
ASSOB			−0.0004** (−2.77)	−0.0010*** (−3.08)	
FDI				−0.0025*** (−2.72)	
GDPPCG					0.003* (1.79)
MCAP					−0.001* (−1.82)
R^2	0.66	0.61	0.65	0.32	0.50

The dependent variable is the average ratio of debt to the sum of debt and shareholders' equity (LEV). The explanatory variables are: domestic credit to private sector, % of GDP (CRTPS); bank liquid reserves to bank assets ratio (BankLR); the proportion of non-performing loans in total loans of banks (NPL); the share of state-owned bank assets in total assets of banks (ASSOB); domestic credit of banking sector (DCBS); the ratio of investments to GDP (INVGDP); inflation, GDP deflator, annual % (INFL); foreign direct investment, net inflows, % of GDP (FDI); market capitalization of listed companies, % of GDP (MCAP); and GDP per capita growth, annual % (GDPPCG). The models are estimated using within groups transformation (deviation from individual means). The data is a balanced panel. There are five cross-sectional groups and the time-series length is 5 years (1997–2001). t-statistics are in parentheses. ***,**,*Indicate 1%, 5% and 10% significant levels, respectively.

Firms' leverage also responds positively to the size of the banking sector privatization, which is captured by the proportion of state-owned bank assets in total banking assets (ASSOB).

A higher economic growth of a country reflected in higher investments to GDP (INVGDP) and the GDP per capita growth (GDPPCG) positively affects leverage levels. Inflation negatively affects the degree of leverage of firms. As in Booth et al. (2001), the results are likely to indicate that firms can borrow against real, but not inflationary growth prospects. Higher interest rate and monetary risk caused by inflation tend to outweigh its positive effect on the monetary value of the company's assets resulting in a negative effect on debt ratios.

5. Dynamic adjustment model of capital structure

The issues of target capital structure and the speed at which firm's actual debt ratios are adjusted towards the target ratios is not new in the empirical literature. Fisher et al. (1989) argue that ranges of optimal debt ratios should be observed because adjustment towards the target is costly and empirical findings tend to support this model (e.g. Ang (1976) and Jalilvand and Harris (1984)). More recently, Fama and French (2002) document slow rate of adjustment of firms' debt ratios towards their targets. The impact of timing the equity issuances on corporate capital structure is found in Baker and Wurgler (2002). Welch (2004) finds long-lasting effects of equity price shocks on corporate capital structure. Leary and Roberts (2004) provide evidence of firms actively rebalancing their leverage to stay within an optimal range. Persistent effect of shocks to leverage is found to be a more likely result of optimizing behavior in the presence of adjustment costs, as opposed to indifference towards capital structure proposed by Welch (2004).

Target adjustment models also received renewed attention in panel data analyses (e.g. Ozkan (2001) and De Miguel and Pindado (2001)). Banerjee et al. (in press) extend the approach and investigate the determinants of the speed of adjustment.

The latter model capitalizes on the idea of endogenous leverage targets for firms and a potential intertemporal sub-optimality of actual financial leverage due to costly adjustments to a target capital structure.

Let the target leverage ratio of a company i at time t, L_{it}^{*}, be determined by the following function:

$$L_{it}^{*} = F(\boldsymbol{Y}_{it}, t) \tag{1}$$

where $\boldsymbol{Y}_{it}$ is a vector of firm specific variables, and t is the time trend.

This specification insures that target leverage may vary across firms and over time due to variations in underlying factors. The fact that the target debt ratio of a particular firm can change over time stresses dynamic aspect of the capital structure problem.

Capital markets imperfections make it costly for a firm to adjust to a target capital structure. A process of costly adjustment in firm's leverage is modeled by the following

relationship:

$$L_{it} - L_{it-1} = \delta_{it}(L^*_{it} - L_{it-1}) \tag{2}$$

where δ_{it} is an adjustment parameter lying between zero and one.[5] The parameter δ_{it} itself can be a function of some variables including previous years leverage. L_{it} and L_{it-1} are observed leverage in year t and $t-1$, respectively.

We can rewrite Eq. (2) as:

$$L_{it} = (1 - \delta_{it})L_{it-1} + \delta_{it}L^*_{it} \tag{3}$$

L^*_{it} and δ_{it} can be assumed to have the following functional form:

$$L^*_{it} = b_0 + \sum_j b_j \boldsymbol{Y}_{jit} + \sum_t b_t t \tag{4}$$

$$\delta_{it} = c_0 + \sum_k c_k \boldsymbol{Z}_{jit} + \sum_t c_t t \tag{5}$$

where $\boldsymbol{Y}_{jit}$ is a jth factor at time t explaining the target leverage of firm i at time t, and $\boldsymbol{Z}_{jit}$ is a kth factor at time t explaining a speed of adjustment to the target leverage of firm i at time t. Using Eqs. (4) and (5) in Eq. (3) provides us with a testable version of the model.

6. Dependent and explanatory variables of the model

We now consider factors influencing availability and level of debt financing, and factors affecting adjustment of companies to their target leverage. The existing literature offers several alternative definitions of leverage. The main differences among leverage proxies concern the use of book measures versus market values and total debt versus only long-term debt. The absence of market data for non-listed firms in our sample leaves us with the choice between total and long-term debt or possibly both. Most of the existing studies focus on a single measure of leverage and the most common measure of debt is total debt (Frank and Goyal, 2004). Furthermore, critical results tend to be robust to alternative leverage definitions. Overall, an appropriate measure of financial leverage, given the scope of our study, the available data and the previous research on the issue is the ratio of total debt to the sum of total debt and shareholders' equity (LEV) (see Rajan and Zingales (1995) for in-depth discussion).

Based on the alternative theories of capital structure and previous empirical work in the area, we select the explanatory variables with a likely affect on target leverage of firms. Recent empirical evidence (Frank and Goyal, 2004) suggests that most of the independent variables we selected are "reliably important". Nevertheless, some important variables could not be included due to the lack of market data for the companies or a large number of missing observations.

[5] In the absence of capital market imperfections, the parameter δ_{it} would be equal to 1 implying that the change in actual leverage between two consecutive periods should be equal to the desired one.

The first explanatory variable is *tangibility* (TANG) proxied by the proportion of tangible fixed assets in total assets. The higher proportion of tangible assets should be positively related to the availability of collateral. Greater collateral may alleviate the agency costs of debt.[6] The importance of collateral is greater for newly established businesses with no close ties to creditors. These arguments suggest a positive relationship between tangibility and target leverage.[7] Indeed, the results for developed countries (Rajan and Zingales, 1995; Titman and Wessels, 1988) uniformly confirm this. On the other hand, there are a number of factors limiting the importance of tangible assets as collateral in transition economies. First, underdeveloped and inefficient legal systems may hinder the creation of enforceable debt contracts. In case of default, the recovery of collateral may be costly and lengthy. Second, thin and illiquid secondary markets for firms' assets create uncertainty about their "recoverable" market value.

A negative relationship between leverage and tangibility has been found in a number of previous studies of transition economies (e.g. Cornelli et al., 1998; Nivorozhkin, 2002). Based on the presented arguments, we expect to find a negative or neutral relationship between leverage and tangibility.

Most capital structure studies argue that a firm's size is a determinant of the optimal debt capacity (e.g. Warner, 1977; Titman and Wessels, 1988). Fixed direct bankruptcy costs would constitute a smaller proportion of a larger (more valuable) firm, and thus increase the firm's target leverage. Moreover, a larger firm is likely to be better diversified, which would reduce the probability of insolvency (and therefore the probability of incurring bankruptcy costs). The predicted relationship between target leverage and the firm's size is again positive.

The positive relationship between the size of a company and its leverage may be reinforced in transition economies. Larger firms may get a favourable treatment from the creditors and set up the higher leverage targets because of implicit (or explicit) "too-big-to-fail" type guarantees from the authorities. Relatively higher "social" importance of a larger company would likely increase its chances of participating in a government-sponsored restructuring program and securing some form of "target financing." There is also some evidence that the banks in most of the transition countries prefer to deal with larger clients due to the high fixed costs of monitoring and information collection.

We use the logarithm of total assets as a proxy for company's size (SIZE) and anticipate a positive relationship between size and debt targets.

A firm's age is usually chosen to proxy the exposure of its capital structure to the asymmetric information problem. Reputation formation takes time and reduces the risk-shifting incentives of borrowers. The longer a firm survives in business, the more profits it can accumulate and subsequently use it to replace debt financing (Diamond, 1989). The above-mentioned factors would tend to decrease the firm's target leverage.

[6] This cost is related to the incentive of stockholders of leveraged firms to invest sub-optimally to expropriate wealth from the firm's bondholders (Jensen and Meckling, 1976; Myers, 1977).

[7] The alternative theory (Grossman and Hart, 1982) explains the negative relationship based on the argument that an increased amount of uncollateralized (more risky) debt would increase monitoring by lenders. That would alleviate the conflict of interests between firm's shareholders and self-interested managers. Given well-publicized evidence of poor corporate governance structures in transition economies, we rule out this explanation of the relationship between tangibility and leverage.

On the other hand, a firm's age may proxy the firm's experience in a particular business, and thus reflect its maturity. Greater business experience would tend to negatively affect the probability of bankruptcy and therefore result in higher leverage targets for older firms. The latter prediction is unlikely to apply to firms in transition economies, since experience before economic reforms is likely to be of limited value for such companies.

We construct the variable AGE as the difference between the observation year and the year in which the firm was established. The expected relationship between firm's age and its leverage targets is negative.

In addition to using debt financing, firms may be financed by their suppliers. The literature (e.g. Petersen and Rajan, 1997) suggests that firms may rely more on trade credit when debt financing is unavailable. We control for the effect of trade credit on the target levels of debt by including the ratios of net trade credit to total assets (NTC). The evidence found for the industrial countries should be reinforced by the larger market imperfections in the credit markets of the transition countries.

The theories of capital structure argue that market imperfections should lead to the relevance of a firm's profitability for its choice of leverage. Myers and Majluf (1984) present a simple version of a pecking-order theory, which predicts that, holding investments fixed, leverage is lower for more profitable firms, and given profitability, is higher for firms with more investments. The prediction of the theory is a direct implication that the asymmetric information between the firm's owners and outside investors creates the pecking order of finance with internal financing preferred to external financing, and debt preferred to outside equity. In a more complex view of the pecking-order argument (Myers, 1984), firms are concerned with both future and current financing costs. Firms with large expected investments may want to maintain a low-risk debt capacity to avoid passing up future investments or finance such investments with new risky securities.

In contrast to the pecking-order theory, the static trade-off theory of capital structure views the choice of a firm's leverage as a trade-off of expected bankruptcy costs and tax shields of debt. The theory predicts a positive relationship between leverage and profitability, because higher profitability implies more income to shield. Since what matters for a firm is the expected realizable value of the tax shields on an extra dollar of promised future interest payments (Myers, 1999), tax shields have significant value only for companies with high and stable income. Given higher economic uncertainty in the transition countries, the latter argument may imply relatively low tax advantages of debt for firms.

We use the ratio of income before interest, tax and depreciation to total assets as a proxy for company profitability (PROF), and expect to find a negative relationship.

We calculate the standard deviation of operating income for each firm in the sample during the period 1997–2001 (VROA) to account for the effect of riskiness of the firm's cash flow on the target level of debt financing. This *income variability* proxy does not directly relate to any theoretical result, but has been used in several empirical papers (e.g. Titman and Wessels, 1988; Friend and Lang, 1988). On the supply side, the suppliers of funds are likely to control their credit risks by both a range of interest rates and prices and through credit rationing. Under these circumstances, higher income variability may lead to

a lower level of leverage. On the demand side, the risk attitude of firms' managers may have an effect on the relationship between volatility of income and target leverage. The potential financial distress implied by a higher variability of a firm's income may lead a risk-averse manager to have relatively lower debt targets.[8] The weak insolvency laws and their enforcement in transition economies may result in a lower risk-aversion of the managers with the corresponding higher debt targets. Overall, the expected relationship between income variability and leverage targets is more likely to be negative in advanced transition countries.

The firms in our sample represent a wide array of industries. Based on the first digit of their primary US SIC code we created dummy variables to control for the effect of *industrial classification* on the level of target debt ratio. The literature points to both the nature of the business of firms in various industries and the differences in regulation as responsible for "the industry effect" (Titman, 1984; Guedes and Opler, 1996).

The degree of a financial leverage of companies is likely to be influenced by the extent of ownership concentration. Evidence from transition economies (see Hussain and Nivorozhkin, 1997; Kočenda and Svejnar, 2003) suggests higher ownership concentration tends to reduce financial leverage. One explanation for this phenomenon is that, given the supply-side imperfections in the credit markets of transition economies and virtual non-existence of market for long-term debt, company demand for long-term financing is likely to be satisfied through an increase in equity capital. Taking into account the poor corporate governance structures of transition economies, large contributions to equity were more likely to be made by strategic investors using their large ownership stakes for control purposes.

The degree of ownership concentration is accounted for with dummy variables.[9] Variable OWN_A takes a value of 1 when the company has no recorded shareholder with an ownership over 24.9% (either direct or total). It is 0 otherwise. Variable OWN_B takes a value of 1 when the company has no recorded shareholder with an ownership percentage (direct or total) over 49.9%, but has one or more shareholders with an ownership percentage above 24.9%. It is 0 otherwise. Variable OWN_C takes a value of 1 when the company has a recorded shareholder with an ownership (direct or total) over 49.9%, and 0 otherwise. Variable OWN_U takes a value of 1 when the ownership concentration is unknown, and 0 otherwise. The reference group for the ownership concentration dummies is OWN_A.

Based on the presented arguments and empirical evidence, we expect to find a negative relationship between target leverage and ownership concentration.

Most of the countries studied here enjoyed significant inflows of FDI during the period of study. We control for the effect of foreign ownership on the leverage targets of companies in our sample by including in the regressions a dummy variable FOR, which takes a value of 1 if the ultimate owner of a company is foreign, and 0 otherwise. Because a foreign owner would likely be willing to exercise management and control over host

[8] The degree of a risk-aversion would be influenced by the personal wealth diversification of the manager, as well as the labor market conditions of the manager.

[9] These variables are based on the "independence indicator" constructed by the providers of the data we use to signify the degree of independence of a company with regard to its shareholders.

country firms, we expect that the presence of strategic foreign investors would reduce the leverage targets of companies.

The model adopted in this paper takes into account the fact that the adjustments of capital structure are likely to be costly and the adjustment costs, which remain unspecified in our model, may vary across firms and time.

If the fixed costs of changing capital structure are important for companies, the speed of adjustment toward target leverage should depend on how far the firm is from the target. We include a variable DISTAN equal to the absolute value of difference between contemporaneous target leverage and lagged observed leverage, $|L^{*}_{it} - L_{it-1}|$. The speed of adjustment is expected to be higher the further away the company is from its target capital structure.

The size of the firm would also likely to influence the speed of firms' adjustments to target leverage. This variable is supposed to test the presence of adjustment costs not captured by the variable DISTAN. The size of a firm could matter for the speed of adjustment, since fixed costs of changing capital structure are proportionally smaller for larger firms. The expected sign of this variable is positive.

7. Data and estimation procedure

The data used here are from the Amadeus database complied by Bureau Van Dyck (as of August 2003). Amadeus is a pan-European database of about 5 million public and private companies. Among other things, the data contain information from corporate annual balance sheets and profit and loss accounts. Ownership information and industrial classification of companies are also provided. The data set tends to be highly representative for the largest companies in the countries. For the countries in this study, at least 95% of companies satisfy one of the following criteria are included in the data set: (1) operating revenues greater than 10 million euros; (2) total assets greater than 20 million euros; and (3) over 100 employees.[10]

Given the dynamic nature of our model, we selected companies with five consecutive years of reports and no missing statements. In addition, firms classified as financial intermediaries were removed from the sample due to their inappropriateness for testing the predictions of optimal capital structure models. Utilities and public administration organizations were excluded from the sample because their financial decisions are likely to be influenced by regulation.

The final sample comprises 729 Bulgarian companies, 976 Czech companies, 311 Estonian companies, 1219 Polish companies and 2477 Romanian companies. The data form a balanced panel for the period 1997–2001.

Table 3 (Panel A–F) in the Appendix provides summary statistics for the explanatory variables of the model.

[10] This information is posted at http://www.amadeus.bvdep.com.

The model we estimate takes the following form:

$$L_{it} = (1 - \delta_{it})L_{it} - 1 + \delta_{it}L_{it}^{*} + \eta_{it}, \tag{6}$$

where L_{it} is the ratio of debt to the sum of debt and equity (LEV), and η_{it} is an error term.

The target ratio of debt to shareholders' equity, L_{it}^{*}, and the speed of adjustment, δ_{it}, are modeled by the following linear relationships:

$$L_{it}^{*} = b_0 + \sum_j b_j \boldsymbol{Y}_{jit} + \sum_t b_t t + \sum_s b_s SIC \tag{7}$$

$$\delta_{it} = c_0 + \sum_j c_k \boldsymbol{Z}_{jit} + \sum_t c_t t + \sum_s c_s SIC, \tag{8}$$

where the vectors of explanatory variables, $\boldsymbol{Y}_{jit}$ includes the following variables:

– income variability (VROA)
– profitability (PROF)
– tangibility (TANG)
– size (SIZE)
– age (AGE)
– net trade credits (NTCS)
– time dummies (T97-T01)
– industrial dummies (IND1, IND2, IND3, IND4, IND5, IND6, IND7, IND8, IND9)
– ownership concentration dummies (OWN_B, OWN_C, OWN_U)
– foreign ownership dummy (FOR).

The vector $\boldsymbol{Z}_{jit}$ includes:

– distance (DISTAN)
– size (SIZE)
– time dummies (T97-T01)
– US SIC dummies (IND1, IND2, IND3, IND4, IND5, IND6, IND7, IND8, IND9).

The dynamic model is estimated separately for each country using a non-linear regression procedure, specifically, the nonlinear regression procedure (PROC MODEL) of SAS (Statistical Analysis System, release 8.02) to compute least squares estimates of the parameters of the nonlinear model. The modified Gauss–Newton method is used. Given Eqs. (6) (7) and (8), the estimated equation is

$$\begin{aligned} L_{it} = {} & \Big(1 - \Big(c_0 + \sum_j c_k \boldsymbol{Z}_{jit} + \sum_t c_t t + \sum_s c_s SIC\Big)\Big)L_{it-1} + \Big(c_0 + \sum_j c_k \boldsymbol{Z}_{jit} \\ & + \sum_t c_t t + \sum_s c_s SIC\Big)\Big(b_0 + \sum_j b_j \boldsymbol{Y}_{jit} + \sum_t b_t t + \sum_s b_s SIC\Big) + \eta_{it}. \end{aligned} \tag{9}$$

The model is flexible and allows possible negative estimates of the firms' target leverage. These negative values were replaced by 0 in each iteration before calculating the distance between the target leverage in period t and observed leverage in period $t-1$.

8. Results

Our results (see Table 4 in Appendix) indicate that higher operating profit variability has a positive or neutral effect on the debt targets of companies. The coefficient of variable VROA is positive for Poland and Romania and Estonia and insignificant for the Czech Republic and Bulgaria.[11] The empirical evidence on the relationship between operating profit variability and leverage in EU countries is somewhat mixed. Banerjee et al. (in press) obtain negative coefficients for this variable in the sample of the UK companies, while Wald (1999) reports positive coefficients for Germany, UK, and France. Importantly, the results for European countries contrast to the evidence for U.S. where the relationship between income variability and leverage tend to be negative (e.g. Bradley et al., 1984; Mackie-Mason, 1995; Wald, 1999). The results seem to support our conjecture of relatively low risk aversion of firms' managers in transition economies. Yet, results are potentially open to alternative interpretations. Contrary to what we expected, the effect of income variability on leverage does not clearly differ between advanced transition countries and less advanced ones.

The tangibility of company fixed assets (TANG) appears to have mixed effects on the debt targets across countries. The relationship is negative for Bulgaria and Romania, which is in line with the evidence from previous studies on the transition economies (Cornelli et al., 1996; Nivorozhkin, 2002, 2004). Nevertheless, the coefficient of variable TANG is positive for the Czech Republic and Estonia and insignificant for Poland. The results imply that although tangible assets remain a poor source of collateral in less advanced transition economies, the effect of tangibility on target leverage is moving towards the positive relationship observed in Germany, France, Italy and the UK (Rajan and Zingales, 1995; Wald, 1999; Banerjee et al., in press).

The profitability of companies has a uniform effect on target leverage across all countries considered. The coefficient of variable PROF is negative and significant in all regressions. The results are in line with evidence for the EU (and other developed countries) and support the pecking-order theory of finance. Firms lacking internal funds would like to close the gap by setting higher debt targets. If the more profitable companies in our sample also have higher growth prospects, the observed relationship is consistent with a story that firms going public may issue increased equity in anticipation of future investments (Fama and French, 2002). This situation is especially appealing for the newly privatized enterprises in transition economies.

Firm size is positively and significantly related to target leverage in all countries, except Estonia and Poland, where the relationship is not significant. The effect of firm size on leverage tends to vary across EU countries. Rajan and Zingales (1995) and Wald (1999) report a negative relationship for Germany, a positive one for UK and an insignificant one for France and Italy. Banerjee et al. (in press) report negative coefficient for UK. In the transition countries considered, the positive effect of firm size on leverage target can likely be explained by the fact that size serves as a stability proxy for creditors. Larger companies are also the likely targets of government bailouts due to the higher and more visible social

[11] The results for the Czech Republic and Bulgaria differ from the negative and positive relationship found for those countries in the period 1993–1997 in Nivorozhkin (2002).

costs imposed by their distress. Larger companies are also often subject to some form of government-sponsored investment programs. The financing within these programs can take the form of guarantees and direct financing.

The age of a firm has a significant and negative effect on its target leverage in all countries under investigation. The results are in line with our expectations supporting the hypothesis of the reputation effect in alleviating the asymmetric information costs for firms' choice of financing (Diamond, 1989). Hall et al. (2000) also find a negative relationship between firm's age and leverage in a sample of UK companies. A close association between size and age has been a concern of many empirical studies (e.g. Fama and French, 2002). An important observation emerging from our results is that firms' size does not seem to proxy the firm's age.

The effect of net trade credits on a firm's leverage targets is negative as expected in all countries, except Bulgaria and Romania, where it is not significant. The results indicate substitution between intermediated debt and trade credits in advanced transition economies. One potential explanation for insignificant results for Bulgaria and Romania is more prudent policies of financial intermediaries in advanced transition economies relative to less advanced ones. An increase in net trade credits of firms in advanced transition economies would more likely decrease the supply of intermediated debt and decrease firms' debt–equity ratios.

The increase in ownership concentration (i.e. decrease in independence) had no significant effect on the target leverage in all countries, except Estonia and Bulgaria.[12] In Estonia and Bulgaria, the presence of a shareholder with the ownership stake over 49.9% resulted in the lower leverage targets relative to companies where there the largest shareholders had stakes greater than 24.9%, but less than 49.9%.

The foreign origin of the ultimate owner of a company decreased the leverage target of Bulgarian firms, and increased the leverage targets of Czech and Estonian firms.

Mixed results with respect to the ownership variables can perhaps be explained by our inability to differentiate between the types of owners. According to Jensen and Meckling (1976), management ownership of equity tends to align the incentives of management and external shareholders. Therefore, larger management ownership would reduce the agency costs arising from the separation of ownership from control, which should reduce the need for debt to be used as a mechanism by which to discipline management. Furthermore, as management ownership increases, management would be expected to become increasingly risk averse and hence have greater incentives to reduce the level of debt (and hence the probability of bankruptcy). Supporting this view, empirical studies on US data by Friend and Lang (1988), Jensen et al. (1992), Bathala et al. (1994) and Firth (1995) report a negative relationship between debt and management ownership. Large number of studies has also suggested that institutional and large shareholders have incentives to monitor and control management actions (Stiglitz, 1985; Shleifer and Vishny, 1986). The effect of that type of ownership on debt ratios depends on whether the discipline exerted by such external shareholders acts as a complement or as a substitute to the disciplinary pressure provided by debt

[12] One should note the large number of companies with unknown degree of independence in the Estonian sample.

finance. Empirical research by Friend and Lang (1988), Firth (1995) and Berger et al. (1997) report a positive relationship to exist between debt and ownership by large external shareholders.

As expected, the speed of adjustment of a firm's leverage tended to increase as the distance to the target leverage increased. The relationship between speed of adjustment and the variable DISTAN is significant in all countries, except Poland. The results indicate that the large adjustments of leverage tend to be less costly relative to smaller ones, which may suggests the presence of fixed costs in changing the capital structure of a firm. Yet, the evidence is also consistent with relatively low costs of deviating from the target leverage in the short run.

Contrary to our expectations, the effect of a company size on the speed of adjustment to the target leverage did not support our hypothesis of relatively smaller adjustment costs for larger companies. The effect was negative and significant for Bulgaria, Estonia and Romania. A positive significant relationship was only observed for Poland. One possible explanation for the obtained results is supply side imperfections in lending policies. Since lending to a larger firm usually implies a higher exposure for a bank, larger companies may be unable to adjust as fast as smaller companies.[13]

The speed of capital structure adjustment of the companies in the first quintile (smallest companies) is 4–9% greater than the speed of adjustment of companies in the fifth quintile (largest companies) for Bulgaria, Estonia and Romania. The largest companies in Poland adjusted 9% faster than the smallest companies. The speed of adjustments in the Czech companies was stable across size groups (see Table 5, Panel A in Appendix). The speed of adjustment tended to remain relatively stable over time in all countries, except Bulgaria, where we observe a three-fold decreased in average speed of adjustment. The difference between mean and median speed of adjustment indicates that the unconditional distribution of adjustment speed is approximately symmetric in every year of the observation period.

According to Fama and French (2002), an annual adjustment in leverage for listed U.S. firms ranged from 10% for dividend payers to 16% for non-payers. Banerjee et al. (in press) find 20% adjustment speed in a sample of UK companies. The estimated average speed of adjustment across all countries in our study is 17%. Yet, the dispersion of adjustment speed across countries is high. It ranges from 8% in the Czech Republic to 24% in Romania. Interestingly, the speed of adjustment tends to be highest in Bulgaria and Romania. The companies in these two countries tended to have the lowest leverage during the period we consider and were clearly "catching up" with the companies from more advanced countries (see Fig. 1).

During all years, the target mean levels of leverage exceeded the observed mean levels of leverage in Bulgaria, Poland and Romania. The opposite tended to be observed in the Czech Republic and Estonia (see Table 5, Panel B in Appendix). The average gap between observed and target leverage ranges from − 11% in the Czech Republic in 2000 to 17% in Poland in 1998. The gap also varies significantly across size groups, although we observe no consistent patterns.

[13] Syndicated lending is likely non-existent in the economies we consider.

Table 2
Panel regressions of mean target values of leverage

	Model I	Model II	Model III	Model IV	Model V
Variable	Coefficient (*t*-value)	Coefficient (*t*-value)	Coefficient (*t*-value)	Coefficient (*t*-value)	Coefficient (*t*-value)
CRTPS	0.005*** (3.38)		0.005*** (9.80)		0.007*** (6.26)
INFL	−0.004*** (−4.93)				
BankLR	0.002*** (4.07)				
NPL		−0.001*** (−3.74)	−0.001** (−2.13)		
DCBS		0.003 (1.10)			
INVGDP		0.012*** (3.16)			
ASSOB			0.001 (−0.685)	−0.0003 (−0.296)	
FDI				−0.006 (−1.49)	
GDPPCG					0.005*** (3.87)
MCAP					−0.005*** (−10.00)
R^2	0.34	0.34	0.33	0.053	0.54

The dependent variable is the average ratio of debt to the sum of debt and shareholders' equity (LEV). The explanatory variables are: domestic credit to private sector, % of GDP (CRTPS); bank liquid reserves to bank assets ratio (BankLR); the proportion of non-performing loans in total loans of banks (NPL); the share of state-owned bank assets in total assets of banks (ASSOB); domestic credit of banking sector (DCBS); the ratio of investments to GDP (INVGDP); inflation, GDP deflator, annual % (INFL); foreign direct investment, net inflows, % of GDP (FDI); market capitalization of listed companies, % of GDP (MCAP); and GDP per capita growth, annual % (GDPPCG). The models are estimated using within groups transformation (deviation from individual means). The data is a balanced panel. There are five cross-sectional groups and the time-series length is 5 years (1997–2001). *t*-statistics are in parentheses. ***,**,*Indicate 1%, 5% and 10% significance levels, respectively.

Table 2 reports the results of regressions of mean target leverage across countries on the variables serving as proxies for credit market and general economic conditions in the countries. The explanatory variables are the same as in regressions of mean observed leverage reported in Table 1.

The comparison of results in Tables 1 and 2 reveals that the variation in actual leverage is better explained by the variation in explanatory variables relative to the variation in target leverage.

The signs of the relationships are the same, although the significance is higher in the regressions with actual leverage. These results may indicate that supply-side imperfections play an important role in a firm's choice of capital structure. These supply-side variables were not explicitly included in the target leverage equation of our model and this could potentially contribute to the observed differences between actual and target leverage in the model. Notably, the results in Tables 1 and 2 differ significantly for some variables serving as proxies for the solvency of the banking sector. The changes in these variables are often hard to predict given the opaque nature of the banking business and the importance of government prudential regulation in the banking sector.

9. Conclusions

We presented evidence on the actual and target capital structures of firms in five EU accession countries of Central and Eastern Europe and the former Soviet Union (Bulgaria, the Czech Republic, Poland, Romania and Estonia). We investigated and compared the determinants of firms' target capital structure and the speed of leverage adjustments.

On average, the leverage of companies in the transition countries remained lower than in EU countries. Nevertheless, the average levels of debt–equity ratios of companies in advanced transition economies of Estonia, Poland and the Czech Republic were close to those observed in several EU countries. Despite the remaining differences in the capital structures of firms across EU accession countries, there was a significant convergence in the average level of firms' leverage across countries studied. On average, the debt ratios of firms in the countries with highest leverage decreased, while the average ratio of firms in the countries with lowest leverage increased.

At the aggregate level, developments in credit markets and the general economic environment in the countries studied explain the variation in firm's debt–equity ratios.

The determinants of target capital structure in the cross-section of firms also vary across countries. The only variables with a uniform effect on target leverage for all countries are the company's profitability and age. More profitable companies tend to borrow less, which supports the pecking-order theory of finance. The negative effect of the firm's age on the leverage targets may indicate the limited value of companies' experience prior to the start of economic reforms but also supports the hypothesis of the reputation effect in alleviating the asymmetric information costs for firms' choice of financing.

The determinants of target capital structure of firms in transition countries appear to be rather similar to what has been observed in EU countries. The effects of conventional factors on companies' leverage could not in general be explained by institutional differences between transition countries. Nevertheless, the results imply that although tangible assets remain a poor source of collateral in less advanced transition economies, the effect of tangibility on target leverage is moving towards the positive relationship observed in Germany, France, Italy and the UK.

The dynamic adjustment model adopted in this paper illustrates the importance of recognition of intertemporal sub-optimality in the firm's capital structure and potentially costly nature of adjustment to the target leverage. In line with our expectations, the large adjustments of leverage tend to be less costly relative to smaller ones, likely indicating the presence of fixed costs in changing the capital structure of a firm. Yet, the evidence is also consistent with relatively low costs of deviating from the target leverage in the short run. Contrary to our expectations, the speed of leverage adjustment tends to decrease with an increase in firm size, indicating potential supply-side imperfections from the exposure control of providers of debt financing. We also obtain evidence indicating that the firms in the countries we study adjusted their capital structure at the similar pace as their western counterparts.

Overall, the evidence showed that the capital structures of firms in EU accession countries tended to converge and gradually approach the leverage levels observed in EU countries. Continuing progress in reform of corporate finance in the transition economies will likely depend on whether these countries achieve macroeconomic stability and success in broad institutional reforms.

Appendix A

Table 3
Summary statistics of the capital structure data set

Variable	*N*	Mean	SD	Minimum	Maximum
A. Bulgaria					
LEV	3645	0.12	0.20	0.00	0.99
TANG	3645	0.50	0.23	0.00	0.99
PROF	3645	0.12	0.16	−0.75	1.42
VROA	3645	0.11	0.08	0.00	0.51
SIZE	3645	14.84	1.56	9.99	20.68
NTC	3645	0.08	0.20	−0.81	0.93
AGE	3645	27.29	24.61	1.00	167.00
IND0	3645	0.06	0.23	0.00	1.00
IND1	3645	0.28	0.45	0.00	1.00
IND2	3645	0.23	0.42	0.00	1.00
IND3	3645	0.07	0.26	0.00	1.00
IND4	3645	0.12	0.32	0.00	1.00

Table 3 (*continued*)

Variable	*N*	Mean	SD	Minimum	Maximum
A. Bulgaria					
IND5	3645	0.14	0.35	0.00	1.00
IND6	3645	0.05	0.21	0.00	1.00
IND7	3645	0.05	0.21	0.00	1.00
IND8	3645	0.00	0.04	0.00	1.00
IND9	3645	0.01	0.12	0.00	1.00
OWN_A	3645	0.14	0.35	0.00	1.00
OWN_B	3645	0.17	0.37	0.00	1.00
OWN_C	3645	0.65	0.48	0.00	1.00
OWN_U	3645	0.04	0.20	0.00	1.00
FOR	3645	0.03	0.17	0.00	1.00
B. Czech Republic					
LEV	4880	0.29	0.27	0.00	1.00
TANG	4880	0.43	0.22	0.00	0.99
PROF	4880	0.12	0.11	−0.60	0.90
VROA	4880	0.05	0.05	0.00	0.35
SIZE	4880	12.25	1.32	8.01	18.80
NTC	4880	0.02	0.18	−0.99	0.90
AGE	4880	7.47	4.85	0.00	51.00
IND0	4880	0.10	0.30	0.00	1.00
IND1	4880	0.12	0.32	0.00	1.00
IND2	4880	0.30	0.46	0.00	1.00
IND3	4880	0.12	0.32	0.00	1.00
IND4	4880	0.09	0.28	0.00	1.00
IND5	4880	0.15	0.36	0.00	1.00
IND6	4880	0.06	0.23	0.00	1.00
IND7	4880	0.00	0.00	0.00	0.00
IND8	4880	0.07	0.26	0.00	1.00
IND9	4880	0.01	0.07	0.00	1.00
OWN_A	4880	0.02	0.13	0.00	1.00
OWN_B	4880	0.18	0.39	0.00	1.00
OWN_C	4880	0.50	0.50	0.00	1.00
OWN_U	4880	0.30	0.46	0.00	1.00
FOR	4880	0.13	0.34	0.00	1.00
C. Estonia					
LEV	1555	0.31	0.27	0.00	0.99
TANG	1555	0.42	0.24	0.00	1.00
PROF	1555	0.16	0.15	−0.74	0.95
VROA	1555	0.09	0.07	0.01	0.53
SIZE	1555	17.36	1.43	9.46	20.60
NTC	1555	0.03	0.20	−0.79	0.86
AGE	1555	15.01	20.78	0.00	103.00
IND0	1555	0.05	0.23	0.00	1.00
IND1	1555	0.17	0.38	0.00	1.00
IND2	1555	0.13	0.33	0.00	1.00
IND3	1555	0.11	0.31	0.00	1.00
IND4	1555	0.06	0.23	0.00	1.00
IND5	1555	0.29	0.45	0.00	1.00

(continued on next page)

Table 3 (*continued*)

Variable	*N*	Mean	SD	Minimum	Maximum
C. Estonia					
IND6	1555	0.11	0.31	0.00	1.00
IND7	1555	0.06	0.23	0.00	1.00
IND8	1555	0.00	0.00	0.00	0.00
IND9	1555	0.03	0.16	0.00	1.00
OWN_A	1555	0.00	0.00	0.00	0.00
OWN_B	1555	0.02	0.13	0.00	1.00
OWN_C	1555	0.09	0.28	0.00	1.00
OWN_U	1555	0.90	0.30	0.00	1.00
FOR	1555	0.06	0.23	0.00	1.00
E. Poland					
LEV	6095	0.24	0.25	0.00	0.99
TANG	6095	0.39	0.22	0.00	0.99
PROF	6095	0.10	0.15	−0.61	1.47
VROA	6095	0.09	0.06	0.00	0.56
SIZE	6095	10.13	1.10	6.98	16.97
NTC	6095	−0.06	0.17	−0.82	0.87
AGE	6095	29.71	43.96	0.00	160.00
IND0	6095	0.02	0.15	0.00	1.00
IND1	6095	0.19	0.39	0.00	1.00
IND2	6095	0.25	0.44	0.00	1.00
IND3	6095	0.08	0.28	0.00	1.00
IND4	6095	0.09	0.29	0.00	1.00
IND5	6095	0.21	0.41	0.00	1.00
IND6	6095	0.09	0.28	0.00	1.00
IND7	6095	0.05	0.22	0.00	1.00
IND8	6095	0.00	0.00	0.00	0.00
IND9	6095	0.01	0.10	0.00	1.00
OWN_A	6095	0.01	0.10	0.00	1.00
OWN_B	6095	0.06	0.24	0.00	1.00
OWN_C	6095	0.44	0.50	0.00	1.00
OWN_U	6095	0.49	0.50	0.00	1.00
FOR	6095	0.07	0.25	0.00	1.00
F. Romania					
LEV	12,385	0.19	0.23	0.00	1.00
TANG	12,385	0.42	0.21	0.00	1.00
PROF	12,385	0.21	0.21	−0.84	2.88
VROA	12,385	0.12	0.08	0.00	1.13
SIZE	12,385	16.71	1.54	8.24	21.05
NTC	12,385	−0.02	0.20	−0.84	0.93
AGE	12,385	6.76	2.23	0.00	11.00
IND0	12,385	0.04	0.19	0.00	1.00
IND1	12,385	0.28	0.45	0.00	1.00
IND2	12,385	0.19	0.39	0.00	1.00
IND3	12,385	0.10	0.30	0.00	1.00
IND4	12,385	0.16	0.37	0.00	1.00
IND5	12,385	0.13	0.34	0.00	1.00

Table 3 (*continued*)

Variable	*N*	Mean	SD	Minimum	Maximum
F. Romania					
IND6	12,385	0.05	0.22	0.00	1.00
IND7	12,385	0.04	0.20	0.00	1.00
IND8	12,385	0.00	0.00	0.00	0.00
IND9	12,385	0.01	0.08	0.00	1.00
OWN_A	12,385	0.13	0.34	0.00	1.00
OWN_B	12,385	0.18	0.38	0.00	1.00
OWN_C	12,385	0.67	0.47	0.00	1.00
OWN_U	12,385	0.02	0.15	0.00	1.00
FOR	12,385	0.09	0.29	0.00	1.00

Table 4
Dynamic adjustment model

A. Bulgaria and the Czech Republic

Bulgaria				Czech Republic			
Parameter	Estimate	*t*-value	Pr>|*t*|	Parameter	Estimate	*t*-value	Pr>|*t*|
Intercept	−0.39	−4.32	<0.0001	Intercept	0.17	0.91	0.36
VROA	0.02	0.22	0.83	VROA	0.15	0.62	0.54
TANG	−0.21	−6.04	<0.0001	TANG	0.19	3.19	0.00
PROF	−0.31	−5.44	<0.0001	PROF	−1.72	−14.67	<0.0001
SIZE	0.04	6.94	<0.0001	SIZE	0.02	2.01	0.04
NTC	−0.03	−0.96	0.34	NTC	−0.50	−6.89	<0.0001
AGE	0.00	−7.57	<0.0001	AGE	−0.01	−4.33	<0.0001
T99	0.05	2.24	0.03	T99	−0.04	−1.10	0.27
T00	0.00	0.11	0.92	T00	−0.14	−3.09	0.00
T01	0.07	2.97	0.00	T01	−0.14	−3.26	0.00
IND1	0.28	6.61	<0.0001	IND1	0.01	0.10	0.92
IND2	0.17	4.02	<0.0001	IND2	0.10	1.03	0.30
IND3	0.16	3.24	0.00	IND3	0.09	0.89	0.38
IND4	0.09	1.98	0.05	IND4	−0.09	−0.70	0.48
IND5	0.20	4.78	<0.0001	IND5	0.13	1.29	0.20
IND6	0.28	5.45	<0.0001	IND6	−0.05	−0.42	0.68
IND7	0.14	2.45	0.01	IND7	0.10	0.96	0.34
IND8	−0.03	−0.04	0.97	IND8	–	–	–
IND9	0.11	1.59	0.11	IND9	0.15	0.67	0.50
OWN_B	0.04	1.25	0.21	OWN_B	0.01	0.12	0.91
OWN_C	−0.02	−0.64	0.52	OWN_C	−0.06	−0.63	0.53
OWN_U	−0.04	−0.92	0.36	OWN_U	−0.04	−0.37	0.71
FOR	−0.07	−1.77	0.08	FOR	0.14	3.57	0.00
Intercept	0.51	3.37	0.00	Intercept	0.01	0.19	0.85
DISTAN	0.63	7.00	<0.0001	DISTAN	0.16	7.04	<0.0001
SIZE	−0.02	−2.10	0.04	SIZE	0.00	−0.94	0.35
T99	−0.12	−3.44	0.00	T99	0.01	1.00	0.32
T00	−0.08	−2.45	0.01	T00	0.01	0.30	0.76
T01	−0.18	−5.10	<0.0001	T01	0.03	1.49	0.14
IND1	−0.19	−1.84	0.07	IND1	0.06	2.10	0.04

(continued on next page)

Table 4 (*continued*)

A. Bulgaria and the Czech Republic

Bulgaria				Czech Republic			
Parameter	Estimate	*t*-value	Pr>|*t*|	Parameter	Estimate	*t*-value	Pr>|*t*|
IND2	−0.04	−0.42	0.67	IND2	0.07	2.67	0.01
IND3	−0.08	−0.73	0.46	IND3	0.09	2.97	0.00
IND4	−0.05	−0.48	0.63	IND4	0.03	0.77	0.44
IND5	−0.04	−0.35	0.73	IND5	0.08	2.84	0.00
IND6	−0.17	−1.56	0.12	IND6	0.06	1.69	0.09
IND7	−0.21	−1.84	0.07	IND7	0.06	2.04	0.04
IND8	−0.17	−0.09	0.93	IND8	–	–	–
IND9	0.09	0.46	0.65	IND9	0.06	0.70	0.49

B. Estonia and Poland

Estonia				Poland			
Parameter	Estimate	*t*-value	Pr>|*t*|	Parameter	Estimate	*t*-value	Pr>|*t*|
Intercept	−1.72	−2.66	0.01	Intercept	0.20	0.82	0.41
VROA	0.37	1.74	0.08	VROA	1.01	4.57	<0.0001
TANG	0.38	5.24	<0.0001	TANG	−0.04	−0.59	0.56
PROF	−1.35	−10.27	<0.0001	PROF	−1.67	−12.38	<0.0001
SIZE	0.01	0.84	0.40	SIZE	0.00	−0.05	0.96
NTC	−0.21	−2.32	0.02	NTC	−0.18	−2.33	0.02
AGE	0.00	−3.68	0.00	AGE	0.00	−3.32	0.00
T99	−0.11	−2.57	0.01	T99	−0.17	−4.34	<0.0001
T00	−0.12	−2.53	0.01	T00	−0.12	−2.92	0.00
T01	−0.15	−2.84	0.00	T01	−0.24	−5.76	<0.0001
IND1	1.90	3.18	0.00	IND1	0.27	1.68	0.09
IND2	1.91	3.17	0.00	IND2	0.23	1.39	0.17
IND3	1.86	3.10	0.00	IND3	0.10	0.58	0.56
IND4	1.87	3.11	0.00	IND4	0.20	1.18	0.24
IND5	1.93	3.22	0.00	IND5	0.32	1.94	0.05
IND6	1.89	3.15	0.00	IND6	0.08	0.49	0.62
IND7	1.92	3.19	0.00	IND7	0.22	1.07	0.29
IND9	2.02	3.31	0.00	IND9	0.22	0.98	0.33
OWN_B	–	–	–	OWN_B	0.16	1.06	0.29
OWN_C	−0.33	−1.93	0.05	OWN_C	0.11	0.80	0.42
OWN_U	0.07	0.48	0.63	OWN_U	0.16	1.16	0.25
FOR	0.37	3.12	0.00	FOR	−0.03	−0.72	0.47
Intercept	0.12	0.79	0.43	Intercept	−0.20	−2.88	0.00
DISTAN	0.13	3.20	0.00	DISTAN	0.00	−0.09	0.93
SIZE	−0.02	−2.65	0.01	SIZE	0.03	5.37	<0.0001
T99	0.04	1.58	0.11	T99	0.01	0.55	0.58
T00	0.01	0.30	0.77	T00	−0.01	−0.34	0.73
T01	−0.04	−1.66	0.10	T01	−0.02	−1.06	0.29
IND1	0.49	7.59	<0.0001	IND1	0.07	1.65	0.10
IND2	0.41	6.36	<0.0001	IND2	0.03	0.69	0.49
IND3	0.49	6.88	<0.0001	IND3	0.09	1.90	0.06
IND4	0.41	5.16	<0.0001	IND4	0.06	1.29	0.20
IND5	0.40	6.69	<0.0001	IND5	0.08	1.93	0.05

Table 4 (*continued*)

B. Estonia and Poland

Estonia				Poland			
Parameter	Estimate	*t*-value	Pr>|*t*|	Parameter	Estimate	*t*-value	Pr>|*t*|
IND6	0.28	4.40	<0.0001	IND6	0.07	1.47	0.14
IND7	0.47	5.77	<0.0001	IND7	−0.01	−0.21	0.84
IND9	0.53	5.39	<0.0001	IND9	0.06	0.76	0.44

C. Romania

Romania			
Parameter	Estimate	*t*-value	Pr>|*t*|
Intercept	0.30	3.76	0.00
VROA	0.18	2.65	0.01
TANG	−0.25	−8.56	<0.0001
PROF	−0.32	−9.89	<0.0001
SIZE	0.01	2.69	0.01
NTC	0.02	0.71	0.48
AGE	−0.01	−4.19	<0.0001
T99	0.03	1.97	0.05
T00	0.06	2.98	0.00
T01	0.04	2.33	0.02
IND1	0.00	−0.13	0.90
IND2	−0.01	−0.23	0.82
IND3	−0.01	−0.36	0.72
IND4	−0.12	−3.66	0.00
IND5	0.03	0.78	0.43
IND6	0.09	1.58	0.11
IND7	−0.12	−2.97	0.00
IND9	−0.07	−0.43	0.66
OWN_B	0.01	0.25	0.80
OWN_C	0.02	1.27	0.20
OWN_U	−0.04	−0.96	0.34
FOR	0.02	1.21	0.23
Intercept	0.36	4.33	<0.0001
DISTAN	0.23	4.58	<0.0001
SIZE	−0.01	−2.28	0.02
T99	−0.01	−0.63	0.53
T00	−0.06	−2.89	0.00
T01	−0.01	−0.73	0.47
IND1	0.02	0.63	0.53
IND2	−0.05	−1.17	0.24
IND3	−0.03	−0.75	0.45
IND4	0.12	2.80	0.01
IND5	−0.02	−0.40	0.69
IND6	−0.09	−1.91	0.06
IND7	0.05	1.03	0.31
IND9	−0.07	−0.46	0.64

Table 5
Mean and median of adjustment speed (δ_{it}), target leverage ratio (L_{it}^{*}), observed leverage ratio (L_{it}), and a gap between target and observed ratios ($L_{it}^{*} - L_{it}$)

Country	Size groups	Adjustment speed (mean)	Target ratio (mean)	Observed ratio (mean)	Average gap (mean)	Adjustment speed (median)	Target ratio (median)	Observed ratio (median)	Average gap (median)
A. Size groups									
BUL	Very small	0.22	0.12	0.07	0.05	0.21	0.12	0.00	0.08
BUL	Small	0.23	0.14	0.10	0.03	0.22	0.13	0.00	0.06
BUL	Medium	0.21	0.17	0.10	0.07	0.20	0.16	0.00	0.09
BUL	Large	0.20	0.19	0.13	0.06	0.19	0.18	0.02	0.09
BUL	Very large	0.18	0.23	0.18	0.05	0.18	0.24	0.07	0.09
CZ	Very small	0.08	0.16	0.23	−0.07	0.08	0.12	0.10	0.00
CZ	Small	0.07	0.21	0.28	−0.07	0.07	0.19	0.20	−0.03
CZ	Medium	0.07	0.22	0.28	−0.06	0.07	0.21	0.24	−0.03
CZ	Large	0.07	0.27	0.34	−0.06	0.07	0.26	0.30	−0.03
CZ	Very large	0.07	0.32	0.30	0.02	0.07	0.32	0.27	0.03
EST	Very small	0.24	0.26	0.27	−0.01	0.25	0.25	0.20	0.00
EST	Small	0.20	0.23	0.30	−0.06	0.23	0.22	0.23	−0.06
EST	Medium	0.20	0.26	0.35	−0.09	0.22	0.24	0.31	−0.10
EST	Large	0.17	0.28	0.33	−0.05	0.20	0.27	0.30	−0.07
EST	Very Large	0.16	0.29	0.31	−0.02	0.17	0.28	0.28	−0.02
POL	Very small	0.11	0.33	0.19	0.15	0.12	0.33	0.10	0.14
POL	Small	0.13	0.33	0.21	0.11	0.14	0.33	0.13	0.12
POL	Medium	0.14	0.35	0.24	0.11	0.15	0.35	0.17	0.13
POL	Large	0.16	0.35	0.25	0.10	0.17	0.36	0.18	0.11
POL	Very large	0.20	0.35	0.28	0.07	0.20	0.34	0.21	0.08
ROM	Very small	0.29	0.23	0.16	0.07	0.28	0.23	0.00	0.12
ROM	Small	0.26	0.24	0.15	0.09	0.25	0.24	0.06	0.13
ROM	Medium	0.24	0.25	0.18	0.08	0.24	0.25	0.10	0.12
ROM	Large	0.22	0.28	0.20	0.08	0.22	0.27	0.13	0.13
ROM	Very large	0.20	0.30	0.25	0.05	0.19	0.30	0.16	0.12
B. Year of observation									
BUL	1997	0.31	0.12	0.09	0.03	0.28	0.10	0.00	0.05
BUL	1998	0.27	0.14	0.10	0.04	0.26	0.13	0.00	0.06
BUL	1999	0.17	0.20	0.12	0.08	0.17	0.19	0.00	0.11
BUL	2000	0.18	0.16	0.13	0.04	0.18	0.15	0.00	0.07
BUL	2001	0.11	0.23	0.14	0.09	0.11	0.23	0.02	0.13
CZ	1997	0.07	0.31	0.31	−0.01	0.07	0.32	0.25	0.01
CZ	1998	0.07	0.30	0.30	0.00	0.06	0.31	0.25	0.02
CZ	1999	0.08	0.26	0.29	−0.03	0.08	0.26	0.23	0.00
CZ	2000	0.07	0.16	0.27	−0.11	0.06	0.14	0.21	−0.05
CZ	2001	0.09	0.15	0.25	−0.10	0.08	0.13	0.20	−0.05
EST	1997	0.20	0.32	0.33	−0.01	0.23	0.33	0.30	−0.03
EST	1998	0.20	0.33	0.34	−0.01	0.22	0.34	0.31	−0.03
EST	1999	0.23	0.25	0.31	−0.07	0.25	0.25	0.27	−0.06
EST	2000	0.20	0.21	0.29	−0.07	0.22	0.20	0.22	−0.06
EST	2001	0.14	0.20	0.27	−0.08	0.16	0.19	0.22	−0.06
POL	1997	0.14	0.36	0.20	0.16	0.14	0.38	0.12	0.18
POL	1998	0.15	0.41	0.23	0.18	0.15	0.42	0.15	0.20

Table 5 (*continued*)

A. Year of observation

Country	Size groups	Adjustment speed (mean)	Target ratio (mean)	Observed ratio (mean)	Average gap (mean)	Adjustment speed (median)	Target ratio (median)	Observed ratio (median)	Average gap (median)
POL	1999	0.16	0.30	0.24	0.06	0.16	0.29	0.14	0.07
POL	2000	0.15	0.36	0.25	0.11	0.15	0.37	0.18	0.13
POL	2001	0.14	0.28	0.25	0.03	0.14	0.27	0.18	0.03
ROM	1997	0.27	0.23	0.14	0.09	0.26	0.23	0.04	0.13
ROM	1998	0.26	0.25	0.17	0.08	0.26	0.25	0.08	0.12
ROM	1999	0.25	0.27	0.19	0.08	0.24	0.27	0.10	0.13
ROM	2000	0.20	0.29	0.21	0.08	0.19	0.29	0.11	0.14
ROM	2001	0.24	0.27	0.22	0.05	0.23	0.27	0.14	0.10

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