KRÁTKÉ ČLÁNKY

What Determines Leverage in Transition Countries?

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1. Introduction

This note investigates the determinants of leverage in the transition economies from Central and Eastern Europe in 1998. Two major features characterize the financial systems of these economies at that time. First, the financial markets are underdeveloped (Anderson – Kegels, 1998), (Scholtens, 2000). As a result, even large companies in the transition economies have restricted access to stock and bond issues for their financing needs. Second, the availability of retained earnings is lower than in Western Europe, because of the diminished profitability related to a worse economic situation. Consequently, companies are expected to ask more credit in these countries. Access to credit is thus a very important issue for the development of these economies.

We then analyze the behavior of creditors, since credit rationing has been shown in these countries (Hersch – Kemme – Netter, 1997), (Bratkowski – Grosfeld – Rostowski, 1998). Our study focuses on a comparative perspective with Western countries to analyze whether the factors influencing leverage are similar between both groups of countries. To tackle this issue, we test the determinants of leverage that are generally adopted in studies for Western economies, by proceeding to a cross-border analysis of six transition countries, with various degrees of economic and financial development. Berglöf and Bolton (2002) indeed underlined the existence of two groups of transition countries according to their degree of financial development. It seems therefore relevant to investigate whether the determinants of leverage are similar in all transition countries. We use the Amadeus database that provides information about a large number of companies. The possible differences between countries in the factors correlated to leverage are then investigated. The remainder of the paper proceeds as follows. The next section discusses related literature in Western and transition countries. Section 3 presents data and variables. Section 4 examines the results. We sum up with some concluding remarks in section 5.

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TABLE 1   Empirical Studies on the Determinants of Leverage

Study	Sample	Results[a]
De Jong and Van Dijk (1998)	102 listed Dutch companies for 1996	tangibility of assets (+), marginal tax rate (+), industry-specific risk (-)
Johnson (1997)	847 American companies for 1989	*non-banking debt ratio*: market-to-book value ratio (+), tangibility of assets (-), leverage[b] (-) * *banking debt ratio* : tangibility of assets (+), leverage (+), age (-), size (-), market-to-book value ratio (-)
Michaelas, Chittenden and Poutziouris (1999)	3500 small British companies for 1995	growth (+), future growth opportunities (+), tangibility of assets (+), operating risk (+), size (+), net debtors (+), profitability (-), age (-)
Rajan and Zingales (1995)	4500 listed companies from all G7 countries during the period 1987–1991	tangibility of assets (+), size (+), market-to-book value ratio (-), profitability (-)
Schwiete and Weigand (1997)	230 German companies during the period 1967–1994	profitability (+), capital concentration (+), growth (-), risk (-), size (-)
Weill (2001)	564 British and 644 French companies for 1996 and 1997	growth (+), tangibility of assets (+), profitability (-), size (-)

Notes: [a] The 'Results' column describes the observed relationships with leverage.
[b] Leverage is defined in this document as the ratio of equity and long-term debt to the total balance sheet.

2. Empirical Literature on the Determinants of Leverage

This section provides a brief survey of former empirical studies that have been conducted on the determinants of leverage in Western and transition countries. *Table 1* displays the results of the main works in Western countries. Leverage is defined in most studies as the ratio of the total balance sheet minus equity divided by the total balance sheet. With more disaggregated data, Johnson (1997) looks at the determinants of the banking debt ratio and the non-banking debt ratio. We can observe the focus using four variables: profitability, tangibility of assets, growth, and size. Furthermore, this survey gives us some insight to the expected relationship of variables with leverage. (a) There exists a positive relationship with tangibility of assets, which is confirmed by all the studies. (b) The relationship with size is ambiguous, since it is either positively or negatively significant depending on work. (c) Profitability tends to have a negative relationship. (d) The relationship with growth is rather positive.

In addition to empirical evidence in Western countries, there exists scarce evidence on the determinants of leverage for companies in transition countries. The starting point of this literature is the importance of self-financing these countries. The low level of bank credit is pointed out by Scholtens (2000) among others: the ratio of bank claims in the private sector divided by the GDP, which approximates the importance of bank credit, was on average 87.8 % for a group of Western economies, but only 22.9 % for a group of Central European economies in 1995. This shows the diminished importance of bank credit in transition countries.

This feature may be explained at least partly by the lack of access to external financing. Hersch, Kemme and Netter (1997) notably show that three quarters of the managers of a sample of small privately-owned Hun-

garian companies find it difficult to get long-term bank loans, even if they accept to pay the current interest rates. This notably results in the absence of a credit worthy reputation for most companies. It is as well the consequence of the collateral requested by the banks as security for a loan that may exceed the capacities of the borrower, as observed by Fan, Lee and Schaffer (1996) in Russia.

Following evidence of restricted access to external finance, the analysis of the determinants of leverage can mostly be considered as work on the factors of access to external finance, after taking internal financing into account. We briefly present the results of four studies about this issue in transition countries. Cornelli, Portes and Schaffer (1996) proceed to an analysis on a large number of Hungarian and Polish companies. They observed that leverage is negatively linked to profitability and tangibility of assets. Hussain and Nivorozhkin (1997) investigated this issue on a small sample of Polish listed companies for the early years of transition (1991–1994). They tested several financial and ownership factors that may influence leverage, defined as the ratio of all debt to either, total assets, equity or capital. Their study concludes in favor of a positive influence for size, foreign ownership, the share of retained earnings in the total balance sheet, but negative for age, current profitability and tangible assets. They also pointed out the absence of role for ownership concentration and tax.

Csermely and Vincze (1999) extend the analysis to a large sample of Hungarian large and medium sized companies. They focused on the factors influencing the bank debt ratio. They showed that profitability, size, the previous year's bank debt ratio and foreign ownership play a positive role, while there exists negative influence for asset tangibility and no link for quick ratio. In a comparative analysis with two Western countries (France, and the United Kingdom), Weill (2001) provides detailed evidence on the determinants of bank leverage, defined as the ratio of bank debt to total assets, in the Czech Republic and Poland. His main conclusion is that there are few significant factors for transition countries with comparison to Western countries: leverage is not significantly linked to profitability, innovation ratio, size and age, while tangibility has only a positive link with leverage in the Czech Republic. Only growth is significantly positive for both countries.

We have also to present the results of Hersch, Kemme and Netter (1997) already mentioned above. Their analysis of the factors favoring access to bank credit for small Hungarian companies provides interesting insights: the characteristics of the owner play a greater role than those for the company. Indeed, the size and age of the company are not significant, while the prior experience of the owner and its former Nomenklatura membership make it easier to obtain financing from the banks. These results must however be considered with care since they concern the very beginning of the transition.

This brief survey has highlighted the existence of differences in the determinants of leverage between Western and transition countries. The most striking difference is the negative relationship with tangibility of assets in transition countries. Furthermore, there are some variations in the sign of

the relationships among studies that may result from the analyzed countries. Thus, it appears relevant to investigate the determinants of leverage on a large sample of transition countries.

3. Data and Variables

The sample of data is made up of information collected from about 4 500 manufacturing companies from six transition countries: Bulgaria, the Czech Republic, Hungary, Latvia, Poland, and Romania. We used a balanced sample. The data is unconsolidated balance sheet data for 1996, 1997 and 1998.[1] As in Konings, Rizov and Vandenbussche (2003)'s study, they were gathered from the Amadeus database edited by Bureau Van Dijk. This database includes data for companies whose total assets or turnover exceeded 12 million USD, or the number of employees exceeds 100. We limited the analysis to manufacturing companies in order to have a homogenous sample, because of the discrepancies in financial structure between industries. To this end, we selected companies with CSO codes between 2 000 and 4 999. Following Rajan and Zingales (1995) and Weill (2001), we used the broadest definition of leverage by defining it as the ratio of total liabilities to total assets.

The starting point of our analysis is evidence of a credit rationing in transition countries. As a result, after controlling the internal financing by including profitability, we make interpretations of the tested determinants of leverage in terms of access to credit. Our aim is the comparison with Western countries. Therefore, we adopted the four main explanatory variables employed in the studies on the determinants of leverage in these countries. The first explanatory variable is *Profitability*, measured as the return on total assets in 1998. Two opposing effects of profitability may be suggested on leverage. First, a high profitability is considered as a positive signal for creditors, since it reduces the bankruptcy risk. Thus, a positive relationship may be expected. Secondly, since companies are credit-constrained in transition countries, the most profitable companies may finance more investment with their equity and may then have a lower leverage. Following the evidence of credit rationing in transition countries, we expect a negative relationship of profitability with leverage. The second explanatory variable is *Tangibility*, measured as the ratio of fixed assets to total assets in 1998. We expect a positive coefficient for this variable, due to the role of tangible assets as collateral value for creditors. Collateral value plays a major role in access to credit in transition countries, as confirmed by Bratkowski, Grosfeld and Rostowski (1998) in the Czech Republic, Hungary, and Poland, and by Fan, Lee and Schaffer (1996) in Russia.

The third explanatory variable is *Growth*, defined as the mean growth ratio of the total balance sheet between 1996 and 1998. We expect a positive coefficient for this variable since high growth is generally considered as a proxy signal of good financial health of a company and is then positively

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[1] 1996 and 1997 data are only adopted for the computation of total balance sheet growth, given the lack of data for other variables.

TABLE 2   Descriptive Statistics for Variables
           (Table displays the mean values for each variable by country.)

	Bulgaria	Czech Republic	Hungary	Latvia	Poland	Romania
N	1022	848	185	122	850	1469
Leverage	44.59	54.47	51.30	49.06	47.34	56.46
Profitability	1.42	0.91	7.16	2.66	4.71	7.50
Tangibility	57.96	43.85	39.59	41.57	44.61	47.79
Growth	328.89	102.96	121.05	119.34	195.62	159.41
Size	7.25	9.35	9.14	8.44	10.06	7.63
*Ind*1	14.29	15.92	15.14	10.66	16.94	14.84
*Ind*2	30.04	44.22	35.68	19.67	31.76	27.09
*Ind*3	55.67	39.86	49.18	69.67	51.30	58.07

Notes: All ratios are multiplied by 100, except for *Size*.
          Profitability the return on assets in 1998, *Tangibility* the ratio of fixed assets divided by total assets in 1998,
          Growth the average growth of total balance sheet between 1996 and 1998, *Size* the logarithm of turnover
          in 1998.
          *Ind*1 (for companies involved in the extraction of minerals, ores and fuels, manufacture of metals and mi-
          neral products), *Ind*2 (metal goods, engineering and vehicle industries), and *Ind*3 (other manufacturing in-
          dustries) are industry dummy variables. Distribution is presented here as a percentage of firms across
          the three industries.

valued by creditors. The fourth explanatory variable is *Size*, measured as the logarithm of turnover. A logarithm is adopted to reduce the dispersion between companies. We expect a positive coefficient for this variable: size may be considered as a proxy of failure risk, since large firms are more diversified and have a lower frequency of failure than small companies. Therefore, creditors should be more willing to lend money or to grant higher delays of payment to large firms.

We also include in each regression industry dummy variables to control the possible impact of an industry on the determinants of leverage. As our sample only includes manufacturing companies, we choose to divide our sample in three categories, following the international CSO industrial classification: the first category consists of companies with CSO codes from 2000 to 2999 meaning all companies involved in extraction of minerals and ores than fuels, the manufacture of metal and minerals and products. The second category consists of companies with CSO codes numbered between 3000 and 3999, meaning all companies involved in metal goods, engineering and vehicle industries. Finally the third category consists of companies with CSO codes between 4000 and 4999, meaning all companies involved in other manufacturing industries. We then use two industry dummy variables: *Ind*1 if the firm belongs to the first category and *Ind*2 if the firm belongs to the second category.

We adopted the Tukey box-plot, based on the use of interquartile range in order to clean the data from outliers. Companies with data out of the range defined by the first and third quartiles that are greater or less than twice the interquartile range were excluded for the following ratios: leverage, profitability, tangibility of assets, and growth. *Table 2* displays by country, the mean values of variables used in the regressions. It also shows the distribution of firms across the three industries. We observed large discrepancies between countries for all variables. Mean leverage ranges from 44.59 % for Bulgaria to 56.46 % in Romania, this means that companies from transition countries are marked by higher levels of capitalization than

TABLE 3   Factors Correlated with Leverage

	Bulgaria	Czech Republic	Hungary	Latvia	Poland	Romania
Intercept	0.885*** (0.050)	0.328*** (0.103)	0.438*** (0.129)	0.648*** (0.213)	0.369*** (0.087)	0.896*** (0.048)
Profitability	-0.854*** (0.061)	-0.797*** (0.145)	-0.927*** (0.132)	-0.541*** (0.199)	-0.829*** (0.057)	-0.861*** (0.051)
Tangibility	-0.676*** (0.034)	-0.340*** (0.050)	-0.363*** (0.085)	-0.355** (0.137)	-0.371*** (0.041)	-0.748*** (0.032)
Growth	-0.054*** (0.008)	0.219*** (0.078)	0.252*** (0.080)	0.184* (0.090)	0.177*** (0.023)	0.053*** (0.014)
Size	0.022*** (0.005)	0.016** (0.008)	-0.275E-3 (0.011)	-0.023 (0.020)	-0.162E-3 (0.008)	0.524E-3 (0.005)
*Ind*1	-0.020 (0.022)	-0.037 (0.026)	-0.053 (0.044)	-0.095 (0.079)	-0.050** (0.019)	-0.072*** (0.018)
*Ind*2	-0.061*** (0.016)	0.007 (0.019)	0.037 (0.033)	-0.037 (0.063)	-0.038** (0.016)	-0.086*** (0.014)
N	1022	848	185	122	850	1469
Adjusted R^2	0.4119	0.0893	0.2686	0.0938	0.2567	0.3417
Condition Index	18.07	30.48	22.94	22.84	34.84	20.84

Notes: Standard deviations are in parentheses.
         *, ** and *** are significant at the 10, 5 and 1percent level respectively.

those from Western countries. Indeed, Rajan and Zingales (1995) observed that mean leverage ranges from 57 % to 72 % for companies from G7 countries. This fact could be misinterpreted as the consequence of a better financial situation with a lower indebtedness for companies from transition countries. However, Bratkowski, Grosfeld and Rostowski (1998) showed that the reason of the high capitalization ratio in transition economies is the reluctance of banks to provide loans, in comparison with Western economies. Therefore, the differences in leverage may result from discrepancies in access to credit between countries. This would mean that Bulgarian companies would be the most credit-rationed companies in our sample.

4. Results

Here, we have performed the following regression for each country.

$$Leverage \text{ [Firm } i] = \alpha + \beta_1 \, Profitability + \beta_2 \, Tangibility + \beta_3 \, Growth + \beta_4 \, Size + \beta_5 \, Ind1 + \beta_6 \, Ind2 + \varepsilon_i$$

We choose not to pool all observations in one sample for the regression, as we consider that regressions by country provide more straightforward results. This choice that was also chosen by Rajan and Zingales (1995) in their cross-country analysis of G7 countries, is allowed by the size of our national samples. *Table 3* exhibits the results by country. Based upon the individual *t*-statistics and the value of the adjusted R^2 statistics, we conclude that the fit of the equation is quite satisfactory for all countries. We used

the condition index of Besley, Kuh and Welsch to assess the collinearity of the model. The multicollinearity of the regressions appears rather satisfactory.

A first glance of the results shows that the tested variables are very significant in most countries. We also notice few differences between countries for the sign and the significance of variables. *Profitability* is negatively correlated with leverage in all countries, confirming that profitable firms rely more on equity. The coefficient for *Tangibility* is significantly negative for all countries. This relationship appears surprising since the role of collateral value is expected to be of the utmost importance in transition countries where banks exert special care to secure loans. This argument could however not be relevant for transition countries, as it ignores two features of these economies. First, the enforcement of the law in case of bankruptcy and liquidation is less efficient in transition countries than in Western countries. Banks may then be inclined to weight positively collateral value but in a lesser degree than in Western countries. Secondly, as suggested by Hussain and Nivorozhkin (1997), lenders in transition countries are particularly risk-adverse and may then attach great importance to liquidity. As a result, the share of current assets in total assets should be positively valued, leading to a negative relationship between tangibility and leverage.

Growth is positively correlated with leverage for five of the six countries as expected. This stems from the positive valuation of growth by creditors in transition countries. The only exception is Bulgaria where we observe a negative and significant coefficient for this variable. This specific relationship might result from very high average growth of the Bulgarian sample that may lead to the lack of valuation by creditors for this non-discriminating feature.

The coefficient for *Size* is not significant in all countries, if we except Bulgaria and the Czech Republic where it is significantly positive.[2] Therefore, the positive relationship expected in transition countries obtains no support for four of the six countries. In these countries with a high frequency of company failure in comparison to Western countries, this is a surprising result as size can be considered as one of the best signals of the probability of survival. The reason may be the counterbalance of this positive effect by a negative influence of size, as cited by Hersch, Kemme and Netter (1997): large firms demand larger loans and larger payables that are harder to obtain. The positive and very significant coefficient in Bulgaria might then result from a weakened negative effect of size, as the mean-sized Bulgarian company is the lowest of our sample.

Our results are in concordance with former studies of transition countries, whose results were stated above. For instance, the unexpected negative sign for the tangibility of assets was also observed by Cornelli, Portes and Schaffer (1996). However, since some of these scarce works only focus

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[2] It has to be emphasized that we also tested the existence of a non-linear relationship between leverage and size, by computing the same regressions by country. The variable *Size* was then replaced by four dummy variables for size classes. *Dummy variables* were not significant in the four countries other than Bulgaria and the Czech Republic for the two highest size classes. This then means no non-linear or linear relationship between leverage and size, other than the observed linear link in Bulgaria and the Czech Republic.

on bank debt (Csermely – Vincze, 1999), (Weill, 2001), it is difficult to compare their results with ours. Our conclusion notably differs from Weill (2001)'s that points out the lack of significance of usual determinants of leverage in the Czech Republic and Poland, but this study investigated the determinants of bank leverage. To explain this difference, further research should then be carried out on the different determinants that influence bank credit and trade credit in transition countries.

5. Concluding Remarks

We analyzed the usual determinants of leverage in six transition countries, to investigate if they play a similar role in Western countries. We observed the significance of tested factors in most countries, with some differences with the pattern of Western countries. The least profitable firms have on average a higher leverage, while higher growth favors leverage. Size does not influence leverage in four countries, whereas there exists a striking negative relationship between the tangibility of assets and leverage observed in all countries. We can also conclude that the determinants do not differ between countries, if we except size. It then seems no divide between both groups of countries according to economic or financial development. This tends to suggest the existence of characteristics specific to all transition countries that influence the determinants of leverage.

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SUMMARY

What Determines Leverage in Transition Countries?

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This note investigates the determinants of leverage usually tested in Western countries on a large sample of manufacturing companies from six transition economies in Central and Eastern Europe in 1998. We observe at that time the significance of tested factors in most countries, with some differences in comparison to Western countries. The few differences between transition countries suggest the existence of specific characteristics in determinants of leverage for these economies.