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Insider Ownership and Capital Constraints: An Empirical Investigation of the Credit Rationing Hypothesis

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Abstract

We analyze the impact of corporate governance structures on access to capital using a unique and rich panel data for a large and representative sample of Estonian firms over the period 1993 through 1999. We distinguish among five different governance structures and provide estimates on the impact of each of them on capital constraints. Our results indicate that: (i) separate regimes exist in investment behavior; (ii) the likelihood of being financially constrained is higher in firms that are recently privatized, small and where ownership is concentrated in the hands of insiders; (iii) soft budget constraints lower the probability of a firm being financially constrained; (iv) the actual probabilities of operating in the financially constrained regime are calculated to be quite high and essentially stable during 1993-1999: 0.52-0.57 for state owned firms, 0.40-0.46 for domestic owned firms and 0.53-0.57 for employee owned firms.

Keywords: Corporate Investment, Corporate Governance, Liquidity Constraints, GMM Estimates, Switching Regression.

JEL Classification: C33, D21, D92, E22, G32, J54, P34.

Introduction

Recently there has been an increased attention to issues related to the impact of the identity and degree of concentration of ownership. The starting point of this literature is the potential conflicts of interest between shareholders and unmonitored managers. Among the implications of this agency conflict is that a firm's ownership structure is an important determinant of its access to finance and cost of capital. Yet, the empirical literature on this issue consists largely of studies based on samples of large publicly traded firms where ownership is vastly dispersed and managers enjoy high degrees of discretion. Under such conditions, the identity of shareholders does not seem to be of primary importance. Instead, the motivation of managers to act in the interests of shareholders is crucial and the aim of the empirical analysis is then to establish whether firms with differing degrees of managerial ownership display differences in access to capital¹.

There exists, however, extensive evidence suggesting in most countries most of the companies are controlled by a single large shareholder (La Porta et. al., 1999, Claessens et. al., 2000, Faccio and Lang, 2002). The situation confronting many economies that went through the economic transition phase is quite similar insofar as the movement away from state ownership led to the emergence of diverse concentrated ownership structures. On many instances insiders, i.e., employees and/or managers, emerged as majority or dominant owners or, even when they possessed minority ownership, enjoyed substantial degrees of control. Under these circumstances the primary agency conflict becomes the one between majority and minority shareholders (La Porta et. al., 1998)

The point of departure is thus the recognition that the effect of liquidity constraints is not evenly distributed across firms with some firms facing higher costs when raising capital than do others. Various theoretical arguments point to firms under insider ownership facing higher likelihood of being more constrained in raising capital than others. The literature on employee ownership (Dow, 2003), stresses a host of factors such as member's wealth position, their time horizon, risk attitudes, goal structure and the structure of property rights in the firm that make employee owners prefer taking the residual in the form of higher income rather than investing it in the firm. This preference along with employee owners' potential aversion to accepting new members lead to potential goal conflict between insiders and outside providers of both equity and debt capital. In addition, the fact that most of these firms are small and not listed in the stock markets exacerbates informational asymmetries and makes access to desired capital more difficult. The net effect of the interaction of these factors could be that

outside investors might be reluctant to invest in employee owned firms or, when they do invest, the risk premium they charge is substantially higher than the market one.

The literature on managerial ownership stresses that an initial increase in managerial ownership is beneficial because it better aligns the interests of managers and shareholders and, consequently, lowers managerial discretion. However, at high levels, managerial ownership is associated with entrenchment and divergence of interests between managers and shareholders. In transition economies the possibility of entrenchment and subsequent rent seeking or asset stripping behavior on the part of managers has been an argument against managerial ownership. The likelihood of this happening depends to a large extent on the efficiency of market for corporate control. In an environment of high uncertainty and infantile capital markets, informational asymmetries might lead to adverse selection problems in the market for corporate control (Earle and Estrin, 1996). These arguments imply that, in a transition economy environment, ownership concentration in the hands of managers is likely to lead to managers' entrenchment, which in itself exacerbates informational asymmetries and leads to more expensive external finance.

In this paper we analyze the impact of various ownership structures on firm's access to finance by explicitly modeling liquidity constraints in firm's investment decisions. The analysis is carried out employing a rich panel data set of companies from Estonia. The study contributes to the literature in several ways. First, it contributes to the debate in the corporate governance literature on the effect of governance through ownership. Second, it accounts for the effect of governance structures in investment decisions through their role in mitigating or exacerbating informational asymmetries and agency costs. To our knowledge no prior study exists that empirically investigates this issue in such detail². Third, by using data from one of the most advanced transition economies, it assesses the long-run viability of certain ownership forms. Fourth, by calculating probabilities of firms' operating in the financially constrained regime we are able to provide evidence of the pervasiveness of financial constraints across groups of firms and their persistence over time. Finally, we provide evidence on differences in propensity to invest by ownership structure.

The paper proceeds as follows. In the next section we describe the methodology employed, present the estimation strategies and introduce the data. We then proceed with reporting and discussing the results of the impact of corporate governance structures on liquidity constraints. The final section is devoted to implications of findings and conclusions.

Methodology and Data

Our primary interest is the relationship between corporate governance structures and liquidity constraints. We investigate this issue in two alternative set-ups: first, in a dynamic setting in the presence of adjustment costs, liquidity constraints and imperfect competition and under both debt and equity constraints, and second, in a switching regression framework with endogenous and unknown sample separation.

In the first set-up we follow Whited (1992) and Bond and Meghir (1994) and estimate a structural dynamic investment equation where investment rates, measured as ratio of investment to capital, are regressed on corporate governance dummies and several control variables. Control variables include lagged investment rates, sales and labor costs per unit of capital, internal funds (measured by the sum of cash flow, short-term assets and revenue from sale of non-current assets), external funds (measured by the amount of outstanding debt), industry, time and size dummies.

A major problem in estimating such specifications with governance variables as right-hand side variables is endogeneity of ownership³, i.e., in equilibrium different owners will determine their optimal ownership share based on various firm characteristics, firm's investment needs included. In the presence of endogeneity we opt to first divide the sample into different sub-samples according to the pre-defined ownership groups and then estimate the relevant specifications for every sub-sample separately. In the interpretation of results we subsequently focus on the differences in respective coefficients across ownership groups, which provide unbiased estimates of the true differences.

A limitation of this approach is that, in general, the partition indicator will be correlated with the dependent variable, i.e., with investment in this case, and this will lead to endogenous selection problems. The *ad hoc* selection of partition criteria is, therefore, likely to cause what might be called static misclassification. Furthermore, over time firms might move from one regime to the other, i.e., at one point in time they might be financially unconstrained, while at some other point in time they might be financially constrained. Even assuming that the static partition avoids any misclassification, i.e., firms are correctly classified as financially constrained and unconstrained, over time the issue of what might be called dynamic misclassification arises. This issue becomes more important as the time period

under consideration gets longer. To tackle both the static and dynamic misclassifications we introduce a switching regression approach with endogenous and unknown sample separation.

A switching regression model is based on the existence of a switching function that determines whether a firm is in one of several potential regimes. In the current set-up, at any given point in time, the firm is assumed to be in either the financially constrained or financially unconstrained regime. Firms being in the financially constrained regime face a higher sensitivity to availability of internal finance than those being in the financially unconstrained regime. But, while the number of regimes is known, the particular regime a firm belongs to is determined by the switching function, which in itself depends on those variables that theoretically determine the wedge between internal and external finance, severity of information and agency problems and time-varying firm characteristics. The model consists of three equations, i.e., two investment equations and the switching equation, which are estimated simultaneously. Once equations are estimated, the respective probabilities of the firm being in either regime are calculated.

In estimating the model, functional forms for both the investment and switching equations need to be specified. Here it is assumed that the investment equation corresponds to the one derived from neoclassical/accelerator models of investment demand as, for example, in Jorgenson (1963). In its basic form the neoclassical/accelerator model is derived under the assumption that the supply of investment funds is perfectly elastic and, consequently does not allow financial constraints to affect investment. Usually, in the literature, profit or cash flow variables are included in empirical specifications to account for the possibility of imperfect substitutability of internal and external finance. In terms of the switching function it is assumed to be a function of two sets of variables: those that determine firm's financial status and those that measure the degree of information and agency problems. The former set of variables includes balance sheet and income statement items, such as debt to capital ratio, interest expenses and liquid financial assets to capital ratio. The latter set of variables includes the percentage of shares owned by the largest owner, as a measure of ownership concentration, firm's age and firm size. Time and industry dummies complete the set of explanatory variables of the switching function. The straightforward interpretation of the coefficients of these dummies is that they represent the effects of general macroeconomic conditions⁴ on the probability of a firm being financially constrained. As these conditions are the same for all the firms in the economy or in an industry, then their sum constitutes the threshold over which a firm will be classified as financially constrained based on its own characteristics. Given that being financially constrained at any given moment in time will depend

on past performance and results, all variables in the switching function other than time and industry dummies enter in the first lag.

The effect of financial variables on the probability of being financially constrained, however, would be insignificant or be significantly reduced if firms would enjoy easy access to capital or experience soft budget constraints. Soft budget constraints include not only cheap capital in the form of direct subsidies from state but also in the form of tax arrears, trade credits, i.e., delayed payments to suppliers and cheap loans from the banking sector⁵. The relative importance of these channels is difficult to evaluate due to the lack of appropriate data, as is the case with tax arrears, or the noise contained in the available data, as in the case with trade credit and bank loans. Nevertheless, given the data in hand, a measure of soft budget constraints is constructed and included in the set of variables that determine the probability of being financially constrained. The measure is constructed as a dummy variable that takes the value 1 if a firm, at a given point in time, has negative earnings before interest, taxes and depreciation (EBITD) and, at the same time, receives positive net financing defined as an increase in short-term debt net of financing costs.

The data used in this paper consist of annual firm-level observations from a large and representative sample of Estonian firms over the period 1993 through 1999. The sample is created through a combination of data obtained from surveys and from standard firm financial statements reported to the Estonian Statistical Office. The aim of surveys is to obtain information on ownership configurations, which is not available in standard financial statements. The firms included in the survey scheme are selected as a stratified random sample based on size and industrial affiliation. The survey information is then augmented with financial information from balance sheet and income statements, such as current and fixed assets, current and long-term liabilities, sales, wages and salaries, inventories, gross and net profit, expenditure on capital goods and investment.

**** Table 1 approximately here ****

The list and definitions of variables used in the analysis are given in Table 1, while Table 2 provides information on the distribution at a given point in time and evolution over time of the number of firms that fall in a given ownership category. We classified firms into one of the categories using the number of shares held by the largest owner. Focusing on the 1995 sample, it is apparent that, in more than 22%

of cases, insiders, i.e., employees and managers, or former insiders are dominant owners. This provides evidence to the importance of insider ownership during the early years of transition. Foreign owned companies comprise around 12% of the sample, with most of them being new companies established as joint ventures in the early 1990s, while domestic outsider owned firms comprise around 18% of the sample. Finally, state owned firms comprise around 48% of the sample, with 232 firms being 100% in state ownership while 30 firms being mostly in private hands but with the state still holding the dominant position⁶.

*** *Table 2 approximately here* ***

Table 3 reports the summary statistics of the most relevant variables used in the analysis. The general facts that emerge from this table are that investment levels are high relative to capital stock, with investment/capital ratio ranging from 0.17 in 1993 to 0.34 in 1995, that average employment decreases while real wage increases over time, that cash flow is positive, that short-term debt increases over time and that cash flow and short-term debt are approximately of the same magnitude in all years but 1996. The increase in debt after 1995 is consistent with the general increase of lending to the private sector during this period in Estonia. Furthermore, up to 1997, the sum of cash flow and short-term debt is less than investment suggesting that firms might have had access to other sources of capital such as short-term trade credit and/or long-term debt.

*** *Table 3 approximately here* ***

This conjecture is supported by the last two rows of the table that show current payables and long-term liabilities, which include long-term loans as well as any other long-term debt a firm accumulates. The rate of growth of long-term liabilities is not high, except for the last year, suggesting that long-term liabilities do not constitute an important source of capital over the stated period. Current payables, however, are quite high and higher than investment over the whole period. Another important feature of Estonian firms during this period is that, on average, they have become more capital intensive as demonstrated by the increase in capital and decrease in employment.

Empirical Results

The results of estimating the structural dynamic investment equation for each ownership group separately, using Arellano's and Bond's (1991) GMM procedure, are reported in Table 4. In terms of overall model performance we see that the over-identifying restrictions, tested through Sargan's test, are accepted at high probability levels, while the second order autocorrelation test is always rejected. Also, adjusted R-squared are comparable across equations and range from around 18% to around 22%. Finally, model adequacy is also confirmed by the rejection of the null that all coefficients are jointly zero.

*** *Table 4 approximately here* ***

Turning to estimates of structural parameters we see that the adjustment cost parameter and the optimal investment/capital ratio are positive and significant across all equations, while the market power parameter is significant in the case of domestic outsider owned and foreign owned firms. The estimates of adjustment cost parameters imply different relative size of adjustment costs to investment expenditures across ownership groups. Assuming that parameter b is zero and evaluating the size of adjustment costs at the mean investment/capital ratio for each group, we find that adjustment costs for foreign owned firms vary between 16% and 19% of investment expenditures, for domestic outsider owned firms between 20% and 22%, for manager owned firms between 29% and 36%, for employee owned firms between 30% and 36% and for state owned firms between 27% and 34%. When optimal investment/capital ratios are compared with their sample means across ownership groups we find that state owned firms have the lowest deviation of actual versus optimal investment rate, while manager and employee owned firms have the highest. This suggest that, even accounting for the non zero value of b in calculating adjustment costs, manager and employee owned firms will face large adjustment costs relative to investment expenditures. Finally, the estimates of market power parameter are insignificant for state owned, manager owned and employee owned firms. In contrast, the values of this parameter for domestic outsider and foreign owned firms are positive, significant and well above unity, indicating that these firms operate in the elastic portion of their demand curve and enjoy monopoly power.

Important differences in investment behavior across ownership groups emerge while inspecting the estimates of financial variables' coefficients. Comparing the coefficients across groups several things are worth noting. First, as expected, different types of firms display different sensitivity to measures of financial constraints. Estimates of all coefficients of financial variables for foreign owned firms are

insignificant, indicating that these firms are not constrained in any sense in their investment behavior. Given that foreign owned firms in Estonia might be either subsidiaries or joint ventures with foreign partners, it is highly possible that profits earned in other countries could be invested in Estonia and the other way round. As such, the measures of internal funds and debt as defined here will not be the relevant ones for these firms. Instead, measures of global funds across different markets where these firms operate will be needed to describe their behavior.

Other types of firms, albeit to differing degrees, display sensitivity to the availability of internal and/or external finance. Manager owned firms are the only ones among them not displaying significant sensitivity to the availability of internal funds, while state owned, domestic outside owned and employee owned firms all display positive and significant sensitivity to measures of internal funds, implying different degrees of financing constraints. Among the latter three groups, the sensitivity is highest for employee owned firms and then for state owned ones. For instance, the estimate of internal funds parameter for employee owned firms is 0.052. This estimate is 30% larger than the one for state owned firms and almost twice as large as the one for domestic outsider owned ones. The estimate of internal funds squared parameter, included to capture potential non-linearities, is significant only for employee owned firms, indicating that for these firms availability of internal finance is crucial in investment policies.

Further evidence of financial constraints comes from the inspection of coefficients of external finance variables. In this case, state owned firms display no sensitivity to availability of external finance, as shown by the insignificant coefficients of debt and its squared parameters. This could serve as indicator that state owned firms are not as constrained as might be conjectured in raising external finance, i.e. they might be operating under soft budget constraints regime. Alternatively, it could be conjectured that, due to high price they might have to pay for external finance, they rely mostly on internal funds to finance their investment, as expressed by the positive and significant coefficient of internal funds parameters, and, as such, have not yet hit their credit limit. Further, the significant coefficient of internal finance and the insignificant coefficient of external finance could also be interpreted as evidence of managerial preferences against outside control. In contrast, all other domestic owned firms, seem to have hit their debt limit in that, whenever significant, higher levels of debt are associated with lower investment rates. The sensitivities are highest, in absolute value, for employee owned firms and then for domestic outsider owned firms across all specifications. Interestingly, the case of manager owned firms is the opposite of that of state owned firms, in that they show significant sensitivity to the

availability of external finance but insignificant sensitivity to the availability of internal funds. An important overall conclusion is that financial constraints operate both through debt and availability of internal funds, although the coefficients of internal funds are significant more often than those of external finance.

*** *Table 5 approximately here* ***

Table 5 reports the results of estimating the switching regression model. Part 1 of Table 5 reports the investment equation estimated, which includes lagged sales, twice lagged sales, lagged cash flow, twice lagged cash flow, lagged financial slack and twice lagged financial slack, all normalized with lagged capital stock, along with time and industry dummies, as right hand side variables. A positive and statistically significant coefficient of cash flow for firms operating in the financially constrained regime would mean that these firms are sensitive to the availability of internal finance and, consequently, credit rationed with respect to external finance. Furthermore, it is customary in the empirical studies of advanced market economies that a statistically insignificant coefficient of cash flow for firms operating in not financially constrained regime is interpreted as sign that these firms are indifferent in choosing between internal and external finance and, hence, are unconstrained financially. Yet, another argument states that cash flow may also convey information about future profitability other than the degree of financial constraints (Kaplan and Zingales, 1997). In this case the coefficient of investment-cash flow sensitivity would be positive and statistically significant even for the not financially constrained firms, but the absolute value of this coefficient would be lower than that for the financially constrained firms. In the transition context, we expect cash flow to be an important conveyor of information on firm's future profitability. Consequently, we expect cash flow coefficients to be different from zero even for the unconstrained firms.

In addition to cash flow, the investment equations include a measure of financial slack, defined as the sum of cash, short-term receivables, short-term securities and revenue obtained from the sale of non-current tangible assets. Differently from cash flow, this variable measures only the availability of internal funds and will, consequently, provide further evidence on the existence of credit rationing. The assumption here is that measures of financial slack are not likely to be positively correlated with firm's future opportunities. This assumption might be violated, however, when voluntary asset sale is determined by the lack of future growth opportunities rather than restructuring considerations. If this is the case then the coefficient of financial slack would be biased against finding a liquidity effect. Kaplan

and Zingales (1997) argue that high levels of financial slack are associated with the lack of financial constraints, given that investment will not be conditioned by the availability of finance. On the other hand, Fazzari, Hubbard and Petersen (1996) and Kim, Mauer and Sherman (1998) argue that high levels of financial slack might be associated with financial constraints given that it is those firms that expect to be constrained which accumulate large holdings of liquidity. These arguments mean that, for financially constrained firms the coefficient of financial slack variables is expected to be positive and statistically significant, pointing to the inability of these firms to substitute between internal and external finance, while for financially unconstrained firms the coefficient of financial slack variables is expected to be not different from zero, indicating that they can freely switch between internal and external financing.

The coefficient estimates of output and measures of internal funds across both regimes are mostly statistically significant and of the expected sign, indicating strong support for the neoclassical/accelerator model. Turning to differences in investment behavior across the two regimes we see that the coefficients of lagged cash flow are significant at 1% and 5% significance level. Furthermore, as expected, lagged cash flow coefficient is larger for financially constrained firms than for financially non-constrained firms, i.e., 0,015 versus 0,004. This supports the belief that financially constrained firms are more sensitive to the availability of internal finance than financially unconstrained firms. In addition, the coefficient of twice lagged cash flow is positive and statistically significant only for firms operating in financially constrained regime. This could be interpreted as evidence of cash smoothing hypothesis, i.e., the fact that, given their inability to secure all desired level of financing when a profitable investment project will be undertaken, financially constrained firms accumulate internal funds over time and use them to finance these projects. Further evidence of different sensitivities to availability of internal funds across firms operating in the two regimes is given by the coefficient of lagged financial slack variable and its twice lagged value. These coefficients are positive and significant at 1% and 5% significance level only for financially constrained firms, implying that these firms accumulate large holdings of liquidity to substitute for their inability to obtain external finance. In contrast, respective coefficients for financially unconstrained firms are positive but insignificant, suggesting that these firms could easily substitute between internal and external finance. Finally, support for the hypothesis of different investment behavior across groups is provided by the coefficient estimates of sales and its lagged value. All coefficients are positive and statistically significant at 1% and 10% significance level, but they are larger in absolute value for unconstrained firms than for constrained firms. This is consistent with the hypothesis that unconstrained firms are

able to react more to the prospect of future growth opportunities, summarized by the sales variable, than the firms operating in the constrained regime⁷.

The identification of separate investment regimes is further supported by the estimates of the switching function reported in part 2 of Table 5. Other than the balance sheet variables, we have included in the specification the percentage of shares owned by the largest owner, its interaction with respective ownership dummies, firm size, firm age and a dummy denoting whether the firm is subject to soft budget constraints or not. Firm size is measured by the logarithm of the average number of employees, while firm age is measured by the number of years the firm has been operating in private hands⁸. The interpretation of this coefficient is the marginal change in the probability of operating in the constrained regime from operating one more year under private ownership.

An important general conclusion that emerges from the results is that ownership type is important determinant of the likelihood whether the firm is financially constrained or not. As expected, the coefficient of the percentage of shares owned by the largest owner is significant indicating that some ownership concentration is important in determining the regime a firm operates. The signs of the coefficients of interaction terms indicate that higher ownership concentration in the hands of either the state or employees is associated with higher probability of being financially constrained. In between these groups, when ownership is concentrated in the hands of the state the effect is twice as large as when ownership is concentrated in the hands of employees. Interestingly, there seems to be no significant effect on the likelihood of being financially constrained when ownership is concentrated in the hands of the other owner types.

*** *Table 6 approximately here* ***

An advantage of using the switching regression approach is that it allows us to calculate probabilities that firms will operate in one or the other regime. In Table 6 we report probabilities that firms, belonging to different ownership groups, operate in the financially constrained regime. Several important facts emerge from the table. First, probabilities of being financially constrained are quite high and seem to be rather stable over time. Second, consistent with the finding that the identity of owners matters with respect to access to finance, there are substantial differences in probabilities across ownership groups. Third, firms under foreign ownership face the lowest probability of being financially constrained. This is consistent with the argument that foreign owners either have access to

alternative capital markets or manage to crowd out domestic demand for capital. Finally, insider owned firms face higher probability of being financially constrained than private outsider owned firms. We perform mean difference tests, not reported here, to check the statistical significance of these differences for each pair of ownership groups for every year. In no case are we able to accept the null that insider and private outsider owned firms have equal probabilities of being financially constrained.

Conclusions

In this paper, using new and rich panel data for a large and representative sample of Estonian firms we investigate the impact of corporate governance structures on liquidity constraints. The investment behavior of firms is examined in two alternative set-ups: firstly in a dynamic setting in the presence of adjustment costs, liquidity constraints and imperfect competition and under both debt and equity constraints, and secondly in a switching regression framework with endogenous and unknown sample separation. The Generalized Method of Moments and Switching Regression estimates confirm the importance of financial factors in determining investment rates and suggest that firms owned by insiders, especially non-managerial employees, are more prone to be liquidity constrained than are others.

Our results contribute to the debate on the efficiency and viability of various ownership structures. The arguments in the debate could be well summarized in Hansmann's (1996) survivorship test, which says that if a given organizational form does not survive, then it must have been at a comparative disadvantage compared to other forms. One of the organizational structures that, on various theoretical grounds, has been pinpointed as inefficient, and, as such, subject to extinction, is employee owned firms. The theoretical arguments have given rise to empirical work that tries to assess the inefficiency of employee owned firms. The results of this work, however, suggest that employee owned firms do not always perform worse than other alternatives. For instance, for the Baltic countries Jones and Mygind (2000) provide evidence that employee owned firms do not perform worse than other Estonian privately owned firms. In reality, however, employee ownership is in decline and Estonia is not an exception in this respect. Consequently, other than inherent inefficiency, there might be other factors that affect their survival. In fact, evidence exist, in for instance Mygind (1997), that in the Baltic countries employee owned firms face unwillingness on the part of financial institutions to lend to them or, when they obtain loans those loans have very high interest rates, which instead of rational risk assessment on the part of financial institutions points towards discrimination in the credit market.

With respect to the likelihood of firms being financially constrained or not, our findings point to the importance of the firm's balance sheet position, as well as to variables that proxy the severity of information asymmetry and agency costs. In general, our results indicate that firms with a weak balance sheet position and those facing more severe asymmetric information and agency costs problems are more likely to operate in the financially constrained regime. More specifically, a higher ratio of debt to capital, a bigger ratio of interest coverage to sales, and a lower liquidity to capital ratio increase the probability of a firm being financially constrained. This probability is also higher for newly privatized and smaller firms, as well as for those in which ownership is concentrated in the hands of insiders and the state. We also find that the existence of soft budget constraints lowers the probability of a firm being financially constrained. When actual probabilities of operating in the financially constrained regime are calculated, it is found that they are quite high and basically stable during the whole period. Overall, the analysis has shown the importance of different capital market imperfections in firm's investment decisions.

Finally, our conclusions point to the importance of ownership configurations for both investment behavior and the likelihood of facing financial constraints. As expected firms whose ownership structures are dominated by insiders face higher probability of being financially constrained and display higher sensitivity to availability of internal finance.

¹ There are, however, studies that have analyzed the role of alternative governance structures on investment behavior. For instance, Hoshi, Kashyap and Scharfstein (1991) analyze the role that membership in industrial groups, which are characterized by extensive crossholding, plays in investment behavior of Japanese firms. Furthermore, Goergen and Renneboog (2001) investigate how ownership concentration in the hands of institutional investors affects liquidity constraints for a sample of companies listed in the London Stock Exchange.

² There exist only a few studies on developed economies mainly due to the low incidence of such firms in these economies. Examples include Jones and Backus (1977) study on British producer cooperatives, Estrin and Jones (1998) study on French producer cooperatives and Bartlett et. al. (1992) study on Italian cooperatives. Transition economies constitute a fertile ground for such studies given the high incidence of insider, both managerial and employee, ownership in post privatization ownership configurations. Nevertheless, studies on firm-level investment in transition do not yet abound. However, as data become more available so do the studies. Examples of studies where authors explicitly address the issue of insider ownership are Anderson and Kegels (1997) and Lizal and Svejnar (2002a, 2002b) for the Czech Republic and Prasnikar and Svejnar (1999) for Slovenia.

³ Although the use of instrumental variables could be called upon to account for the endogenous ownership structures, there are two major problems with this approach. The first problem has to do with the quality of instruments. In general, finding appropriate instruments for ownership dummies is difficult. The literature concerning the determinants of ownership structures is large and it has identified several factors influencing the choice of optimal ownership shares, such as firm size, productivity, profitability, capital intensity, financing requirements or firm quality. In principle, all these variables could serve as instruments for the endogenous ownership dummies. The application of the instrumental variable approach requires all these instruments to be uncorrelated with the unobserved variables. In structural investment equations, however, all factors mentioned will be correlated with unobserved firm specific shocks to investment and, as such, still be correlated with the error terms. Then, the use of such bad instruments, as Angrist and Krueger (2001) point out, will still lead to biased parameter estimates.

Instead of using the potential instruments to substitute for the endogenous ownership dummies in the regression, a two-step procedure could be adopted. At the beginning, first-stage predicted probabilities of a firm being under a given ownership structure are generated, through the estimation of a probit or logit regression, and then, in the second stage, these predicted probabilities are included in the main regression instead of the ownership dummies. While this approach sounds appealing, it has a drawback in that the use of nonlinear first stage predicted values in the second stage equation will not generate consistent estimates unless the nonlinear model happens to be specified exactly right, leading so to misspecification bias. Getting the functional form of ownership equations right, however, is not trivial. Financing requirements are one of the determinants of optimal ownership shares. What matters, however, for a forward-looking firm are not only current financing requirements but also future ones. Assume, for instance, that two similar firms are randomly allocated to managers. In the process of financing restructuring both firms will have to raise capital, but one might need more funds than the other. If the manager of this firm expects that his/her credit constraint will be binding in the future, then he/she might decide to issue equity that will subsequently dilute his/her ownership share. A fully specified model of ownership determinants will have to contain measures of such future financing requirements.

⁴ An example would be a banking crisis or economywide productivity shocks that affect similarly all firms in the economy.

⁵ Kornai, Maskin and Roland (2003) include also the imposition of import restrictions, trade barriers and/or ease of pressure from foreign competition as form of soft budget constraints. Estonia is the most liberal country in Europe in terms of trade barriers and restrictions and as such we do not expect this form of soft budget constraints to have played any role in Estonian firms' performance.

⁶ If the focus of the analysis had been simply the effect of private ownership versus state ownership these firms would have been classified as private ones. As the identity of private owners, however, matters in explaining differences in observed behavior, these firms end up being classified as state owned.

⁷ The existence of two distinct regimes could be more formally tested using appropriate likelihood ratio tests. Testing, however, is not straightforward. The reason is that, in such models, under the restriction that coefficients of the two investment equations are equal, the parameters of the switching equation are not identified, which makes it difficult to calculate degrees of freedom. In addition, the likelihood ratio test statistic might not be asymptotically distributed as χ^2 distribution. However, Goldfeld and Quandt (1976) have suggested that the likelihood ratio test can be performed using a χ^2 distribution with degrees of freedom equal to the sum of the number of constraints and the number of unidentified parameters. The critical value of χ^2 distribution at 5% significance level with 45 degrees of freedom is 50,71, while the respective value of likelihood ratio tests is 517,264. These values lead to decisive rejections of the null hypothesis of a single regime.

⁸ Given that most of the firms in our sample are former state owned firms, it would have made no sense to define firm's age with the absolute number of years the firm has been in operation, since most firms have been operating many years before

transition started. At that time, however, investment needs of these firms and allocation of resources were determined by central planners.

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Table 1. Variable Definitions

Variable	Definition
Investment	The sum of investments in reconstruction, expansion and acquisition of buildings, in constructions of new buildings and other business related projects, in buying new machinery, equipment and means of transportation and in buying and improving land.
Capital	The book value of non-current tangible assets. It is calculated as the average of the value of these assets at the beginning and at the end of the year.
Employment	The average number of employees per year. The study has excluded all firms with fewer than 10 employees.
Labor Cost	The sum of wage and salaries in a given year.
Average Wage	The ratio of labor cost to average employment in a given year.
Sales	Net sales per year as stated in firm's income statement.
Profit	Net profit per year as stated in firm's income statement. This is profit left after all taxes are paid.
Cash Flow	The sum of depreciation allowances and net profit.
Value Added	Two definitions of value added are adopted. The first is the sum of depreciation allowances, net profit, labor cost and expenditures for social tax and health insurance. The second includes all these variables as well as financial costs.
Debt	The sum of short-term loans.
Current Liabilities	The sum of short-term loans and payables to suppliers and or customers.
Total Liabilities	The sum of short and long-term loans and other short and long-term liabilities.
Short-Term Assets	The sum of cash, short-term receivables and short-term securities.
Financial Cost	The net of financial income accrued and financial cost incurred during a given year.
Extra Revenue	Revenue obtained from sale of non-current tangible assets over a given period.
Industry Groups	7 broad industry groups were defined as follows: 1. Agriculture and fishing. 2. Mining, food products, textile and leather. 3. Wood products, paper products, coke, petroleum, chemicals, rubber, plastic, non-metallic, basic metals and machinery and equipment production. 4. Electrical, optical and transport equipment production. 5. Energy and construction. 6. Wholesale and retail trade. 7. Transport.
Size Groups	Firms are divided into three size groups according to their average employment. The first group includes firms with 49 or fewer employees, the second includes the firms with more than 49 employees and fewer than 101, and the third group includes firms with more than 101 employees.
Ownership Groups	6 ownership groups are defined as follows: state, foreign, institutional domestic outsiders, former employees, incumbent employees and managers.
Ownership Category	A firm is considered to be dominantly owned by the owner who holds the largest share.

Table 2. Ownership Distribution Over Time According to Dominant Owner¹

Year	1993	1994	1995	1996	1997	1998	1999	Total
Ownership Group								
Domestic Outsiders	81	94	97	110	95	90	119	686
Employee	48	54	47	41	27	26	29	272
Former Employees	0	0	11	14	19	15	16	75
Foreign	42	60	63	68	67	59	72	431
Managers	45	53	65	76	81	71	84	475
State	228	181	262	204	172	123	6	1,176
No Answer	54	56		1	19	18	31	179
Total	498	498	545	514	480	402	357	3294

¹ A firm is considered to be dominantly owned by the owner who holds the largest share.

Table 3. Means and Standard Deviations of Principal Variables Over Time

Year	1993	1994	1995	1996	1997	1998	1999	Obs. ²
Variables ¹								
Investment	2150 (12363)	2245 (18844)	3371 (22029)	3007 (17249)	2634 (15504)	3407 (14019)	4547 (19549)	3283
Capital	12250 (51023)	9740 (48137)	9771 (45305)	10329 (47218)	10411 (47756)	11200 (49623)	16816 (43022)	3294
Sales	21773 (63301)	21502 (61562)	30377 (93119)	24269 (69179)	27573 (77562)	27989 (63535)	32816 (88789)	3294
Employment ³	196 (414)	166 (340)	164 (388)	161 (393)	157 (276)	137 (282)	124 (228)	3294
Real Wage ⁴	14.42 (17.11)	16.46 (10.91)	13.31 (7.73)	21.04 (30.59)	21.92 (17.28)	22.96 (14.63)	28.37 (18.33)	3294
Cash Flow	805 (7530)	649 (8801)	1103 (10008)	658 (12607)	1678 (14428)	1994 (18195)	2932 (17328)	3294
Debt	867 (2692)	891 (4112)	1389 (3974)	1701 (4007)	1717 (3664)	2276 (3885)	2962 (4127)	3294
Current Payables	5516 (23301)	4848 (21130)	3804 (11895)	4334 (12503)	4363 (10672)	4605 (12843)	5445 (15750)	3294
Long-Term Liabilities	2595 (14961)	2702 (19652)	3143 (12450)	3433 (12048)	3820 (13874)	4469 (12052)	6863 (16384)	3294

¹ All the variables except employment are expressed in thousands of Estonian kroons and in 1993 prices

² This number is the sum over the whole sample with non-missing values for the respective variable

³ Average number of employees in a given year

⁴ Real average wage per employee

Table 4. GMM Estimates of Investment Functions by Ownership Group^a

	State	Domestic Outsider	Foreign	Manager	Employee
Parameters					
Adjustment Cost Parameter, a	2.739*** (4.22)	1.923** (1.67)	1.385*** (4.73)	2.313** (1.22)	3.017*** (2.56)
Optimal Investment-Capital Ratio, b	0.21** (2.02)	0.19*** (7.27)	0.17** (2.27)	0.12** (1.11)	0.11** (2.09)
Market Power Parameter, η	0.87 (0.94)	1.25*** (3.79)	1.38** (1.78)	0.93* (1.62)	0.82 (0.78)
Internal Funds Parameter	0.04*** (3.23)	0.027** (1.32)	0.004 (0.28)	0.018 (0.74)	0.052*** (3.68)
Internal Funds Squared Parameter	0.0012 (0.98)	0.0001 (0.18)	0.0001 (1.01)	0.003 (0.97)	0.002* (1.64)
External Funds Parameter	- 0.004 (- 0.68)	- 0.022*** (- 3.00)	- 0.00001 (- 0.37)	- 0.021*** (- 3.26)	- 0.051** (- 1.78)
External Funds Squared Parameter	0.0002 (0.86)	- 0.002 (- 1.16)	0.0004 (1.15)	- 0.0009*** (- 3.85)	- 0.012** (- 1.84)
F-test 5% Critical Value	12.34 1.75	12.65 1.75	15.76 1.75	9.64 1.75	9.45 1.75
Sargan's Statistic	21.76	20.57	20.96	14.08	21.07
Degrees of Freedom	14	14	14	14	14
P-value	0.12	0.13	0.12	0.42	0.11
Second Order Autocorrelation Test	0.46	0.45	-0.86	-1.04	-1.03
P-value	0.64	0.64	0.37	0.29	0.27
No. of Observations	303	241	254	277	212
Adjusted R-Squared	0.191	0.186	0.218	0.209	0.205

^a Values in brackets denote respective t-statistics. Each model is estimated with time, industry and size dummies, whose estimates are not reported here. Internal funds are measured by the sum of cash flow, short-term assets and revenue from sale of non-current assets. External funds are measured by the amount of outstanding debt. The t-statistics of adjustment cost, optimal investment/capital ratio and market power parameters are calculated using delta method with analytical first derivatives. The model estimated corresponds to specifications derived assuming the firm maximizes the discounted present value of total dividends. Instrument sets include all real and financial variables lagged three periods or more. All regressions include the inverse of Mill's Ratio to account for sample selection bias.

*** Denotes significance at 1% significance level.

** Denotes significance at 5% significance level.

* Denotes significance at 10% significance level.

Table 5. Coefficient Estimates for Two-Component Investment Regression and Switching Equation¹

Part 1						
Investment Equation²	Lagged Sales	Twice Lagged Sales	Lagged Cash Flow	Twice Lagged Cash Flow	Lagged Financial Slack	Twice Lagged Financial Slack
Constrained Regime	0,012*** (19,12)	0,010*** (15,06)	0,015*** (12,98)	0,012** (1,79)	0,051*** (7,74)	0,012** (2,12)
N/Constrained Regime	0,097*** (7,42)	0,059* (1,29)	0,004** (2,19)	0,001 (0,98)	0,01 (0,21)	0,0005 (1,23)
Part 2						
Switching Equation³	Debt-to-Capital Ratio	Liquidity-to-Capital Ratio	Int. Coverage – to – Sales Ratio	Size	Age	SBC
Coefficient Estimates	0,019*** (9,87)	-0,003*** (-4,42)	0,087* (1,87)	-0,039*** (-12,47)	-0,103 (1,42)	-0,029** (-2,53)
	Largest Share	Largest Share*Dom	Largest Share*For	Largest Share*Man	Largest Share*Emp	
Coefficient Estimates con't	0,025*** (3,88)	0,057 (0,45)	0,032 (0,98)	-0,029 (-1,25)	0,012*** (13,25)	

¹ * ** - significant at 1% confidence level, ** - significant at 5% confidence level, * - significant at 10% confidence level. Numbers in parentheses are *t*-statistics of coefficient estimates.

² The dependent variable is investment in fixed capital divided by lagged capital stock. The right hand side variables presented are also divided by lagged capital stock. Each estimated investment equation also includes a constant, time and industry dummies as well as the inverse of Mill's ratio to account for selection bias.

³ The dependent variable is an indicator taking value of 1 for firms classified as financially constrained and 0 for those classified as not financially constrained. The right hand side variables, other than time and industry dummies, enter in first lags.

Table 6. The Average Probability of Being in the Financially Constrained Regime Over Time and Across Ownership Groups

Ownership Group Year	State	Foreign	Domestic	Manager	Employee
1995	0,537	0,328	0,438	0,498	0,542
1996	0,518	0,309	0,429	0,504	0,505
1997	0,526	0,298	0,431	0,510	0,512
1998	0,545	0,310	0,459	0,487	0,539
1999	0,558	0,346	0,477	0,500	0,572