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## Investment and Credit Constraints in Transition Economies: Micro Evidence from Poland, the Czech Republic, Bulgaria and Romania

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**Investment and Credit Constraints in Transition Economies: Micro Evidence from  
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**INVESTMENT AND CREDIT CONSTRAINTS IN TRANSITION ECONOMIES:  
MICRO EVIDENCE FROM POLAND, THE CZECH REPUBLIC, BULGARIA AND  
ROMANIA**

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**Abstract**

In this paper we investigate to what extent firm investment in transition countries is sensitive to internal finance. We use accounts data of over 4000 companies in four countries at different stages of transition. We find that firms in Bulgaria and Romania are less sensitive to internal financing constraints, in contrast to firms in Poland and the Czech Republic. A likely explanation is that Bulgaria and Romania, which are the least advanced in the reforms towards market economy, have a stronger persistence of soft budget constraints than in the other two more advanced countries.

Keywords: Investment, financial constraints, soft budget constraint, transition to a market economy

JEL classification codes: E22, G32, P21, D21, D92

## **I. Introduction**

The transition from a centrally planned to a market orientated economy that started in Central and Eastern Europe more than a decade ago implied the need for substantial restructuring of many inefficient firms. Theoretical models made a distinction between initial and strategic restructuring (e.g. Grosfeld and Roland, 1997; Aghion, Blanchard and Burgess, 1994; Blanchard, 1997). While the former is concerned with getting rid of labor hoarding, the latter is concerned with achieving long run viability of firms.

One of the key components of strategic restructuring in these models refers to the investment decision that firms need to make. At the start of transition it became clear that most firms had to invest heavily to modernize their obsolete capital stock and thus to improve their long run viability if they were to compete in international markets. However, the external conditions such as the functioning of capital markets and the presence or absence of soft budget constraints are of crucial importance to achieve such strategic restructuring. In particular, if soft budget constraints (SBC) persist (i.e., the government or other institutions bail out loss making firms), restructuring may be postponed (Kornai, 1999; Dewatripont, Maskin and Roland, 2000). In their 1999 transition report, the EBRD has indeed documented the continuation of soft budget constraints in most of the transition economies, not through direct subsidies, but rather via indirect ways, such as tax arrears or “preferential” bank loans.

In this paper we use a unique panel of more than 4,000 manufacturing firms consisting of comparable data for Poland, the Czech Republic, Bulgaria and Romania between 1994-1999. The main purpose is to contrast the investment behavior of firms in the slowly reforming economies of Bulgaria and Romania versus those in fast reforming countries, Poland and the Czech Republic. We find firms in Poland and the Czech Republic to be credit constrained, suggesting that capital markets are not functioning properly. In

contrast firms in Bulgaria and Romania seem far less dependent on internal financing to invest. We interpret this result as evidence of stronger persistence of SBC in this group of slowly reforming transition countries. The remainder of the paper is organized as follows. Section II introduces the methodology and discusses estimation issues. Section III describes the data set and discusses the estimation results. The final section IV concludes.

## II. Background, Empirical Model and Estimation Issues

The standard accelerator model of investment, assuming perfect capital markets, relates investment to the output performance in firms.<sup>1</sup> Financial variables should have no impact on the investment decision of firms as internal and external finance are perfect substitutes in perfect capital markets. However, in the context of transition economies where capital markets are just emerging and in the face of substantial information asymmetries, the assumption of perfect capital markets is harder to defend.

There are only a handful of papers that study the investment behavior of firms in transition countries. Lizal and Svejnar (2001) and Anderson and Kegels (1997) analyze investment in firms in the Czech Republic in the 1990s, while Budina, Garretsen and de Jong (2000) analyze investment of Bulgarian firms over the period 1993-1995.

The empirical equation that we seek to estimate has the following standard specification:

$$\frac{I_{it}}{K_{it-1}} = \alpha_0 + \alpha_1 \frac{Q_{it}}{K_{it-1}} + \alpha_2 \frac{CF_{it}}{K_{it-1}} + \varepsilon_{it}, \quad (1)$$

where  $I$  stands for gross investment defined as the change in the real capital stock plus depreciation,  $Q$  is the growth of real sales of the firm,  $CF$  is the real cash flow of the firm,  $K$  is the level of the real capital stock (proxied by tangible fixed assets), subscript  $i$  refers to firm  $i$  and subscript  $t$  refers to year. We normalize by the capital stock to control for size effects. We deflated all nominal values with the producer price index. The parameter  $\alpha_i$  represents an unobservable firm level fixed effect that may be correlated with the other explanatory variables and  $\varepsilon_{it}$  is a white noise error term.

As in other studies, the growth in real sales in equation (1) proxies for the investment opportunities. The coefficient  $\alpha_2$  captures the sensitivity of firm level investment with respect to the internal financing of the firm and is the coefficient of interest. A low value of the cash flow coefficient,  $\alpha_2$ , suggests that the firm has access to external finance while a high value of  $\alpha_2$  suggests that investment is largely dependent on the profitability and the liquidity of the firm as measured by the cash flow.<sup>2</sup>

To control for the unobserved firm level fixed effect we will estimate equation (1) in first differences or

$$\Delta \frac{I_{it}}{K_{it-1}} = \alpha_1 \Delta \frac{Q_{it}}{K_{it-1}} + \alpha_2 \Delta \frac{CF_{it}}{K_{it-1}} + \Delta \varepsilon_{it} . \quad (2)$$

By estimating equation (2) we can obtain consistent estimates of the parameters of interest and at the same time control for potential firm heterogeneity. Furthermore, we will treat the regressors as endogenous as it is conceivable that higher investment leads to higher changes in sales and higher cash flows. There may be measurement error in the variables as well. We

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<sup>1</sup> Some of the most successful empirical investment models are based on the traditional acceleration principle, which links the demand for capital goods to the level or change in firm's output or sales. (e.g., Abel and Blanchard, 1986 and Fazzari, Hubbard and Petersen, 1988).

will estimate equation (2) including year dummies to control for unobserved common aggregate shocks.

Arellano and Bond (1991) demonstrate that in a first difference model as in equation (2) good instruments are the values of the endogenous explanatory variables dated  $t-2$  and at earlier dates as they are not correlated with the contemporaneous first differenced error term. As the panel progresses an increasing number of instruments can be used which increases the efficiency of the estimates. We will therefore compute a Sargan test of overidentifying restrictions to test the validity of the instruments used. Furthermore, we will also report a second order serial correlation test (SOC) which is asymptotically  $N(0,1)$  distributed. The absence of second order serial correlation is consistent with the absence of first order serial correlation in the levels equation (1). This is important to verify as we are using lagged values of the endogenous explanatory variables as instruments.

### **III. Data and Results**

We use data from company accounts recorded in the AMADEUS database.<sup>3</sup> To be included in AMADEUS companies must comply with at least one of the following criteria: (i) turnover greater than 10 million EUR; (ii) number of employees greater than 150; (iii) total assets greater than 10 million EUR. Uniformity is achieved by standardization of accounting information enabling easy cross border analysis. We examine the time period 1994-1999, a period for which AMADEUS has a large coverage of firms. We trace firms for

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<sup>2</sup> Experimenting with other proxies for the liquidity variable, such as the liquidity ratio yielded qualitatively the same results.

<sup>3</sup> AMADEUS is a Pan-European financial database, created and distributed by the Bureau Van Dijk on CD-ROM, containing information on medium and large public and private companies. The data are collected by local information providers and Bureau Van Dijk makes them consistent to facilitate cross-country comparisons. For Bulgaria are provided by Creditreform Bulgaria OOD; for Czech Republic-by Albertina Data; for Poland-by InfoCredit; and for Romania-by Romanian Chamber of Industry and Commerce.

at least three consecutive years and table 1 gives an overview of the structure of the panel and the number of firms in each country.

Summary statistics of the relevant variables such as employment, investment, growth of sales and cash flow are reported in table 2. We can already note that firms in Bulgaria and Romania, the two slow reformers, have on average lower investment rates and lower growth rates in real sales.

The regression results are reported in table 3. The results are IV GMM estimates where we treat the growth in real sales and the cash flow as endogenous. In the first column we report the unconstrained model, while in the second column we report the liquidity constrained model. The estimated coefficient  $\alpha_1$ , of the change in real sales controlling for investment opportunities, is positive in all countries and similar in magnitude to what has been reported in previous studies for transition economies. This suggests that the accelerator model is not a bad approximation for describing investment behavior in transition economies.

We next turn to the discussion of liquidity constraints in column (2). The coefficients on the cash flow take different values for the different countries in our sample. While for Poland and the Czech Republic,  $\alpha_2$  is highly significant and positive this is not the case for Bulgaria and Romania. For Bulgarian firms we find a relatively low coefficient of 0.025 that is statistically significant only at the 10% critical level. This compares to a coefficient of 0.07 for both Polish and Czech firms. For Romanian firms there is no statistically significant effect of cash flows on investment. Thus firms in Poland and the Czech Republic seem to be credit constrained, a result often observed in western market economies as well. To put it differently, firm investment in these countries seems to depend on the liquidity of firms. Furthermore, credit constraints seem far less present in the least advanced transition countries, Bulgaria and Romania. It is unlikely that this is a reflection of perfect capital markets, given the many uncertainties and the early stage of financial reforms characterizing



these two countries. The alternative explanation is that soft budget constraints prevail in Bulgaria and Romania, which implies that firms are not operating under liquidity constraints. When access to credit is facilitated through preferential lending under a variety of patterns, investment becomes less sensitive to internal firm financing.

Finally, as a robustness check of the sensitivity of our results to outliers, we have re-estimated every country regression for a sample excluding firm-years with negative investment to capital ratios, which can be considered as outliers in the dataset. The results are presented in table 4 and show to be qualitatively the same as the results for the full sample.

#### **IV. Conclusion**

This paper uses comparable firm level data for four transition economies, two fast reformers and two slow reformers, to analyze the impact of internal financial constraints on firm's investment behavior. For the fast reformers we find, as in well-developed market economies, that firms are liquidity constrained in their investment decisions. However, in the slowly reforming economies, we find that such constraints are less important. This is unlikely to be a reflection of the presence of perfect capital markets, rather it is likely to be a reflection of the presence of soft budget constraints in these countries.

A further exploration of how soft budget constraints influence firm's restructuring and performance is not only important in transition economies, but also in well-developed market economies, where soft budget constraints may exist.

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**Table 1 Structure of the panel**

Years of observation	Number of firms			
	Poland	Czech Republic	Bulgaria	Romania
3	251	221	268	196
4	148	379	293	551
5	55	444	621	983
Total number of firms	454	1044	1182	1730

**Table 2 Summary statistics**

	Poland		Czech Republic		Bulgaria		Romania	
	Mean	St.Dev.	Mean	St.Dev.	Mean	St.Dev.	Mean	St.Dev.
<i>E</i>	514	978	504	1034	386	761	743	1391
<i>I/K</i>	0.049	0.186	0.132	0.290	0.017	0.475	-0.108	0.467
<i>Q/K</i>	0.327	1.847	0.437	3.210	-0.176	1.984	0.113	9.913
<i>CF/K</i>	0.307	0.767	0.170	0.628	0.198	3.654	0.357	3.566

**Note:** *E*: number of employees; *I*: gross fixed investment, including depreciation, over beginning of period capital; *Q/K*: change in real sales over beginning of period capital; *CF/K*: real cash flow over beginning of period capital;

**Table 3: Dependent variable:  $I/K$   
GMM IV estimates**

	Poland		Czech Republic		Bulgaria		Romania	
	I	II	I	II	I	II	I	II
$Q/K$	0.020 (6.932)	0.038 (6.753)	0.018 (1.610)	0.010 (2.027)	0.040 (1.767)	0.016 (2.099)	0.012 (1.783)	0.007 (2.273)
$CF/K$		0.067 (4.596)		0.070 (4.105)		0.025 (1.597)		0.004 (0.376)
Number of firms	454	454	1044	1044	1182	1182	1730	1730
Number of observations	1620	1620	4399	4399	5081	5081	7710	7710
SarganTest	0.413	0.822	0.980	0.593	0.210	0.308	0.204	0.132
SOC	1.476	1.487	1.053	0.991	1.277	1.267	1.741	1.634

**Note:** two step robust t-statistics in brackets,  $Q/K$  and  $CF/K$  are instrumented using all available moment restrictions from  $t-2$  and before. All equations include year dummies. The Sargan test is  $\chi^2$  distributed, p-values are reported, p-values below 0.05 would suggest a rejection of the validity of the instruments at the 5% critical level. The second order serial correlation test (SOC) follows a Normal distribution, a value above 2 or below  $-2$  would suggest presence of second order serial correlation at the 5% critical level..

**Table 4: Dependent variable:  $I/K$   
GMM IV estimates (only firms with positive investment rates)**

	Poland		Czech Republic		Bulgaria		Romania	
	I	II	I	II	I	II	I	II
$Q/K$	0.028 (7.146)	0.039 (7.171)	0.016 (1.904)	0.020 (3.348)	0.035 (2.553)	0.033 (2.251)	0.017 (2.201)	0.021 (5.517)
$CF/K$		0.054 (5.411)		0.058 (11.05)		0.031 (1.792)		0.007 (1.048)
Number of Firms	422	422	901	901	1081	1081	1474	1474
Number of observations	856	856	2655	2655	2248	2248	3433	3433
Sargan Test	0.467	0.247	0.401	0.433	0.467	0.179	0.232	0.263
SOC	1.043	1.324	1.174	1.340	1.119	1.124	1.475	1.469

**Note:** as in table 3