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Panel Data Results From Estonia, 1995-1999.***

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William Davidson Institute Working Paper Number 649
February 2004

Financial Constraints in Investment - Foreign Versus Domestic Firms. Panel Data Results From Estonia, 1995-1999. *

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Abstract

Using data from Estonian manufacturing firms during the period 1995-1999 we apply panel data techniques, in particular the Arellano-Bond (1991) method to investigate the investment behaviour. We employ the model of optimal capital accumulation in the presence of convex adjustment costs. We find that the domestic companies seem to be more financial constrained than those with the presence of foreign investors. Furthermore we find that smaller firms are more constrained than their larger counterparts.

JEL classification: G32, F23, P31, C23.

Key words: Investment, Cash Flow, Foreign Ownership, Firm Size, Estonia

* We are particularly indebted to Jaan Masso for comments. All remaining errors are ours.

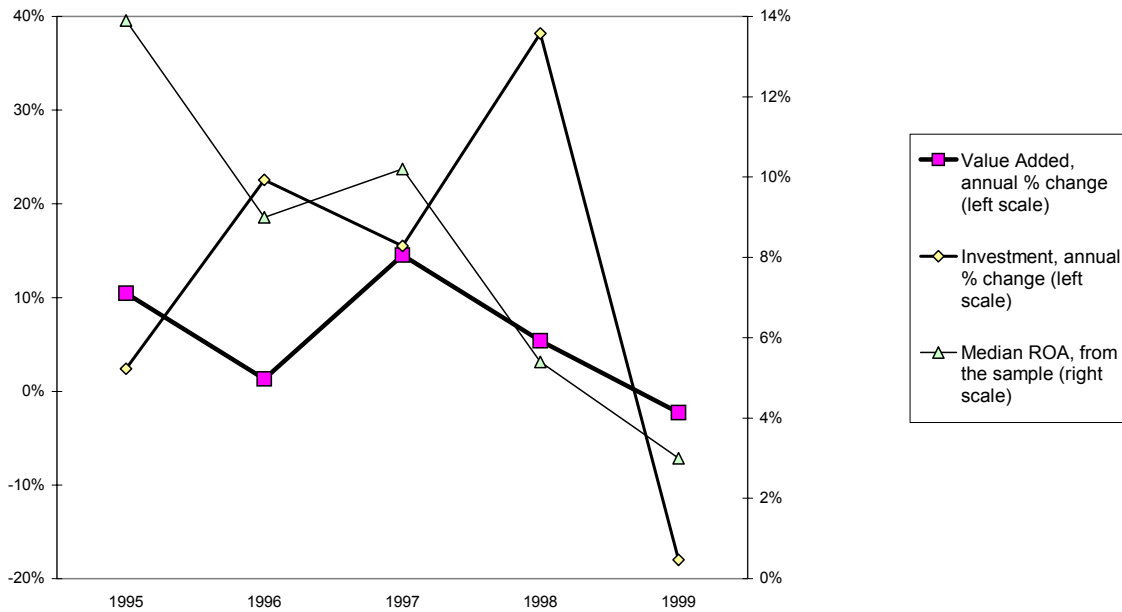
1. Introduction

The assumption of perfect capital markets and of investment decisions being independent of financial factors (Modigliani and Miller 1958) may be still a useful approximation for many purposes. Yet we know by now that it can be refuted by empirical data. If internal and the external capital are not perfect substitutes, then investment may depend on financial factors, such as the availability of internal finance or the functioning of credit markets. Thus, a “financing hierarchy” exists, in which internal funds have a cost advantage over issuing new debt or equity finance. While a series of empirical studies is available no visible consensus on methodology and on interpretation on findings exists. On the contrary, investment remains one of the most disputed topics. For that reason we believe that it is still an area, where empirical results count, and even a modest contribution like ours may still possess some value added. We do not aim to advance theory. Instead, we focus on econometric work, apply a simple design, which addresses the issue of endogeneity of firms’ groupings. Our main focus of interest is the difference between companies with foreign owners and those with domestic owners in respect of financial constraints. Does a company with foreign ownership have an advantage in terms of overcoming financial constraints and in better access to financial capital than its domestic counterpart? Our data is from a small open, advanced transition economy, Estonia. During the period we analyse (1995-1999), it experienced a major inflow of foreign capital. This process of building up of foreign presence after initial opening indicates that foreign ownership cannot be taken as exogenous factor. Taking that into account, we establish that foreign companies are less financially constrained. So are larger companies. These results shed some light on the process of foreign direct investment and the nature of owner specific advantages of foreign investors.

2. Investment in a transition economy

Firstly we give a brief overview of investment at the aggregate level in Estonia during the period which corresponds to our sample.¹

Figure 1. Value Added, Investment and Profitability in Estonian Manufacturing



After collapsing at the beginning of the transition period, investment in manufacturing recovered and impressive growth rates of production and investment were recorded in late 1990's, albeit the slow down in production in 1999 was accompanied again by falling investment levels. Disappointing results in 1999 reflect the impact of the Russian crisis of 1998, which affected several neighbouring economies, including Estonia. As might be expected, variation in investment rates is much higher than in production. One could also notice some indication that acceleration/deceleration in production growth lead to acceleration/deceleration in investment rates with a one-year delay correspondingly.

Wide variation in investment rates may be indicative of capital market imperfections, as investment becomes dependent on retained earnings and those in turn are sensitive to the dynamics of demand. As stated by Bond and Meghir (1994): “the way in which investment responds to transitory demand shocks and to cyclical variation in profits crucially depends on whether internal finance constraints capital expenditure”.

¹ Indicators based on the sample are different; in particular, aggregate data capture the impact of both outflow of firms and inflow of new entrants, thus they better characterise the overall situation in manufacturing.

So far investment in transition economies attracted little attention from researchers, especially on a micro-level. Existing studies on firm investment behaviour at the firm level in transition economies include Konings *et al.* (2002), Lizal and Svenjar (2002) and Prasnikar and Svenjar (1998). This gap in the literature may be explained by two problems. Firstly, the data on assets was of low quality or unavailable for the early transition period. Secondly, evidence from macroeconomic studies indicated that there was no correlation between investment and production dynamics for the early transition period. That is due to the fact that initially, most efficiency gains could be achieved by reallocation and reorganisation, which required little investment in fixed assets.² Yet, several years into the transition process, those ‘shallow’ sources of productivity gains are no longer predominant and it becomes clear that firms need to invest in order to modernise obsolete capital, as the process is crucial for strategic restructuring. However in a situation of poorly working capital markets this is not an easy task.

Colombo and Driffill (2003) highlight problems experienced in financial institutions during the initial transition period, where a banking system needed to be developed which could judge and monitor the creditworthiness of potential borrowers, along with channelling resources to worthy investment projects. In particular they note the problems found in the financial sector such as bad loans, bankruptcies, and poor stock market development. Lizal and Svenjar (2002) also note the problems associated with corruption in the banking system in transition economies, such as the “old boys” network of extending credit to existing clients. Some authors argue that as a result of this and other macro influences, transition economies suffered from the “credit crunch” (Calvo and Coricelli, 1994). Financing for the small and medium enterprises remain a problem, with serious economic implications, as the initially underdeveloped SME sector plays important role in generating employment and production growth. While bank reorganisation and reform had occurred during the 1990’s, the financial system remains underdeveloped. Also, new equity issues play a small role as a source of capital for

² For a recent contribution and further references to the empirical literature on macroeconomic growth in transition countries, see Falcetti *et al.* (2002). Notably, neither this nor earlier studies include investment variables.

investment. In such an environment, access to foreign capital may play an important role overcoming these financial constraints.

Our research motivation is to investigate how this situation impacts on firm investment behaviour. Do companies with foreign owners enjoy an advantage vis-à-vis domestic firms in their access to finance? Are small companies constrained in their investment and growth? Do small companies rely on internal finance only?

The dominant trend in the literature was to assume that if firms rely on internal sources of finance then we can conclude that capital markets are not working correctly, and thus firms are “credit constrained”. We now turn to this issue.

3. Alternative research frameworks

Here we refer briefly to alternative specifications of the investment equations present in contemporary literature. Jorgenson (1971) offers a classic review of earlier investment theories.

Firstly, the acceleration principle links the demand for capital goods to the level or change in a firm’s output or sales. Examples of empirical research based on this model include Fazzari *et al.* (1998), who include contemporaneous sales (as well as several lags) in their investment equation, Hall *et al.* (1998a) and Konings *et al.* (2002) for transition economies.

Hall *et al.* (1998a) successfully apply the accelerator model in similar samples of firms in US and France for the period 1978-89. Their regression results show that sales dynamics positively affect investment in both the US and France (with long run impact of sales on the desired level of capital being close to one in US, although the coefficient is imprecisely determined for France). In addition, sensitivity of investment to cash flow, which was detectable for 1970s for both countries, no longer exists in the period 1985-1993, which may be interpreted as an improvement in the way the capital market operate there.

Nevertheless, the sales accelerator also has its drawbacks. One such criticism is that it does not include the relative price of capital in the empirical specification.

Secondly, specifications based on Tobin's Q may be derived from more general optimisation models. According to this methodology, the market value of the firm affects investment. The Tobin Q framework states that a value maximising firm will invest as long as the shadow value of an additional unit of capital, marginal q, is no smaller than unity. One advantage of this approach is that Q can control for the market's evaluation of the firm's investment opportunities. However, Schiantarelli (1996) argues that average Q may be a very imprecise proxy for the shadow value of an additional unit of new capital (p74). As a result Q is an inefficient method of measuring investment opportunities. And, Weller (2000) argues that the Tobin's Q approach may not be practical in a transition environment as capital markets are underdeveloped, which makes it very difficult to arrive at market valuations (p10).

Thirdly, estimation of the optimum capital accumulation model, which uses the Euler equation, avoids relying on measures of profitability based on the firm's market value. Instead it states that the value of marginal product of capital today, after adjustment costs, should equal the cost of a new machine, minus the cost savings resulting from the fact that the firm can invest less tomorrow while still maintaining the capital stock on its optimal path (Schiantarelli, 1996, p76). The resulting investment equation can be successfully estimated by IV or GMM econometric techniques, using lagged values of the variables as instruments. Unfortunately, the Euler equation approach also suffers from some drawbacks. In particular, in the case of liquidity constraints this approach may be unable to detect the presence of financial constraints, if the tightness of such constraints is constant over time. In addition, this method can be prone to parameter instability, suggesting the existence of specification problems (*Ibid*, p.77). Hall *et al.* (1998a) also criticise the Euler equation for being 'fragile'. Another point is that there is more than one model of optimisation that has similar empirical implications. In particular, the typical assumption is that there are convex adjustment costs. That implies more investment after a bad shock and less after a positive one, as companies aim at smoothing net cash flow after investment over time. Interestingly, Carceles-Poveda (2003) proves that the similar behavioural implication may follow from an alternative assumption that

the firm is risk averse, in the broader model of utility maximising, in place of value maximising.

Our highly stylised conclusions are the following. The approach based on Tobin Q is not applicable in case of Estonian data, as it is not in most economies apart from a group of highly developed economies with well functioning capital markets. The simple reason for it is that the stock market valuation is not available in a prevailing number of cases. That leaves us with a choice between the accelerator model and the model based on Euler equation. We think that the latter has more appeal due to fact that it is based on implicit optimisation modelling. Yet, it proved to be difficult to estimate in other studies and, ultimately, our choice is conditional on econometric viability. We would turn to accelerator model in the case where we cannot obtain consistent estimates of the model derived from optimisation of capital accumulation.

4. Financial performance, availability of internal funds and investment

The nature of the link between financing constraints and investment is a highly debated issue in the literature on investment. One stream of literature shows that high sensitivity and positive response of investment to cash flow can be interpreted as evidence of financial constraints and demonstrate an empirical link with the likely predictors of existence of credit constraints. In particular, some researchers classify firms on the basis of dividend- payout behaviour (Fazzari *et al*, 1988), association with banks or business groups (Hoshi *et al*, 1991), ownership (Lizal and Svenjar, 2002, among others) and firm size (see Schiantarelli 1996 and Hubbard 1998 for reviews of all but most recent literature).³ One outstanding example of this approach is Bond and Meghir (1994), who develop a model incorporating the hierarchy of finance, relying on both dividend behaviour and issue of new shares. The investment behaviour of firms should differ across different financial regimes. They argue that Euler equation can be estimated consistently for two categories of companies: /i/ those, which can generate abundant

internal funds in relation to perceived investment opportunities, and therefore pay positive dividends, /ii/ the companies, which issue new stock to finance investment. In between those two, we have the third category of companies, which neither pay dividends nor finance new investment by issuing new shares. In this group, investment would depend on unobservable value of constraint on dividend payments. The companies are liquidity constrained in a sense that ‘a windfall addition to current earnings, which conveys no information about the firm’s future prospects, will result in an increase in investment’ (*Ibid.*, p.203). This group of firm may be characterised by excess sensitivity of investment to measures of internal finance.

However, Kaplan and Zingales (1997 and 2000) and Cleary (1999) present empirical evidence intended to demonstrate that investment-cash flow sensitivity is not a useful measure of financial constraints, due to non-monotonicities. While their conclusions were in turn questioned by Fazzari *et al.* (2000), the debate is not concluded. In particular, Kaplan and Zingales (2000) notice that some prominent companies (like Microsoft) have high cash balances and avoid dividend payments, while investment remain very sensitive to cash flow. They notice that one explanation of this, may rely to so called ‘flypaper effect’, which is discussed by Hines and Thaler (1995). According to the latter authors, while “the distinction between having money on hand and being able to raise money without difficulty should have no impact on spending decisions”, in practice “when it comes to predict the behaviour of governments, organisations and individuals, it is important to distinguish between the resources they have on hand and resources they could easily get” (*Ibid.*, pp. 224-225). Correspondingly, larger volume of cash flow may lead to more investment.

A similar, more elaborate hypothesis was proposed in an important stream of literature linked with Jensen (1986) who developed the “free cash flow” approach. According to this, the managers maximise objectives, which are not in common with shareholders’ interests, with managers aiming to increase firm size, as this boosts their pay, status and power. Thus the cash flows that are at the disposal of managers after valuable/efficient

³ Other possible classifications include financial leverage, ownership concentration and different time

investment is carried out, is “free cash flow”. Managers may then still take on more investment projects at the expense of shareholders, increasing firm size but at the cost of lower net present value. Consequently cash flow and investment may be positively related and this is an alternative explanation as compared with the financial constraints hypothesis, and may explain the puzzling behaviour of firms like Microsoft . Nevertheless, inefficient use of resources is still implied, as in the credit constraint hypotheses; it is just the sources of the problem are different.

Ownership and corporate governance

Ownership structure or corporate governance is also often considered when examining investment. The characteristics of corporate control structures and identity of owners may correspond to the degree in which firms are hindered by information and incentive problems in capital markets, and thus investment may have various degrees of sensitivity to liquidity. Alternatively, it may affect investment behaviour due to the fact that parameters of the objective function would vary.

Hoshi *et al.* (1991) examine whether liquidity is a more relevant determinant of investment for Japanese firms which are affiliated to a *keiretsu* or industrial group with close links to banks, or those firms which are independent of such an alliance. They split their panel of 145 Japanese manufacturing firms on the grounds of whether there are independent or not from an industrial group, and more specifically if they have a close relationship with a major bank. Their main result shows that the liquidity variable - cash flow⁴, is more important for the independent firms, than for those firms affiliated to an industrial group. They argue that the reason for this is the fact that those firms who have a close link to banks are able to minimise the cost of raising capital, and thus investment is less sensitive to liquidity constraints. In contrast, firms that are independent of an industrial group are more prone to relying on internal funds, caused by the additional costs of raising external finance.

Hall *et al.* (1998b) study the determinants of investment in scientific firms for US, France and Japan (1979-1989) and find that the link between investment, profit, sales and cash

periods (as, say, related to business cycle phases).

⁴ Measured in their study by net (after tax) income plus depreciation, less dividend payments.

flow differs for each. Investment is more sensitive to cash flow in the US, compared to France or Japan. The authors argue that it reflects the different corporate governance structures, which operate in each country. Firms in the US do not enjoy close links with banks, as do firms in Japan, so the cost of external finance maybe higher, forcing firms to rely more on internal funds.

Degrise and de Jong (2000) also hypothesise that corporate governance will affect investment expenditure. In their specification they interact the cash flow variable with their data on corporate governance, such as board structure, ownership and bank relations. Their findings relating to this issue show that firm-bank relations and the size of the largest shareholder have no impact on investment. However, the size of insider equity increases the impact of cash flow upon investment.

Galindo and Schiantarelli (2002) provide an overview of recent research on investment financing in Latin America, with evidence that firms with foreign ownership are less restricted in their access to finance. On the other hand, Columbo (2001) found no significant impact of foreign ownership for Hungary on access to short term debt. In turn, Harrison and McMillan (2003) apply the augmented Euler equation to demonstrate that foreign companies are less credit constrained than domestic firms for the sample of firms taken from the Ivory Coast.

Foreign ownership may be conducive to easier access to finance not just because of direct funding from foreign partners and generally foreign sources of finance, but also because firms with some degree of foreign ownership enjoy less bankruptcy risk and adopt international standards faster in terms of product quality and therefore find it easier to gain access to domestic bank debt (Columbo 2001; Harrison and McMillan 2003).

Firm size

Why smaller companies may be constrained in their access to financing? One possible explanation is that providers of finance face some fixed costs of evaluating the project. This assumption alone will be sufficient to create a bias against smaller firms. Moreover, smaller firms may be more likely to be the subject of idiosyncratic risk and are less likely to have developed a good reputation with investors, as small firms are more typically start-ups with no long credit history (Schiantarelli 1996; Colombo and Driffill 2003).

However empirical evidence is mixed and the conclusions may be specific to particular countries / types of financial systems. Fazzari *et al.*(1988) investigates the link between firms size and access to capital: in times of tight credit small and medium firms are often denied funds, in favour of better quality borrowers (p153). Gertler and Gilchrist (1994) show that there is a strong correlation between firm size and the scope of external finance: smaller firms rely on intermediary finance, while larger firms are not restricted in their access to capital market. In addition, they use data on manufacturing US firms from 1958 to the early 1990's in order to determine how small and large firms adjust their behaviour to macroeconomic conditions. Their results show that small firms scale back borrowing more than larger firms as a result of negative shocks and that small firms are more prone to liquidity constraints. Large firms are able to borrow in the event of an economic downturn, but small firms are unable to. Lizar and Svejnar (2002) split their sample for firms which have greater than or equal to 100 employees ("large firms") and "small firms", which have less than 100 employees. From this exercise they find evidence of credit rationing (i.e. a positive relationship between profit and investment) in only smaller, private firms. In contrast, larger firms have virtually unlimited access to capital and therefore there exists a negative relationship between profit and investment for these firms.

However, contrasting results were obtained as well. For instance, both Hu and Schiantarelli (1994) and Kadapakkam *et al.* (1998) found that *ceteris paribus*, size is *positively* associated with the probability of a firm being financially constrained. Several explanations are put forward by those authors. Banks may face trade-off between higher evaluation and preparation cost for multiple small and medium size loans and higher risk resulting from a focus on smaller number of large projects. Agency problems may be

more serious for larger firms with dispersed ownership. And finally, larger firms are less restricted in optimise timing of their investment over time, so it may coincide with more cash being available.

Conclusions derived from this section

- We expect that firms, which are affiliates of foreign companies, will exhibit no positive link of investment to internal funds, relative to privatised and state owned firms.
- The relationship between internal funds and investment in smaller firms shall be positive and significant, as expect that larger companies have easier access to the external sources of finance.

5. Data set and methodology

Data sources and issues

For the empirical analysis we use annual data of enterprises in the manufacturing sector, collected by the Estonian Statistical Office. The database covers 1995-1999, and the beginning of the time period is determined by the fact that in 1995, Estonia adopted a new accounting law and introduced International Accounting Principles.

The data set comprises 438 enterprises, however that includes 65 companies, for which 1995 data is not available and 54 for which 1995 data is missing. All annual data includes values for stock variables both at the beginning and at the end of the period, and previous year end value is the same as beginning value of the subsequent year. Therefore, for 319 firms six time points are available for stocks and five for flows, and for 119 companies the series is one period shorter.

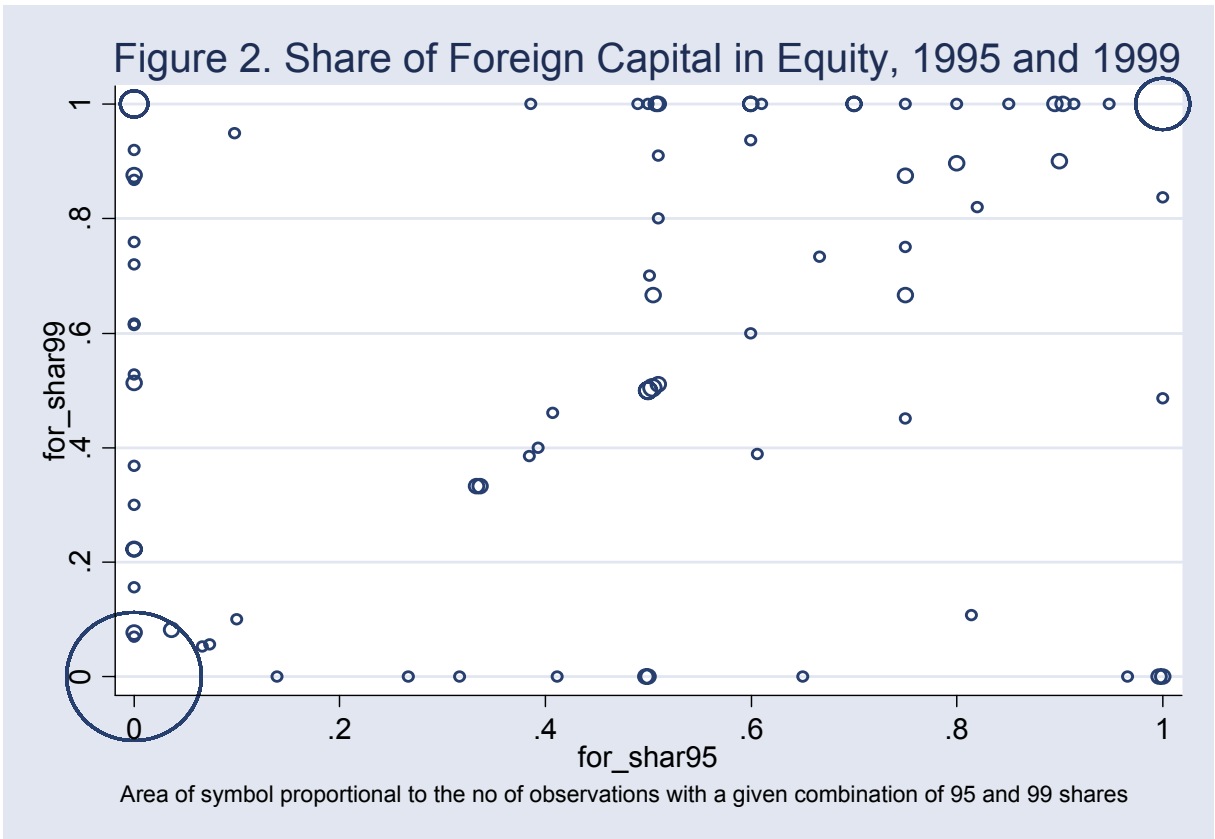
Parallel to this study, Hanula and Tamm (2002) utilises the same dataset to compare performance of foreign⁵ and domestic companies across several dimensions and Masso and Heshmati (2003) aim to estimate efficiency in labour utilisation. The latter paper

⁵ Defined as companies, where the share of foreign ownership in equity exceeds 10%.

includes a detailed description of the dataset, therefore subsequent discussion in this paper will mostly focus on issues, which are most specific to our paper.

As calculated by Masso and Heshmati (2003), the firms in the sample correspond to about 70% of the output of Estonian manufacturing industry. However, they also notice that the sample includes proportionally more large firms than small, which obviously biases the sample representativeness. Companies with less than 50 employees represent only 14% of the sample. Most companies are in branches of manufacturing, apart from 1.9% in mining. A more detailed sectoral distribution is provided in Table 2. As by 1995, the privatisation process in Estonian manufacturing was almost completed, 98.4% of observations relate to companies, which are privately owned. Enterprises with majority foreign ownership represent 21.2% of the sample (see Masso and Heshmati (2003), Appendix 1 for more detailed distributions).

Changes in the distribution of foreign ownership during the sample period are illustrated by Figure 2 below. Observations on the diagonal represent companies, where the share of foreign ownership remained the same at the end of the period as at the beginning. Points above the diagonal reflect an increase in foreign ownership, while those below the diagonal represent decreasing foreign ownership. There is a large number of companies, with no foreign ownership throughout the period (N=186), which corresponds to the marker at the left hand bottom corner of the graph. A number of companies retained 100% foreign ownership throughout the period (N=30, the right hand upper corner of the graph) and there is handful with the same share of ownership at the beginning and at the end of the period (points on the diagonal). Yet, in spite of a short span of time in the sample, the change in ownership composition is considerable. A clear trend towards increasing foreign ownership is visible, as represented by the points left and above the diagonal. As the share of foreign ownership evolved in a significant number of companies, that raises a potential endogeneity problem; we will return to it in the next section.



Below, a full description of variables used in this study (Table 1-2) and some descriptive statistics are presented, which supplement those provided by Masso and Heshmati (2003) (Table 3).

Table 1: Variable description

Description of variable	Details / comments
<i>investment</i>	cost of increase in tangible assets during the year
<i>r_invest</i>	<i>investment</i> deflated using manufacturing and mining price index correspondingly
<i>r_capital</i>	net tangible assets in volume (at the end of the period), computed by a perpetual inventory method with a constant rate of depreciation ($\delta=8\%$): $r_capital_t = (1 - \delta) r_capital_{t-1} + r_invest$
<i>inv_capital</i>	$r_invest / r_capital$
<i>inv_capital_sq</i>	<i>inv_capital</i> squared
<i>sales</i>	sales
<i>r_sales</i>	<i>sales</i> , deflated by a corresponding price index (manufacturing or mining)
<i>labourcost</i>	personnel expenses
<i>r_netsales</i>	<i>sales - labourcost</i> , deflated by a corresponding price index
<i>netsal_cap</i>	$r_netsales / r_capital$
<i>ni_capital</i>	return on assets: net (after taxes) income (profit) divided by net tangible assets (both nominator and denominator deflated by the price index)
<i>employment</i>	employment
<i>l_employment</i>	natural logarithm of employment
<i>foreign_shar</i>	share of foreign owners in equity
<i>dom_shar</i>	$1 - foreign_shar$
<i>dom_x_nscap</i>	<i>dom_shar</i> times <i>netsal_cap</i>
<i>recemp_x_nsc</i>	<i>netsal_cap</i> divided by <i>employment</i> (i.e. reciprocal of <i>employment</i> times <i>netsal_cap</i>)
<i>recsal_x_nsc</i>	<i>netsal_cap</i> divided by <i>r_sales</i> (i.e. reciprocal of <i>r_sales</i> times <i>netsal_cap</i>)
<i>doxrsaxnsc</i>	<i>dom_shar</i> times <i>recsal_x_nsc</i>
<i>y1999, y1998</i>	annual dummies

The interested reader is referred to Mass and Heshmati (2002), who offers correlation table for main variables in the dataset. This will not be reproduced here for space constraints.

Instead we focus on the variables, which are relevant for this study. The results are presented in Table 2 below.

Table 2. Median values for selected variables over 1995-1999

Variable	All firms	With foreign owners	No foreign owners	Smaller (below the median employment, i.e. <88)	Larger (on and above the median employment, i.e. =88)
Return on assets	0.073	0.052**	0.079**	0.072	0.073
Net sales ^a / assets	2.596	2.071***	2.846***	2.658	2.486
Sales / assets	3.663	4.104***	2.683***	3.889†	3.548†
Investment / assets	0.264	0.243	0.276	0.279	0.255
Employment	88	86	89		

All financial variables in 1995 prices.

Significance levels relate to Pearson χ^2 (continuity corrected) based on the non-parametric test on the equality of medians.

*** Significant at 0.001; ** Significant at 0.01; † Significant at 0.1

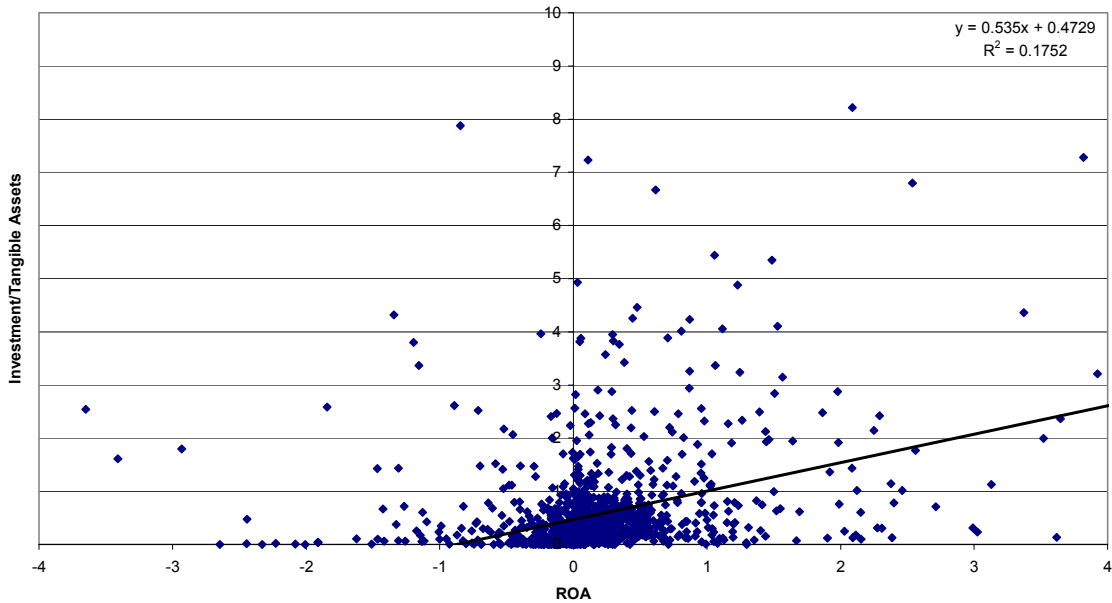
^a See definition in Table 1.

Interestingly, financial performance indicators (return on assets being the most relevant) are significantly higher for domestic companies, than for those with the presence of foreign owners. However, the average figures mask the trend: throughout the period, profitability of companies with foreign presence was growing in relation to domestic companies, as documented in more detail by Hannula and Tamm (2002) for the same sample. The difference between smaller and larger companies is not significant in terms of financial performance, apart from marginal significance of the difference in ratio of total sales to assets, where utilisation of assets in smaller companies seems to be more productive. Interestingly, the comparison of median values of employment for domestic and foreign companies show no difference – median employment for both groups is almost the same.

Our primary research question asks whether there is evidence for financial constraints in investment behaviour. As a preliminary assessment, the question is illustrated by Figures 3-6 below.⁶

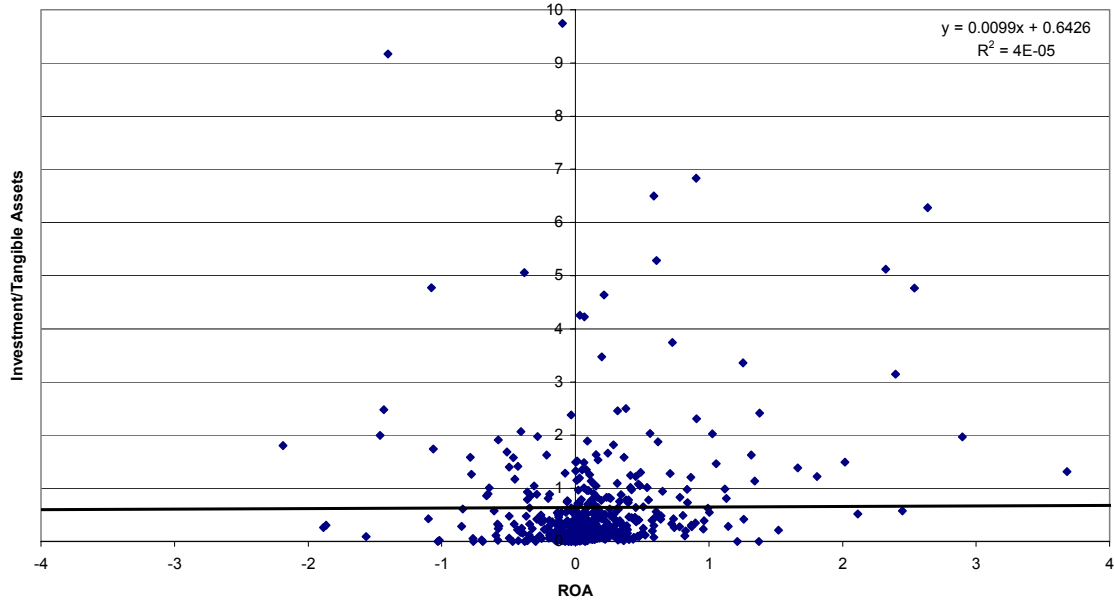
Here, as a first approximation, correlation between investment to capital ratio and same period profitability will be taken as an indication of financial constraints in investment. First, we distinguish between observations, where foreign shareholders were not present (N78) and those observations where foreign owners participated as equity holders (N1396). The results are illustrated by Figures 3 and 4. Clearly, in the case of domestic companies, a correlation between current net income and investment is detectable. For those with the presence of foreign owners it is virtually zero.

Figure 3. Investment & Profits: Domestic Companies



⁶ All four figures and corresponding correlations were based on trimmed sample: 0.05% of outliers on each end of the variables tails were not included.

Figure 4. Investment & Profits: Companies with Foreign Owners



Similarly, we split the observations into two groups according to size: (i) below the median value and (ii) on and above the median value (which equals 88). Again, correlation between current net income and investment is far more visible for larger companies than it is for smaller, however, the difference is somehow less pronounced than in the domestic – foreign cross section.

Figure 5. Investment & Profits: Smaller Companies

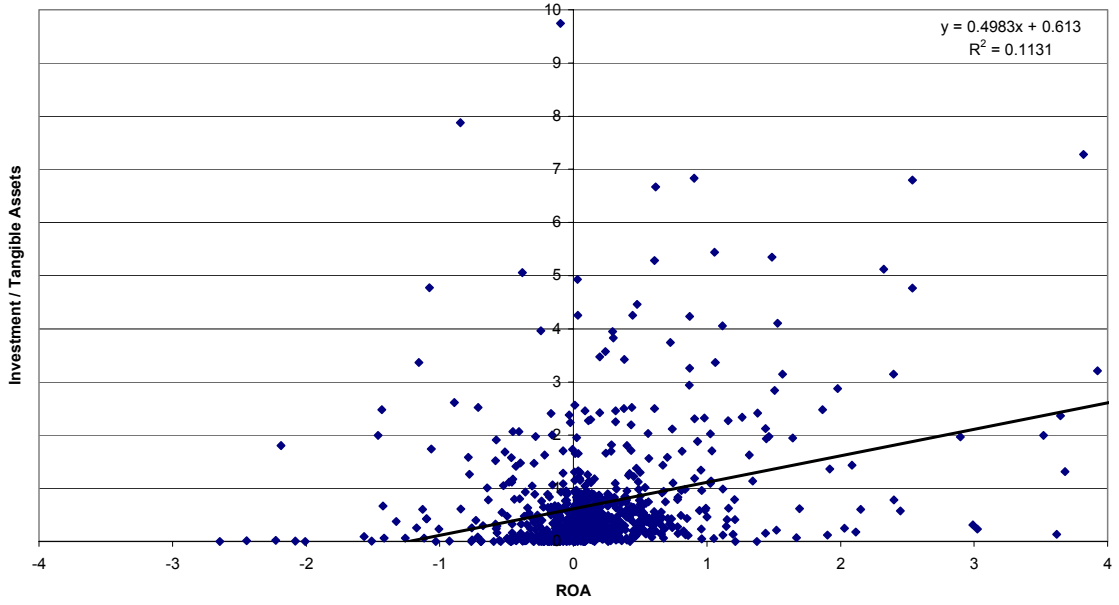
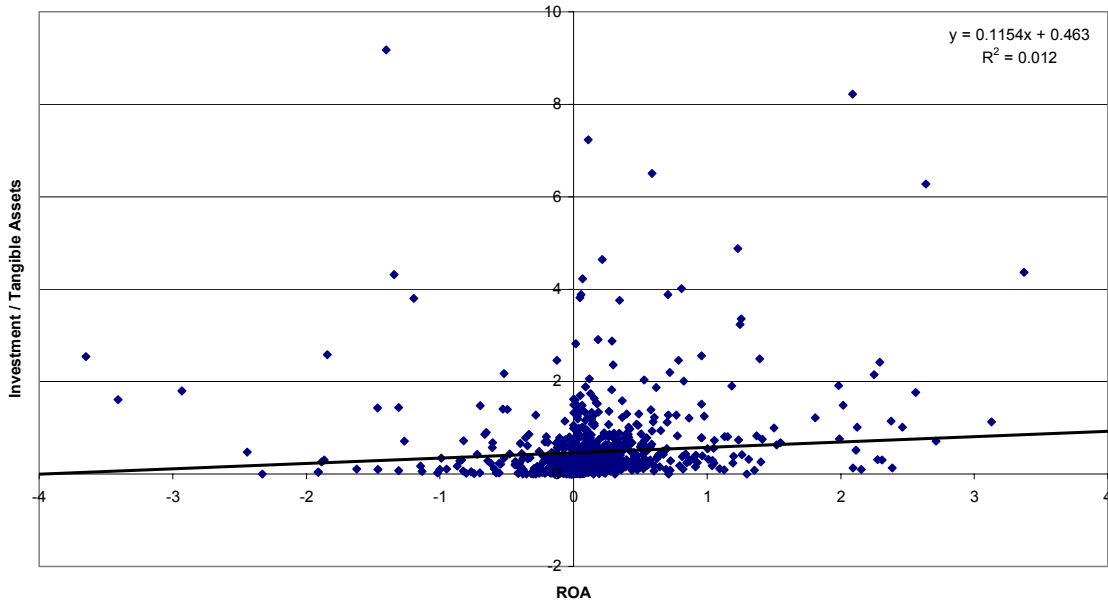


Figure 6. Investment & Profits: Larger Companies



Sectoral contrasts

Estonian Statistical office uses the EMTAK system of classification, which corresponds to ISIC Rev.3, yet longer six digit codes are used, with zeros added at the end. Most of the firms did not change sectoral affiliation over the five years, apart from 30 observations (out of 2071 observations available), where for same years (typically at the beginning of the period) firms are classified as ‘other service activities’ (code starting with 93), ‘other business activities’ (code starting with 74) or trade (codes starting with 51 and 52). We reclassified those 30 observations based on their affiliation to a specific sector of manufacturing in adjacent years. Grouping firms into eight sectors (defined below), we created seven orthogonal contrasts coding variables in the standard way. The advantage of this approach is that unlike sectoral effects controlled by simple dummies, here, we are able to consider each effect sectoral effect independently. The distribution of firms and coding used for contrasts is provided in Table 3 below.

Table 3. Variable description: sectoral contrasts

sectors	<i>minheav</i>	<i>chemical</i>	<i>engineer</i>	<i>food</i>	<i>textiles</i>	<i>apparel</i>	<i>wood</i>	<i>furniture</i>
description	mining and heavy industry	chemical industry	engineering	food and beverages	manufacture of textiles	wearing apparel and leather	wood except furniture	manufacture of furniture
corresponding ISIC 3 codes	10-14, 27	21-26	28-35, 37	15-16	17	18-19	20	36
No of firms in the sample	12	70	89	87	25	60	51	44
coding for orthogonal contrasts:								
<i>light</i>	-5	-5	-5	3	3	3	3	3
<i>chemic</i>	-1	7	-1	-1	-1	-1	-1	-1
<i>engineer</i>	-1	-1	7	-1	-1	-1	-1	-1
<i>woodfurn</i>	0	0	0	-2	-2	-2	3	3
<i>food</i>	0	0	0	4	-1	-1	-1	-1
<i>textile</i>	0	0	0	-1	4	-1	-1	-1
<i>furniture</i>	0	0	0	0	0	0	-1	1

Methodology

As already discussed, our first choice estimation method is the specification implied by optimisation model for investment with presence of adjustment costs (based on Euler equation), which does not rely on Tobin q , as the indicator is not available for our sample. The potential problem with estimation is that the time dimension is relatively short. Yet, we believe that the advantage of reference to optimisation outweighs the problems, and we are not aware of alternatives, which we would consider superior, given the limitations imposed by the sample characteristics. A seminal paper that uses the Euler equation specification is Bond and Meghir (1994). Here we use a version of this specification, which assumes a competitive market, for which the term representing sales/assets vanishes. This seems to be a reasonable assumption for a small open economy such as Estonia. This is essentially, the version of Euler equation that Lizal and Svenjar (2002) utilises (apart from interactive effects we added, see below).

Our chosen estimation technique is the Generalised Method of Moments. In their seminal paper Arellano and Bond (1991) find that GMM is superior to simpler instrumental variable estimators and recommend one step GMM for inference (*Ibidem*, p.293). More recently, Judson and Owen (1999) support the conclusion that this estimation method is superior as compared with feasible alternatives for panels with a short time dimension. The GMM estimator is robust in that it does not require information of the exact distribution of the disturbances and is instrumental in combating the problems associated with potential endogeneity⁷. Similar conclusions can be found in Bond (2002): the one step estimator is superior to the two step version, as the latter technique offers very modest efficiency gains, and more importantly the asymptotic distribution is less reliable under the two step method (*Ibidem*, p.9). Despite the efficiency of GMM, there is one qualification to make: when the instruments that are available are weak, large finite sample biases may occur as a result (*Ibidem*, p.26). Several other researchers of firm investment behaviour have used the GMM technique, for example Konings *et al.* (2002) and Bond *et al.* (1999).

⁷ We refer the interested reader to Lee (2002) for more details on the GMM technique.

One critical issue in methodology is how to distinguish between companies, which may be financially constrained because of their specific characteristics, and those which would not. Creating a robust econometric design for testing for the difference is not a trivial issue. Amongst others, Schiantarelli (1996) in his review of methodology of investment studies notes that it is common for researchers to split samples on the basis of whether a firm belongs to a financially constrained or unconstrained group. Usually this is done on the basis of dividend pay out, ownership or firm size. However, in practice, those characteristic are typically time variant and such should be the basis for splitting the sample, allowing the firms to transit between different states (Schiantarelli 1996, p78). Moreover, the sample splitting criterion is likely to be correlated with firm specific and time invariant component of the error term. One simple solution to this, may be to use contemporaneous information to partition the observations, and used lagged information as instruments within the GMM context (*Ibid.*, p78). One of few studies which heeds to this advice is Bond and Meghir (1994) who use a dummy variable which allows firms to transit between constrained and unconstrained states, whilst employing the GMM technique. We address the problem in a similar way. We are interested if the smaller size of the company and lower level of foreign shareholdings result in financial constraints. And instead of the time-invariant sample split, we introduce interactive effects, that is we multiply our measure of cash flow by a domestic shareholdings and by reciprocal of size (see Table 1 for definitions). Those two new variables are treated as endogenous the same way as all other variables in the model, apart from sectoral contrasts and time effects.

Specifications

As discussed, we apply a version of the Euler equation. In case of Estonia it is legitimate to assume competitive markets, which implies that the output term vanishes from the specification. Subsequently, our first specification corresponds to the equation estimated by Lizal and Svejnar (2002; equation (6)), apart from the fact that our additional vector of control variables utilises orthogonal contrasts, as described above.

1. General equation

$$inv_capital_t = constant + inv_capital_{t-1} + inv_capit_sq_{t-1} + netsal_cap_{t-1} + year_dummies + sectoral_contrasts + \varepsilon_{it}$$

Next, to check if the impact of cash flow is significant, we interact the cash flow variable with our two ‘prime suspects’, i.e. the size of domestic owners in equity and reciprocal of size. The two new variables are instrumented the same way as all other, by past levels (i.e. standard Arellano-Bond (1991) method), thus also treated as endogenous. This results in the following equations.

2. Equation with ownership and size interactions with cash flow (size approximated by employment)

$$inv_capital_t = constant + inv_capital_{t-1} + inv_capit_sq_{t-1} + netsal_cap_{t-1} + dom_x_nscap + recemp_x_nsc + year_dummies + sectoral_contrasts + \varepsilon_{it}$$

3. Equation with ownership and size interactions with cash flow (size approximated by real sales)

$$inv_capital_t = constant + inv_capital_{t-1} + inv_capit_sq_{t-1} + netsal_cap_{t-1} + dom_x_nscap + recsal_x_nsc + year_dummies + sectoral_contrasts + \varepsilon_{it}$$

Finally, we checked if domestic ownership interacts with size, i.e. if impact of foreign ownership is either enhanced or decreased for larger companies.

4. Equation with additional interaction including both ownership and size

$$inv_capital_t = constant + inv_capital_{t-1} + inv_capit_sq_{t-1} + netsal_cap_{t-1} + dom_x_nscap + recsal_x_nsc + doxrsaxnsc + year_dummies + sectoral_contrasts + \varepsilon_{it}$$

Variants of these equations included testing if results were sensitive to lag structure, to different treatment of controls (standard sectoral dummies instead of controls), and to the introduction of foreign share and size directly in an ad hoc augmented equation. All results are available on request.

We also tested if the equations hold, when we split the sample between the light industry (the largest relatively homogeneous sectoral group in our sample) and all others.

6. Results and discussion

Basic results are presented in Table 4 below.

Table 4. GMM (Arellano-Bond) Estimations. Dependent Variable: $inv_capital_t$

	(1)	(2)	(2a)	(3)	(4)	(5)	(6)	(7)
$inv_capital_{t-1}$	.157 (.040)***	.163 (.041)***	.169 (.041)***	.165 (.041)***	.165 (.041)***	.104 (.033)**	.155 (.040)***	.160 (.041)***
$inv_capit_sq_{t-1}$	-.0003 (0)***	-.0004 (0)***	-.0004 (0)***	-.0004 (0)***	-.0004 (0)***	-.0002 (0)**	-.0003 (0)***	-.0004 (0)***
$netsal_cap_t$	-.018 (.005)***	-.079 (.027)**	-.077 (.027)**	-.069 (.022)**	-.061 (.023)**	-.080 (.023)***	-.018 (.005)**	-.075 (.027)**
$dom_x_nscap_t$						.165 (.022)***		
$dom_x_nscap_{t-1}$		.058 (.026)*	.056 (.026)*	.047 (.022)*	.038 (.028)	.064 (.022)**		.055 (.026)*
$recemp_x_nsc_t$						8.46 (1.04)***		
$recemp_x_nsc_{t-1}$		.816 (.326)*	.794 (.325)*			.416 (.275)		.729 (.333)*
$recsal_x_nsc_{t-1}$				72.23 (22.45)***	46.39 (60.17)			
$doxrsaxnsc$					40.02 (84.62)			
dom_shar							.503 (.898)	
$l_employment$							-.516 (.367)	-.322 (.378)
c_light	-.018 (.074)	-.022 (.074)		-.021 (.074)	-.021 (.074)	.015 (.062)	-.017 (.074)	-.021 (.074)
c_chemic	.055 (.076)	.046 (.077)		.048 (.077)	.048 (.077)	.061 (.064)	.054 (.077)	.047 (.077)
$c_engineer$	-.015 (.075)	-.014 (.076)		-.015 (.076)	-.015 (.076)	.015 (.064)	-.014 (.076)	-.014 (.076)
$c_woodfurn$	-.099 (.051)	-.110 (.053)		-.124 (.053)*	-.123 (.053)*	-.100 (.044)*	-.098 (.052)†	-.106 (.053)*
c_food	.003 (.051)	.001 (.051)		-.015 (.052)	-.015 (.052)	.038 (.044)	.003 (.051)	.002 (.051)
$c_textile$	.042 (.077)	.055 (.078)		.038 (.078)	.038 (.078)	.046 (.066)	.049 (.079)	.055 (.078)
c_furnit	.091 (.166)	.135 (.169)		.139 (.169)	.140 (.169)	.079 (.142)	.118 (.169)	.140 (.169)
$y1998$	-.246 (.357)	-.265 (.363)	-.289 (.363)	-.267 (.362)	-.272 (.362)	-.206 (.304)	-.190 (.364)	-.220 (.366)
$y1999$	.035 (.304)	.024 (.310)	-.004 (.309)	.025 (.309)	.012 (.309)	-.014 (.260)	.082 (.310)	.048 (.311)
$constant$	-.173 (.231)	-.134 (.236)	-.102 (.227)	-.143 (.235)	-.132 (.236)	.216 (.198)	-.175 (.234)	-.143 (.236)
Test for no second-order autocorrelation:z	.57	.45	.26	.51	.51	.57	.52	.49
Sargan test: χ^2 (over-identifying restrictions)	2.20	.39	.46	.35	.33	.91	2.10	.44
Number of observations	1143	1130	1130	1133	1133	1129	1130	1130
Number of firms	434	431	431	432	432	431	431	431

*** Significant at 0.001; ** Significant at 0.01; * Significant at 0.05; † Significant at 0.1

Column 1 corresponds to core the Euler equation specification (equation 1 above). All variables have the expected sign and are highly significant. That itself can be taken as evidence that the financing in Estonia is relatively efficient and there is no indication of strong financial constraints. In particular, this conclusion is implied by the fact that while the Euler equation model predicts a negative sign on the cash flow coefficient, the financing constraint would imply positive and significant sign.

Yet the conclusion implied by estimation presented in Column 1 has to be qualified as soon as we account for heterogeneity between different categories of companies. In contrast to aggregate results in Column 1, specification in Column 2 (based on equation 2 above) interacts a cash flow term with both the share of domestic owners and with reciprocal of employment. While the basic variables from the Euler model preserve their sign and significance, we now have positive and significant signs for interactive effects.

The conclusion is that while overall, the financing constraints are not acute, they emerge for particular types of companies. A smaller presence of foreign owners make a firm more susceptible to constraints in financing. As does smaller size. Interestingly, the magnitude of the core cash flow effect is now much higher and remain negative, so correcting for the heterogeneity in firm types clarify the results.

In columns 2a and 3 of Table 4 offer additional checks of these conclusions. Column 2a corresponds to the specification, where we check if the results are robust to inclusion/exclusion of sectoral controls and the answer is clearly no. The coefficients are remarkably stable. In column 3 (corresponding to equation 3 above), we use an alternative measure of size that is company sales (in constant prices) in the interactive effect. The results are not affected. Level of sales and level of employment as a measure of size can be given a slightly different interpretation. In the latter case, one could interpret the effects of size as being of ‘political economy’ nature: bigger firms may be given some additional support from the government, to avoid large redundancies (but this is unlikely in case of Estonia). Yet, as the results are robust to replacing employment by the level of sales as a proxy for size.

In column 4 (presented as equation 4 above) we experiment with an additional ‘second order’ interactive term, to find out if the lack of presence of foreign owners is more acute when combined with small size of the companies. For this type of specification,

multicollinearity between the three interactive terms become a problem and it is no surprise that significance levels collapse for those variables. Nevertheless, we get some indication that the joint effect of these two factors may have additional negative effects. In the case of small companies with no foreign owners there seem to be some weak additional effect enhancing credit constraints, but it is estimated in very imprecise way.

Columns 5 and 6 provide some additional checks.

In column 5 we introduce contemporary values in addition to lagged interactive terms, to see how that impacts on our results. The answer is very little, apart from the fact that now the contemporary effect of size-cash flow interactive term dominates the lagged one.

Next, we check if our significant results for the two interactive terms used so far were not enforced as a substitute for simple effects of the variables used to construct those terms. Therefore, we replace interactive effects by simple effects /i/ of both shareholding composition between domestic and foreign owners and /ii/ of size. The results are presented in Column 6. As reported there, when those two variables are introduced directly in an augmented form of Euler equation model, we may see that both are insignificant. The composition of shareholding is highly insignificant, thus it has no impact on investment rate, a result that is consistent with median test presented in Table 3 above. The variable has also positive sign, in contrast with interactive specification. Thus, we hope it is highly unlikely that we misinterpret our results related to the domestic versus foreign ownership split. The situation is slightly more complicated in the case of direct size effect, which is only marginally insignificant and has the sign corresponding to the interactive term (i.e. a negative sign for $l_employment$ is consistent with the positive sign of the reciprocal of employment, which was used in interactive term). Therefore, we present an additional check to see if we do not enforce the result for interactive effect with size, by omitting the size variable. In Column 7 we present an additional specification where both interactive term for size and simple size effects are present. Clearly, the interactive terms survive the treatment as significant with expected sign.

Table 5 presents an additional test for robustness. There is a number of observation (32), with state majority shareholdings. In the estimations above we defined them jointly as domestic shareholding, merging the corresponding shares with private domestic owners.

Our motivation was twofold. First, if we focus on the distinction between foreign and domestic companies, we may expect state owned companies being more similar to other domestic companies. And second and more importantly, we know from the literature on privatisation, that the impact of privatisation may be traced already before the formal date of ownership transfer (see: Megginson and Netter 2001 for overview). The observations in this group all relate to pre-privatisation. Nevertheless, for the sake of transparency we also performed the tests with all observations with state majority removed from the sample. The results are presented in Table 5, columns 1-5. Very little changes and both signs and size of the coefficients remain very similar to corresponding columns of Table 4.

Finally, we experimented with breaking the sample along the sectoral lines. That was rather unsuccessful. As the sample size shrank, it is became difficult to obtain estimates that pass structural tests, as GMM is sensitive to small sample size. One sector, for which we are able to obtain consistent estimates is engineering, but even then, both the Sargan test and test for second order autocorrelation are only just above the critical levels. Nevertheless, we may see that while the size of the coefficients change, the signs do not and the basic logic of the model is preserved on the sectoral level (those results are available on request).

Table 5. GMM (Arellano-Bond) Estimations. Dependent Variable: *inv_capital_t*

Observations with state majority shareholding excluded					
	(1)	(2)	(3)	(4)	(5)
<i>inv_capital_{t-1}</i>	.160 (.040)***	.163 (.040)***	.163 (.040)***	.100 (.032)**	.159 (.040)***
<i>inv_capit_sq_{t-1}</i>	-.0004 (0)***	-.0003 (0)***	-.0004 (0)***	-.0002 (0)**	-.0004 (0)***
<i>netsal_cap_t</i>	-.079 (.027)**	-.070 (.022)**	-.062 (.027)*	-.080 (.022)***	-.077 (.027)**
<i>dom x nscap_t</i>				.176 (.021)***	
<i>dom x nscap_{t-1}</i>	.058 (.026)*	.048 (.021)*	.039 (.028)	.064 (.021)**	.056 (.026)*
<i>recemp x nsc_t</i>				8.40 (1.00)***	
<i>recemp x nsc_{t-1}</i>	.813 (.321)*			.401 (.265)	.755 (.328)*
<i>recsal x nsc_{t-1}</i>		72.86 (22.06)***	47.48 (59.11)		
<i>doxrsaxnsc</i>			39.35 (83.16)		
<i>dom shar</i>					
<i>l employment</i>					-.216 (.376)
<i>c light</i>	-.019 (.080)	-.017 (.080)	-.018 (.080)	.0152 (.065)	-.019 (.080)
<i>c chemic</i>	.028 (.082)	.030 (.082)	.031 (.082)	.038 (.067)	.028 (.082)
<i>c engineer</i>	-.013 (.081)	-.014 (.081)	-.014 (.081)	.014 (.067)	-.014 (.081)
<i>c woodfurn</i>	-.111 (.052)*	-.126 (.052)*	-.124 (.052)*	-.099 (.043)*	-.108 (.052)*
<i>c food</i>	.003 (.052)	-.014 (.052)	-.014 (.052)	.037 (.043)	.003 (.052)
<i>c textile</i>	.054 (.077)	.037 (.077)	.037 (.077)	.047 (.064)	.054 (.077)
<i>c furnit</i>	.135 (.166)	.140 (.166)	.140 (.166)	.075 (.137)	.139 (.166)
<i>y1998</i>	-.333 (.363)	-.334 (.362)	-.339 (.362)	-.260 (.298)	-.303 (.366)
<i>y1999</i>	.029 (.310)	.030 (.309)	.016 (.310)	.011 (.255)	.044 (.311)
<i>constant</i>	-.134 (.241)	-.145 (.240)	-.133 (.241)	.217 (.198)	-.139 (.241)
Test for no second-order autocorrelation:z	.42	.63	.47	1.22	.41
Sargan test: χ^2 (over-identifying restrictions)	.51	.41	.41	.55	.57
Number of observations	1100	1103	1103	1099	1100
Number of firms	427	428	428	427	427

*** Significant at 0.001; ** Significant at 0.01; * Significant at 0.05; † Significant at 0.1

7. Conclusions

Arguably, consistent estimates of the investment model based on Euler equations may be interpreted as evidence for the fact that financing of enterprises in one of the leading transition economies has been operating relatively efficiently already in the late 1990's. Yet, as soon as we account for the heterogeneity of firms, clear differences emerge. Lack of foreign ownership produces a clear disadvantage in finance, making it more dependent on internal cash flow. Similarly, small companies seem to be financially constrained. And there is some weak evidence that a combination of those two effects is particularly harmful: small domestic companies are especially constrained in their access to finance.

As support for development of small enterprises is now one of the major themes of economic policy, this research may provide some food for thought for policy makers. Uneven access to finance may be one of the factors, which could result in dual industrial structure, with a visible split between the foreign affiliated companies, which face easier opportunities for growth and developments and underdeveloped sector of small domestic companies.

Bibliography

Arellano, M., and Bond, S., (1991), "Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations", *Review of Economic Studies*, 58, pp277-297.

Bond, S., (2002), "Dynamic Panel data models: a guide to micro data methods and micro practice," CEMMAP working paper CWP09/02, Institute of Fiscal Studies, London, also published in Portuguese Economic Journal, 1, 2.

Bond, S., and Meghir, C., (1994), "Dynamic investment models and the firm's financial policy," *The Review of Economic Studies*, Vol. 61, 2, pp197-222.

Bond, S., Harhoff, D., and Van Reenen, J., (1999), "Investment, R&D and financial constraints in Britain and Germany," The Institute for Fiscal Studies Working Paper Series No. W99/55.

Calvo, G., and Coricelli, F., (1994), "Inter enterprise arrears in transition," *Emprica*, 21.

Carceles-Poveda, E., (2003), "Capital adjustment cost and firm risk aversion", *Economic Letters*, Vol. 81, pp 101-107.

Cleary, S., (1999), "The relationship between firm investment and financial status," *The Journal of Finance*, pp673-692.

Columbo, E., (2001), "Determinants of corporate capital structure: evidence from Hungarian firms," *Applied Economics*, 33, pp1689-1701.

Columbo, E., and Driffill, J., Eds., (2003), *The role of financial markets in the transition process*, Physica-Verlag.

Degryse, H., and de Jong, A., (2000), "Investment spending in the Netherlands: the impact of liquidity and corporate governance," Catholic University of Leuven and University of Tilburg, mimeo.

Falcetti, E., M. Raiser and P. Sanfey, (2002), "Defying the Odds: Initial Conditions, Reforms and Growth in the First Decade of Transition", *Journal of Comparative Economics*, 30, 2, pp. 229-250.

Fazzari, S., R. Hubbard, B. Petersen, Blinder, A., and Poterba, J., (1988), "Financing constraints and corporate investment," *Brookings Papers on Economic Activity*, 1, pp141-206.

Fazzari, S., R. Hubbard, B. Petersen, (2000), "Investment-Cash Flow Sensitivities are Useful: A Comment on Kaplan and Zingales", *Quarterly Journal of Economics*, 115, pp. 695-705.

Galindo, A. and A. Schiantarelli, (2002), "Credit Constraints in Latin America: An Overview of the Micro Evidence", Boston College, *Working Paper*, No. 537.

Gertler, M., and Gilchrist, S., (1994), "Monetary Policy, business cycles and the behaviour of small manufacturing firms," *Quarterly Journal of Economics*, 109, 4, pp309-340.

Hall, B., Mairesse, J., Mulkay, B., (1998a), "Firm Level Investment in France and the United States: An Exploration of What We Had Learned in Twenty Years", Mimeo, Nuffield College, Oxford, UC Berkley, IFS and NBER.

Hall, B., Mairesse, J., Branstetter, L., and Crepon, B., (1998b), "Does cash flow cause investment and R&D: an exploration using panel data for French, Japanese and US scientific firms," Mimeo, Nuffield College, Oxford, UC Berkley, IFS and NBER.

Hanula, J. and K. Tamm (2002), "Restructuring and Efficiency in the Estonian Manufacturing Industry: The Role of Foreign Ownership", University of Tartu, Faculty of Economics and Business Administration, *Working Paper*, No 15.

Harrison, A. and M. McMillan, (2003), "Does direct foreign investment affect domestic credit constraints?", *Journal of International Economics*, Vol. 61, pp. 73-100.

Hines, J. and R. Thaler, (1995), "Anomalies: The Flypaper Effect", *Journal of Economic Perspectives*, 9, 4, pp. 217-226.

Hoshi, T., Kashyap, A., and Scharfstein, D., (1991), "Corporate structure, liquidity and investment: evidence from Japanese Industrial groups," *Quarterly Journal of Economics*, vol. 106, 1, pp33-60.

Hu, X., and Schiantarelli, F., (1994), "Investment and financing constraints: a switching regression approach using US firm level panel data," Boston College, Working Paper No. 284.

Hubbard, R., 1998, "Capital Market Imperfections and Investment", *Journal of Economic Literature*, vol. 36, pp.193-225.

Jensen, M., (1986) , "Agency costs of free cash flow, corporate finance and takeovers," *American Economic Review*, 76, pp323-329.

Jorgenson, D., (1971), "Econometric studies investment behaviour: a survey," *Journal of Econometric Literature*, 9, 4, pp1111-1147.

Judson, R., and A. Owen, (1999), "Estimating Dynamic Panel Data Models: A Guide for Macroeconomists," *Economics Letters*, 65, pp9-15.

Kaplan, S., and Zingales, L., (1997), "Do financing constraints explain why investment is correlated with cash flow?" *Quarterly Journal of Economics*, 112, pp169-215.

Kaplan, S., and Zingales, L. (2000), "Investment-Cash Flow Sensitivities are Not Valid Measures of Financing Constraints", *Quarterly Journal of Economics*, 115, pp. 707-712.

Kadapakkam, P., P. Kumar and L. Riddick (1998), "The Impact of Cash Flows and Firm Size on Investment: The International Evidence", *Journal of Banking and Finance*, 22, pp. 293-320.

Konings, J., Rizov, M., and Vandenbussche, H., (2002), "Investment and credit constraints in transition economies: micro evidence from Poland, The Czech Republic, Bulgaria and Romania," Catholic University Leuven, LICOS Discussion Paper 112.

Lee, M., (2002), *Panel data econometrics: methods of moments and limited dependent variables*, Academic Press.

Lizal, L., and Svenjar, J., (2002), "Investment, credit rationing and the soft budget constraint: evidence from Czech Panel data," *The Review of Economics and Statistics*, 84, 2, pp353-370.

Masso, J. and A. Heshamati, (2003), "The Optimality and Overuse of Labour in Estonian Manufacturing Enterprises", University of Tartu, Faculty of Economics and Business Administration, *Working Paper*, No 20.

Harrison, A. and M. McMillan, (2003), "Does Direct Foreign Investment Affect Domestic Credit Constraints?", *Journal of International Economics*, 61, pp 73-100.

Meggison, W. and J. Netter, (2001), "From State to Market: A Survey of Empirical Studies on Privatisation", *Journal of Economic Literature*, 39, pp. 321-389.

Modigliani, R., and Miller, M., (1958), "The cost of capital, corporation finance and the theory of investment," *American Economic Review*, 48, pp261-297.

Prasnikar, J., and Svenjar, J., (1998), "Investment and wages during the transition: evidence from Slovene firms," WDI Working Paper, No.184.

Schiantarelli, F., (1996), "Financial constraints and investment: methodological issues and international evidence," *Oxford Review of Economic Policy*, 12, 2, pp70-89.

Weller, C., (2000), "The finance-investment link in a transition economy: evidence for Poland from panel data," Mimeo, Economic Policy Institute, Washington, and University of Bonn.

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