Corporate Governance, Firm Size and Liquidity Constraints: A Dynamic Analysis

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This version, March , 2007

Abstract:

New and rich panel data for a large and representative sample of firms are used to estimate the sensitivity of access to capital to differing ownership structures. The investment behaviour of firms is examined in a dynamic setting in the presence of adjustment costs, liquidity constraints and imperfect competition. The empirical work is based on the derivation of Euler equations in the presence of symmetric and quadratic adjustment costs and both debt and equity constraints. Whereas the norm is to use ad hoc approaches to model these constraints, our alternative and more consistent leads to the inclusion of financial variables in investment equation in first differences rather than in levels. Our GMM 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. Among the other groups, somewhat surprisingly, only domestic outsider owned firms display sensitivity to both measures of the availability of finance, with manager owned firms being sensitive to the availability of external finance, while state owned firms being sensitive to the availability of internal finance.

1.Introduction

The importance of liquidity constraints in firms' real investment decisions has long been the focus of economic research (Stein, 2003). The literature finds that access to capital is not unlimited and is determined by the degree of informational asymmetries and agency costs. The large empirical work has focused on identifying indicators at the firm level, such as dividend payout ratios, bond rating, degree of bank affiliation, membership in financial conglomerates, firm size, firm age and/or governance structure, that approximate for the severity of capital market imperfections and explain the observed differences in investment behavior across firms[1]. In this paper, by using a rich panel data for a large and representative sample of firms, we investigate the investment behavior of a sample of Estonian firms during the period 1993 through 1999 and make several contributions.

Fundamentally, we provide new empirical evidence on a topic that has attracted the attention of theorists but for which there is little empirical evidence --the impact on investment of alternative governance structures. The study contributes to the literature in several ways. First, it introduces and empirically tests a novel way of how financial variables enter a structural dynamic investment equation. Second, it accounts for the effect of governance structures in investment decisions through their role in mitigating or exacerbating informational asymmetries and agency costs. Third, it assesses the long-run viability of certain ownership forms. This is an important issue in light of the continuing debate in the literature on the efficiency of various ownership forms resulting from the extensive privatization process in almost all former centralized economies. Fourth, in a more general context, it contributes to the debate in the corporate governance literature on the effect of governance through ownership. Finally, the results of this analysis allow us to answer questions such as how pervasive are liquidity constraints in Estonia and the extent to which different governance structures are likely to be financially constrained. These answers, in turn, provide directions where public policy should focus in terms of designing effective policies to promote successful restructuring on the part of firms.

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[1] This literature, which started with the seminal study of Fazzari, Hubbard and Petersen (1988), is large and it would require a book in itself to review it in detail. Other studies in this area are, for example, Hoshi, Kashyap and Scharfstein (1991), Whited (1992), Oliner and Rudebuch (1992), Schaller (1993), Galeotti, Schianatarelli and Jaramillo (1994), Petersen and Rajan (1994), Bond and Meghir (1994), Hubbard, Kashyap and Whited (1995), Kaplan and Zingales (1997), Hu and Schianrarelli (1998), Hadlock (1998), Cleary (1999) and Goergen and Renneboog (2001).

The remainder of the paper is structured as follows. In the following section we outline the testable hypotheses and present the specifications to be estimated in the empirical work. The next two sections focus on sample construction and data description, and the estimating strategy and presentation of empirical results. In the last section we conclude with some policy recommendations.

2. Governance Structures, Firm Size, Investment and Liquidity Constraints

The extensive literature on investment behavior has not much to say on the role of different governance structures on investment decisions, with the reason being that most of the empirical studies are based on samples of large publicly traded firms where ownership is vastly dispersed and managers enjoy high degrees of discretion[2]. In the process of decentralizing their economies, in many countries the movement away from state ownership has led to the emergence of diverse forms of ownership. On many instances insiders[3], i.e., employees and/or managers, have majority or dominant ownership or, even when they possess minority ownership, enjoy substantial degrees of control. The existence of such diverse governance structures allows testing of various theoretical propositions regarding the efficiency of different owners in capital allocation and in monitoring management.

Various arguments point to firms under insider ownership facing higher likelihood of being more constrained in raising capital than others. The literature on employee ownership, summarized in Dow (2003), stresses a host of factors such as member' wealth position, their time horizon, risk attitudes, goal structure and the structure of property rights[4] 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

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[2] This is, especially, the case for samples drawn from Anglo-Saxon countries, i.e., from the US, the UK and Canada.

[3] Some clarification is in order here with respect to the terminology we use. The term insiders used in the literature on transition economies refers to both managers and employees who in a way or another have become owners or shareholders of the enterprises they worked before the start of transition. For those not familiar with this literature the use of this term might be confusing given that the same term is used in the more traditional analysis of western firms to refer only to managers. In the paper whenever we use the term insiders we refer to both managers and employees.

[4] The traditional analysis of employee ownership assumes that employee owned firms are characterized by collective ownership and non-transferable individual rights. An important development in transition economies is that, in most of the cases, employee owners are share owners, i.e., they own part of the firm on an individual basis and are able to trade shares in the capital markets. However, these firms still retain a strong degree of collective ownership by imposing limits on share trade. Evidence of this is provided by, for instance, Kalmi (2002) for Estonia. In a field survey of firms under insider ownership the author reports that in only 6% of his sample there are no restrictions on share trading. Furthermore, in 92% of the cases insiders are asked to offer their shares first to current shareholders.

accepting new members, leads 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. Overall, disincentives to invest internally and barriers to raise capital externally might lead to employee owned firms under-investing.

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[5] is associated with entrenchment and divergence of interests between managers and shareholders. In transition economies, managerial shareholding in post-privatization ownership configurations, in the form of majority, dominant or minority shareholders, is substantial. The possibility of entrenchment and subsequent rent seeking or asset stripping behavior on the part of managers has been an argument against managerial ownership (Djankov, 1999). The likelihood of this happening depends to a large extent on managers' outside career opportunities and portfolio diversification, the way they obtain shares and the efficiency of market for corporate control. When outside career opportunities do not exists and managers have invested most of their human and financial capital in the firm, they will try to hold on to their equity share by following policies, including investments, which will increase their job security. Furthermore, manager's behavior might be fundamentally different depending on whether he/she acquires the firm through a managerial buy-out (MBO) or gets it either for free or in the framework of a voucher-funded privatization. If the ownership is gained through one of the latter two cases, the manager might perceive it as a windfall gain and consume it faster than earned income (Djankov, 1999). On the contrary, MBOs serve as screening mechanisms that allow only highly qualified, growth oriented managers to become owners[6]. Finally, markets for corporate control serve as disciplining devices for managers. Yet, in an environment of high uncertainty and infantile capital markets, informational

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[5] The models on which these conclusions are based start from zero managerial ownership and then consider the dynamics once managerial ownership increases. However, the definition of low and high managerial ownership should not be taken as meaning majority (dominant) versus minority managerial ownership. High managerial ownership could be considered a stake around 10%.

[6] Financing of an MBO often requires external financing and only qualified managers might be able to raise external finance.

asymmetries might lead to adverse selection problems in the market for corporate control (Earle and Estrin, 1996). Overall these arguments imply that, in a transition economy, 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 and less investment.

Agency problems arise when managers control, but do not own, the firm. Under these circumstances the identity of outside owners is crucial with respect to their ability to curb managerial discretion. For the purposes of this study we classify outside owners into three sub-groups: the state, foreign owners and domestic outside owners. The efficiency of each owner in disciplining management results in differences in managerial discretion across firms, which, in turn, results in differences in access to capital and investment behaviour. High degrees of managerial discretion mean that managers could engage in unprofitable investment projects or even in projects with negative present value that are valuable to them and lead to their entrenchment. Moreover, high managerial discretion accentuates the degree of asymmetric information and makes external finance more expensive. The outcome is reliance on internal funds, which results in investment being highly sensitive to the availability of internal finance.

When majority or dominant owners are foreigners, who possess enough experience and resources to engage in effective monitoring, managerial discretion is kept at minimal levels. Further, given that foreign owners have access to their parent company' resources and/or to international capital markets, investment behavior of foreign owned firms is not expected to be constrained by the availability of either internal or external finance. When majority or dominant owners are domestic outsider investors the degree of effective monitoring depends on the identity, number and size of investors. Depending on the combination of these factors several scenarios might arise. For instance, if ownership is concentrated in the hands of a few big institutional investors with experience, resources and low coordination costs, then effective monitoring will arise. Alternatively, if ownership is dispersed in the hands of a large number of small investors, then managers are more likely to enjoy substantial discretion in pursuing their objectives. Finally, when ownership is concentrated in the hands of the state[7]

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[7] As Shleifer and Vishny (1997) point out state ownership can be viewed as relation between a principal and two agents. The principal are the individuals (citizens), who are the ultimate owners of the firm. Being dispersed they have no ability and resources to monitor the state, i.e., the politicians and bureaucrats, who act as the first agent

managers will possess virtual control of the firm and enjoy high degrees of discretion in pursuing their interests.

A further determinant of investment behavior and access to capital is firm size. Smaller firms exhibit larger degrees of information asymmetry between insiders and outsiders. In addition, these firms also face higher costs in issuing new equity. If these factors are significant then small firms are expected to rely more on internal funds. Agency costs may also be greater for these firms, raising further the cost of external financing. Overall, small firms are expected to rely more on internal funds than larger firms.

In testing the propositions firm's investment behavior is modeled in a dynamic setting in the presence of adjustment costs, liquidity constraints and imperfect competition, similar as in Whited (1992) and Bond and Meghir (1994). The firm, at every point in time, is supposed to maximize the discounted present value of future after-tax dividends as follows[8]:

$$\max_{K_t, L_t, B_t} \quad E_t \sum_{s=1}^{\infty} \beta_{t+s} \cdot D_{t+s} \tag{1}$$

where t represents a time index, E_t denotes the expectation operator that is taken based on all the information available at time t, $\beta_{t+s} = 1/(1+\theta_s)$ is the discount factor at time s with θ_s being the nominal discount factor at time s and $\beta_t = 1$ at time t, and D_t stands for after-tax dividends at time t. The model is solved subject to a flow of funds constraint, capital accumulation constraint, dividend non-negativity constraint and a credit ceiling constraint[9].

Equation (1) models the firms as dividend (profit) maximizers. Yet, while dividend maximization is a good approximation of firm behavior for certain groups of firms, it might not be appropriate for others (Ward, 1958, Dow, 2003). It is often argued that insider-owned firms would maximize income per worker rather than profit or dividends. The substantial insider power, especially employee power, in transition economies would make dividends per

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and who in themselves have to monitor managers, the second agent. Both agents have usually objectives quite different from those of the principals and they can easily collude to pursue their objectives at the expense of the principals.
[8] Except for the time index the firm's maximization problem has to be written with a firm identification index. Given that it plays no role in altering the solution to the problem, in order not to complicate notation that index is dropped.
[9] The solution of the model is presented in Hobdari (2003).

worker maximization seem the more appropriate objective function than total dividends maximization. Consequently, the model is solved for alternative objective functions and tests are performed in the empirical work to determine which of them better approximated firm behaviour. The equations to be estimated are the following:

$$\left(\frac{I}{K}\right)_{t+1} = \alpha_o + z_o + \alpha_1 \cdot \left(\frac{S}{K}\right)_t + \alpha_2 \cdot \left(\frac{L}{K}\right)_t + \alpha_3 \cdot \left(\frac{I}{K}\right)_t + \alpha_4 \cdot \left(\frac{I}{K}\right)_t^2 + f_i + s_{t+1} +$$

$$+ z_1 \cdot \left(\frac{\Delta B_{t+1}}{K_{t+1}} - \frac{\Delta B_t}{K_t}\right) + z_2 \cdot \left(\frac{CF_{t+1}}{K_{t+1}} - \frac{CF_t}{K_t}\right) + z_3 \cdot \left(\frac{\Delta B_{t+1}}{K_{t+1}} - \frac{\Delta B_t}{K_t}\right)^2 + z_4 \cdot \left(\frac{CF_{t+1}}{K_{t+1}} - \frac{CF_t}{K_t}\right)^2 + \zeta_{t+1} \quad (2)$$

$$\left(\frac{I}{L}\right)_{t+1} = \alpha_o \cdot \left(\frac{K}{L}\right)_{t+1} + \alpha_1 \cdot \left(\frac{S}{L}\right)_t \cdot \frac{K_{t+1}}{K_t} + \alpha_2 \cdot d_t \cdot \frac{K_{t+1}}{K_t} + \alpha_3 \cdot \left(\frac{I}{L}\right)_t \cdot \frac{K_{t+1}}{K_t} + \alpha_4 \cdot \left(\frac{I}{K}\right)_t^2 \cdot \frac{K_{t+1}}{L_t} +$$

$$\alpha_5 \cdot \frac{K_{t+1}}{L_t} + f_i + s_{t+1} + z_o + z_1 \cdot \left(\frac{\Delta B_{t+1}}{L_{t+1}} - \frac{\Delta B_t}{L_t}\right) + z_2 \cdot \left(\frac{CF_{t+1}}{L_{t+1}} - \frac{CF_t}{L_t}\right) + z_3 \cdot \left(\frac{\Delta B_{t+1}}{L_{t+1}} - \frac{\Delta B_t}{L_t}\right)^2 +$$

$$+ z_4 \cdot \left(\frac{CF_{t+1}}{L_{t+1}} - \frac{CF_t}{L_t}\right)^2 + \xi_{t+1} \quad (4)$$

Equation (2) is derived under the assumption that firms are dividend maximizers, while equation (3) is derived under the assumption that firms are dividend per worker maximizers.

3. Data and Sample Description

The data employed in this study cover a large and representative sample of Estonian firms over the period 1993 through 1999. The data consists of ownership configurations, obtained from surveys, and of financial information from firm's balance sheet and income statements reported to the Estonian Statistical Office. The firms included in the survey scheme are selected as a stratified random sample based on size and industrial affiliation. For the purposes of the analysis firms have to be classified into ownership groups. Yet, this classification is not a trivial pursuit. Often firms are misclassified among ownership groups because important information contained in ownership variables is overlooked (Filer and Hanousek, 2002). In the Appendix we present a detailed account of how ownership structures

are defined. After correcting for data inconsistencies[10], the merging of ownership and financial information creates an unbalanced panel of 3294 observations to be used in the analysis.

Table 1 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 using dominant ownership classification. 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, 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 fully under state ownership while 30 firms being mostly in private hands but with the state still holding the dominant position[11].

The table also contains important information on ownership dynamics. It is apparent that the number of state and employee owned firms steadily decreases, while the number of domestic outsider and manager owned firms increases over time. While the decrease in the number of state owned firms over time is expected due to the continuation of the privatization process, the decrease in the number of employee owned firms seems to underline the suspicion that in the long-run this ownership structure is not viable and will be diluted in favor of others. Their inability to secure enough external funding and, consequently, to carry out the necessary investment in order to remain competitive is among the drivers of these dynamics. As for the increase in the number of manager owned firms, an argument often made is that it might be mostly caused by the concentration of ownership in the hands of managers in insider owned firms, i.e., by the shift of ownership rights from employees to managers. Evidence on these claims is provided by transition matrixes, which plot ownership structures at two different points in time against each other. An example is given in Table 2, where the ownership categories in 1995 are plotted against the ownership categories in 1999.

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[10] Examples of such inconsistencies are firms reporting zero labor force or capital or sales, or reporting ownership shares whose sum is lower or larger than 100. The following seven criteria were applied to the data: the firm's capital at the beginning and the end of the period should be positive, investment should be non-negative, investment should be smaller than end of period capital stock, sales should be positive, the average employment per year should be positive and equal to or greater than 10, labor cost in a given year should be positive and ownership shares should add up to 100.

[11] 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.

Overall, some important facts emerge from these transitions. First, state firms privatized after 1995 end up mostly in the hands of outsider investors, i.e., domestic outsiders and foreigners, with employees and former employees being the least preferred option. Second, there is little employee or former employee activity in taking over firms once they are in private hands. Third, domestic outsiders, foreigners and managers are quite active in the market for corporate control, with continuous acquisitions and cessations across groups. Fourth, the concentration of ownership from employees to managers, although existing, is not the driving force behind the rise in managerial ownership. Finally, former employees hang on to their dominating ownership position for some time after they have left the firm, but ultimately renounce it.

Turning to firm size distribution, Table 3 shows the distribution of firms by size groups over time, while Table 4 shows the joint distribution of firms by ownership and size groups. It is seen that over time large firms drop out of the sample. Because of the large number of state-owned firms in this group, two potential reasons for the steady decrease in number of firms over time might be their break-up before privatization into smaller units or decreases in employment due to pre-privatization restructuring. Inspecting the joint distribution of ownership and size it is apparent that state owned firms tend mostly to be large, insider owned and, surprisingly, foreign owned firms tend to be small and medium, while domestic outsider owned firms tend to be small and large.

Table 5 presents 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.

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.

4. Results and Discussion

In this section we report the results of estimating investment equations by ownership and size group. The results are obtained using Arellano's and Bond's (1991) GMM estimator. Inference on coefficients is based on one-step procedure results, while on model specification on two-step procedure results. This is due to a downward bias in standard errors for small samples when the two-step procedure is applied. The standard errors of the underlying parameters of the model, i.e., the adjustment cost parameter, the optimal investment/capital ratio and the market power parameter, are then calculated using the delta method with analytical first derivatives.

The effect of ownership structures on firm's investment behavior and the degree of financial constraints is normally investigated by introducing ownership dummy variables and estimating the specifications using the pooled sample. Further, all dummies are interacted with all other real and financial variables in the regression allowing not only the intercepts but also slopes to differ across groups. A major problem in estimating such specifications with ownership variables as right-hand side variables is the endogeneity of ownership, i.e., in equilibrium different owners will determine their optimal ownership share based on various firm characteristics, among which is firm's investment needs. A potential solution to the problem is the use of instrumental variables, i.e., the endogenous variables in the model, the ownership dummies in our case, are instrumented with a set of variables that are correlated with them but not with the error term.

Yet, the instrumental variable approach is not without problems. Finding appropriate instruments for ownership dummies is difficult. The literature on the determinants of ownership structures identifies firm size, productivity, profitability, capital intensity, financing requirements and/or firm quality as determinants of ownership shares. All these variables could serve as instruments for the endogenous ownership dummies. The application

of the instrumental variable approach requires all 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 bad instruments will still lead to biased parameter estimates (Angrist and Krueger, 2001).

An alternative approach is the division of the sample into several sub-samples according to the ownership groups defined and the estimation of the relevant specifications for every sub-sample separately. Other than avoiding the pitfalls of instrumental variable approach, this approach offers the possibility to test the hypothesis on the existence of different objective functions across groups of firms. This is the approach adopted here by dividing the sample into five sub-samples as follows: state owned, domestic outsider owned, foreign owned, manager owned and employee owned firms[12]. In the interpretation of results we then focus on the differences in respective coefficients across ownership groups, which provide unbiased estimates of the true differences. The results of the estimating the equations under alternative assumptions on firm's objective function are reported in Tables 6 and 7.

Focusing first on 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.

Turning to estimates of structural parameters we see that the adjustment cost parameter and the optimal investment/capital ratio are generally positive and significant across all equations, while the market power parameter is significant only 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

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[12] As the number of observations for former employee owned firms does not allow independent analysis of this group, these firms are included in the employee owned firms group.

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. Exception is the estimate of this parameter in Model 1 for manager owned firms, which is positive and significant. The value of 0.93, however, is close to unity, implying no market power. 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. The values of the parameter are larger for foreign owned firms than for domestic outsider owned firms across all specifications.

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. As seen in Table 7.3, 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. Unfortunately, we possess data neither on the relations of these firms with their parent companies, if any, nor on their access to international capital markets.

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 Model 1 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 differences in estimates vary from model to model, but the pattern remains the same. The estimate of internal funds squared parameter, included to capture potential non-linearities, is significant only for employee owned firms[13], indicating that for these firms availability of internal finance is crucial in investment policies.

One argument against the interpretation of coefficients of cash flow and value added as indicators of financing constraints is that they also proxy for future investment opportunities. However, if measures of cash flow or value added are equally correlated with future opportunities across all firm types, then the differences in these coefficients are unbiased indicators of differences in financing constraints. This is tested by estimating an equation with sales as dependent variable and different lags of cash flow, ownership dummies and their interaction with lagged cash flow variables as independent ones. The results, not reported here, showed that cash flow predicts future sales across all firms and that the effect is larger for foreign and domestic outsider owned firms than for the other types. This finding supports our conjecture that differences in internal funds parameter between, for example, employee owned or state owned firms and foreign owned firms are a good predictor of financing constraints.

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. Finally, the significant coefficient of internal finance and the insignificant coefficient of external finance could also be

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[13] With one exception in Model 3 for state owned firms where the coefficient is significant at 10% significance level.

interpreted as evidence of managerial discretion and their preferences against outside control. In contrast, all other domestic owned firms, that is domestic outsider owned, manager owned and employee owned, 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.

A general fact emerging from inspecting the tables 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. A final observation is that, results are robust to the alternative definitions of internal funds, i.e., the use of cash flow or value added, as well as to the assumption on firm's objective function. This means that, while their magnitude and significance changes across different specifications, their sign remains the same.

The last step of the analysis in this sub-section is testing whether firms under different ownership structures have different objective functions. As in the previous sub-section, given the non-nested nature of the competing models, the tests are carried out using Davidson and MacKinnon's (1981) J-test for non-nested alternatives. The results of the test are reported in Table 8. The table should be read as follows. The cells in column "Model 1" show the t-test on the significance of the fitted values from Model 3 that are added as an additional regressor in Model 1, while the cells in column "Model 3" show the t-test on the significance of the fitted values from Model 1 that are added as an additional regressor in Model 3. The interpretation is similar for Model 2 and Model 4. The test results show that for state and manager owned firms we are able to reject both models as being the correct ones. However, under alternative definitions of internal funds, we conclude that foreign and domestic outsider owned firms behave consistently with profit (dividends) maximization hypothesis, while employee owned firms behave consistently with dividends per worker maximization hypothesis. These conclusions provide support against treating all the firms as being similar and pooling them in one sample.

In chapter two, we argued that the probability of firms facing liquidity constraints is not independent from firm size. The reasons for this are that both the cost to outsiders of collecting information and the cost to insiders of issuing debt and/or equity decrease with firm size. Consequently, small firms are expected to face more severe liquidity constraints than large firms. In testing the proposition on the role of firm's size on liquidity constraints, the same approach as in the case of ownership structure is followed. That is, the sample is divided into three sub-samples of small, medium and large firms[14], and the analysis is performed separately for every sub-sample. The estimation results are reported in Table 6.5.1 through Table 6.5.3. Model performance is in line with the previous results. Sargan's statistic in all the models is accepted at high probability levels, the second order autocorrelation hypothesis is always rejected at high significance levels and the adjusted R-squared are at the range of 16% to 22%. Furthermore, the estimates of adjustment cost and optimal investment/capital ratio parameters are positive and significant for all the three size groups, while the market power parameter is positive and significant only for small and large firms but insignificant for medium firms.

With respect to estimates of financial variables parameters, it is seen that they are significant and of the expected sign only for medium sized firms. Given the non-significance of parameters for the other two groups it is impossible to make comparisons across groups. These results are at odds with the results obtained, for instance, by Fazzari, Hubbard and Petersen (1988), who find that the likelihood of firms experiencing liquidity constraints decreases with firms size, and Hooks (2003), but are in line with the results of Audretsch and Elston (2002) who find that small German firms face fewer liquidity constraints. However, while Audretsch's and Elston's (2002) results are driven by the specific institutional structure in Germany, which provides long-term and competitively priced capital to small enterprises, in our sample, results are driven by the specific ownership distribution within each size group. More specifically, as shown in chapter four, the group of small firms is characterized by the large share of foreign owned and manager owned firms, which, as reported in the previous sub-section, show little sensitivity to financial variables. The significant results for medium firms could be driven by the large share of domestic outsider owned and state owned firms within this group.

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[14] Firms are divided into three size groups according to their average employment in a given year. The first group includes firms with 49 or fewer employees, the second includes firms with more than 49 employees and fewer than 101, and the third group includes firms with more than 101 employees.

5. Conclusions and Policy Implications

Strategic restructuring is identified as one of the pillars on which rests the success of transition. It, in turn, depends, to a large extent, on firms' ability to carry out the necessary investment by raising large amounts of capital operating under hard budget constraints. Furthermore, a good investment climate is a precondition for achieving sustainable long-term economic growth and poverty reduction. In this paper we have investigated whether investment spending of firms in Estonia is affected by liquidity constraints as well as whether the degree of such constraints differs across firms under different governance structures. The analysis is carried out by explicitly modeling firms' investment behavior in a dynamic setting in the presence of quadratic adjustment costs, and debt and equity constraints. A major advantage of this Euler equation approach is that it allows the estimation of the effects of financial constraints on inter-temporal allocation of investment, which avoids the measurement issues involved when an explicit investment demand equation has to be assumed. After deriving the optimal rule for capital accumulation from firm's dynamic optimization problem, the up to date econometric modeling of liquidity constraints is based on *ad hoc* inclusion in the specification of variables affecting access to capital, due to the fact that these variables do not explicitly enter first order conditions of firm's maximization problem. In this paper, however, we follow the approach of Chatelain (1998, 2000) that allows for an explicit solution of the Lagrangean multiplier related to dividend constraint in terms of financial variables. Differently from the *ad hoc* approach, this approach leads to the inclusion of financial variables in respective investment equations in first differences rather than in levels.

While we argue that the identity of owners matters in the severity of liquidity constraints that firms face, current and future financing needs are also important determinants of the choice of optimal ownership structures. This two-way causality leads to endogeneity of ownership structures with respect to investment rates, which, if not accounted for, would result in biased estimates. Two potential ways to correct for it are the use of instrumental variables and the use of the predicted values from an equation modeling determinants of ownership structures. Both of them, however, are problematic. On the one hand, the use of instrumental variables is complicated by their potential correlation with firm specific shocks to investment, leading to biases of an unknown nature. On the other hand, the use of predicted values from a first-step

regression of ownership shares or dummies on various factors that influence the choice of ownership structures requires that regression specification be exactly right for the second step estimates to be consistent. These considerations lead us to adopt the following estimation strategy: divide the sample into sub-samples of firms belonging to a given ownership class, estimate investment equations separately for each group and focus on the differences in estimated coefficients across groups.

The empirical results underline several important points. First of all, the adjustment cost parameter and the optimal investment/capital ratio with minimal adjustment costs are positive and significant across all groups and across all specifications. Second, only for foreign and domestic outsider owned firms the market power parameter is significant and well above unity, indicating that these firms enjoy some monopoly power. Third, financial variables, used as proxy for the degree of liquidity constraints, play a significant role in firm's investment decisions. Although all coefficients of internal and external funds are insignificant when the Euler equations are estimated for the whole sample, the inclusion of financial variables improved the performance of estimated equations in terms of not being able to reject the hypothesis that they are correctly specified.

Fourth, the degree of liquidity constraints varies with firm ownership structure. We consistently find that, on average, all non-foreign owned firms face some liquidity constraints either through positive and significant coefficients of internal funds variables or through negative and significant coefficients of external funds variables. The behavior of foreign owned firms, however, is consistent with the Euler equation specification in the absence of liquidity constraints. These findings provide support to the hierarchy of finance arguments and are consistent with the belief that successful restructuring in a transition economy is dependent on the availability of finance. Focusing on coefficient differences across groups, we find that the sensitivity of investment to the availability of internal and external finance is stronger for employee owned firms. From the other groups, somewhat surprisingly, only domestic outsider owned firms display sensitivity to both measures of the availability of finance, with manager owned firms being sensitive to the availability of external finance, while state owned firms being sensitive to the availability of internal finance. The results on domestic outsider owned firms imply that these firms could suffer from high levels of managerial discretion and control. All in all, the results provide support to almost all hypotheses outlined in Section 2. Only in the case of manager owned firms we do not find

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support to the hypothesis of positive and significant correlation between investment rates and measures of internal funds. Furthermore, we find evidence that, on average, employee owned firms are more financially constrained than the other types.

Finally, we provide evidence that firm behavior in a transition economy cannot be analyzed by invoking the representative firm approach. The results of Davidson's and MacKinnon's (1981) J-tests for non-nested alternatives reject the hypothesis that employee owned firms can be modeled as profit maximizers. Curiously, the tests do not reach a clear conclusion with respect to state owned and manager owned firms, implying that their behavior is consistent with both profit maximization and profit per worker maximization. The results imply that, due to firm heterogeneity, pooling all firms in one sample for the purpose of the analysis would result in mis-specification bias.

The paper contributes to the literature in several important aspects. First, it provides more evidence in support of the financing hierarchy hypothesis[15]. Second, it adds to the stock of the limited evidence on the role of liquidity constraints on firm behavior in a transition economy. Third, it is among the few studies, such as the ones by Lizal (1998) and Lizal and Svejnar (2002), which make a comprehensive analysis of the effect of various ownership structures on firm investment behavior. Especially, advantage of this paper compared to the others is the possibility of identification of insider owners, both managers and employees, which allows us to test various propositions related to their behavior. In most of other studies, due to data unavailability, authors use state versus private owned or state, private and foreign owned division. A study that investigates similar issues for Estonian firms using company accounts data is Masso (2002). The author, however, focuses only on the differences between foreign and Estonian domestic firms. As such, this study offers a better picture of processes that characterize Estonian transition.

The robustness of results, however, needs to be further tested by employing both larger samples and better measures of access to capital. As already mentioned, in short time panels the GMM estimates suffer from semi-consistency. As transition proceeds and data become more and more available, it will be possible to make use of longer time panels that will lead to better estimates. In addition to estimation strategy, it is often argued that the use of financial

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[15] Studies listed in footnote 1 have found evidence consistent with this hypothesis.

variables to proxy for liquidity constraints is not perfect in that they also convey information on future profitability. In our case both profit and revenue from sale of non-current assets might fall into this category. If, for instance, the latter variable is correlated with the lack of future growth opportunities, then it would not be a perfect measure of liquidity constraints. In separating these effects data on the type of assets sold would be needed. If assets sold are not related to firm's core operations, then it is likely this action represents restructuring rather than lack of growth opportunities. The reverse might be true if assets sold belong to firm's core operations. Furthermore, given the arguments on the separation of ownership and control, measures of control and the degree of monitoring need to be employed in order to be able to account for the effect of unobservables, such as for example managerial discretion, on investment behavior.

A continuous and lively debate in the transition literature is 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. Estonia is one of the countries where employee ownership has been in decline, as indicated also by our data presented in Table 2. Kalmi (2002) makes a thorough analysis of the degeneration of these firms and finds that structural bias towards extinction[16] and insufficient motives of incumbent insiders to extend ownership to new employees are the main reasons that drive their decline. Our results emphasize here the degree of liquidity constraints as a further factor that potentially accentuates the decline of employee ownership. Indeed, Kalmi's (2002) and ours sets of conclusions are complementary and provide the strongest evidence yet on the causes of employee ownership degeneration. In addition, a major contribution of this paper is that it is probably the first to provide robust evidence to the arguments that employee owned firms do face larger liquidity constraints than other types of firms. While this result is relevant for Estonia and other transition countries with high incidence of employee ownership, the overall evidence on the impact of alternative ownership structures on firm's policies is also pertinent to the broader corporate governance literature,

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[16] This bias is caused by the property rights designation within the firm and the imperfection of the market for shares.

which attempts, among other things, to ascertain the costs and benefits of governance through ownership.

These results imply a role for public policy in increasing the level of investment by influencing the environment firms operate in through policy measures such as the provision of fiscal incentives, development of capital markets and financial system and improvements of access to capital. Fiscal incentives in the form of lower corporate taxes and/or exemption of retained earnings used for investment from taxes, i.e. taxes will be paid only on the level of profits above that of investments, will stimulate investment through an increase in availability of internal funds. Indeed, since 2000 retained earnings are exempt from taxation in Estonia. While it is still early to assess the full effects of such policy, it is expected that, in the long run it will result in higher capital stock. For instance, Masso (2002), citing unpublished work done using a model based on Tobin's Q, states that the long run effect of this policy is expected to bring about an increase in capital stock of 6.1%. There is a possibility, however, that such policies might produce undesirable effects. Under the conditions when managers enjoy high degrees of discretion, an increase in the availability of internal finance simply offers them more resources at their disposal to pursue their own interests at the expense of those of the other shareholders. Instead of relaxing the constraints, the outcome of this policy might then be over investment. These potential costs, as well as the fact that the provision of fiscal incentives depends on government's budget constraints, imply a limited role for fiscal policies. As such, they must be combined with other policies designed not only to relax liquidity constraints but also to mitigate agency conflicts within the firm by curbing managerial discretion.

One way to achieve both objectives is to follow policies to further develop capital markets and the financial sector, i.e., banking and non-banking institutions. Estonia's capital market, although growing, is small, and, as such, its future will lie in alliances with other stock exchanges. The first step in this direction is the creation of the pan-Baltic stock exchange in early 2000. Subsequent membership of Estonia in the European Union in 2004 will also open European capital markets to Estonian companies. However, those likely to benefit from the stock market, at least in the short term, are large firms. More important for Estonian firms in general is the development of the banking sector and other non-banking institutions, such as investment funds, venture capital funds, mutual funds and credit unions. The banking system in Estonia is consolidated and well regulated. Nevertheless, it is mostly involved in financing

the government than the private sector. Here there is scope to introduce legislation that will increase banks incentives to extend loans to private companies. Similar steps need to be taken to increase non-banking institutions participation in financing the private sector, which until now has been marginal. A possible way would be to provide tax breaks to such institutions that would be contingent to the amount of loans they extend to private companies, especially to those encountering difficulties in raising finance.

An alternative way for governments to relax liquidity constraints for certain types of firms is to provide direct subsidies to them. This policy, however, is likely not to be efficient on two grounds. First, to the extent that, governments are not more efficient than private sector in identifying firms with binding versus non-binding constraints, it could exacerbate the lemons problems. Second, it could soften recipient's budget constraints and lead to inefficient capital allocation. Indeed, the available evidence points to no effect of government subsidies on firms' growth. For instance, Demirguc-Kunt and Maksimovic (1996) find that government subsidies to industry do not increase the proportion of firms growing faster than predicted. Finally, a faster way of injecting capital into firms is to promote the inflow of foreign direct investment either in the form of fully foreign owned subsidiaries, established through greenfield investment or acquisition of an Estonian state or private owned company, or partnerships with domestic capital. The latter is of particular interests for Estonian private companies in need of fresh funds for investment. Given that foreign owners have access to global capital markets, this will enable Estonian companies to gain access to sources of funds that will have otherwise been either inaccessible or too costly.

The measures outlined above are not likely to improve the situation unless applied in combination with each other. The actual set of policy measures to be applied at a particular moment in time will depend on general macroeconomic conditions and the stage of institutional development. Successive Estonian governments have been very active in designing policies to improve firms' access to capital. Results of this paper suggest, however, that there is still latitude for public policy action.

Table 1. Ownership Distribution Over Time

Year / Ownership Group	1993	1994	1995	1996	1997	1998	1999	Total
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

Table 2. Transition Matrix for Ownership Changes Between 1995 and 1999

Ownership Group 1999 / Ownership Group 1995	Domestic Outsider	Employee	Former Employee	Foreign	Manager	State	Total
Domestic Outsider	30	8	6	21	28	1	94
Employee	15	4	4	10	10	1	44
Former Employee	4	0	0	2	3	1	10
Foreign	18	6	0	17	15	1	57
Manager	20	5	3	14	17	2	61
State	32	6	3	9	11	0	61
Total	119	29	16	73	84	6	327

Table 3. Number of Firms by Size Over Time

Year / Firm Size	1993	1994	1995	1996	1997	1998	1999	Total
Small Firms (1-49)	219	225	218	214	203	169	154	1402
Medium Firms (50-100)	78	104	126	123	118	98	94	741
Large Firms (> 100)	201	169	201	177	159	135	109	1151
Total	498	498	545	514	480	402	357	3294

[1] Firm size groups are defined in terms of the number of employees.

Table 4. Number of Firms by Ownership Group and Size

Firm Size Ownership Form	Small Firms	Medium Firms	Large Firms	Total
Domestic Outsiders	254	141	291	686
Employee	132	55	85	272
Former Employee	41	16	18	75
Foreign	209	109	113	431
Managers	276	128	71	475
State	400	252	524	1176
No Answer	90	40	49	179
Total	1402	741	1151	3294

Table 5. Means and Standard Deviations of Principal Variables Over Time

Year Variables[1]	1993	1994	1995	1996	1997	1998	1999	Obs.[2]
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 6. GMM Estimates of Investment Functions by Ownership Group for Dividend Maximization Model[a]

Ownership Group Parameters	State Owned	Employee Owned	Manager Owned	Foreign Owned	Domestic Outsider Owned
Adjustment Cost Parameter, a	2.739*** (4.22)	3.017*** (2.56)	2.313** (1.22)	1.385*** (4.73)	1.923** (1.67)
Optimal Investment-Capital Ratio, b	0.21** (2.02)	0.11** (2.09)	0.12** (1.11)	0.17** (2.27)	0.19*** (7.27)
Market Power Parameter, η	0.87 (0.94)	0.82 (0.78)	0.93* (1.62)	1.38** (1.78)	1.25*** (3.79)
Internal Funds Parameter	0.04*** (3.23)	0.052*** (3.68)	0.018 (0.74)	0.004 (0.28)	0.027** (1.32)
Internal Funds Squared Parameter	0.0012 (0.98)	0.002* (1.64)	0.003 (0.97)	0.0001 (1.01)	0.0001 (0.18)
External Funds Parameter	- 0.004 (- 0.68)	- 0.051** (- 1.78)	- 0.021* (- 3.26)	- 0.00001 (- 0.37)	- 0.022*** (- 3.00)
External Funds Squared Parameter	0.0002 (0.86)	- 0.012** (- 1.84)	- 0.009*** (- 3.85)	0.0004 (1.15)	- 0.002 (- 1.16)
F-test 5% Critical Value	12.34 1.75	9.45 1.75	9.64 1.75	15.76 1.75	12.65 1.75
Sargan's Statistic Degrees of Freedom	21.76 14 0.12	21.07 14 0.11	14.08 14 0.42	20.96 14 0.12	20.57 14 0.13
Second Order Autocorrelation Test	0.46 0.64	-1.03 0.27	-1.04 0.29	-0.86 0.37	0.45 0.64
No. of Observations	303	212	277	254	241
Adjusted R-Squared	0.191	0.205	0.209	0.218	0.186

[a] Values in brackets denote respective t-statistics. Each model is estimated with time 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, while 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. 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 7. GMM Estimates of Investment Functions by Ownership Group for Dividend per Worker Maximization Model[a]

Ownership Group / Parameters	State Owned	Employee Owned	Manager Owned	Foreign Owned	Domestic Outsider Owned
Adjustment Cost Parameter, a	2.137* (1.55)	2.524** (1.76)	1.932*** (3.09)	1.285*** (3.62)	1.784** (1.71)
Optimal Investment-Capital Ratio, b	0.24*** (4.18)	0.18*** (5.38)	0.25** (1.92)	0.33*** (4.47)	0.31** (2.29)
Market Power Parameter, η	1.03 (0.79)	0.94 (1.21)	1.02 (0.76)	1.35** (2.29)	1.31*** (3.71)
Internal Funds Parameter	0.02*** (4.47)	0.025*** (3.75)	0.0001 (1.12)	0.0002 (0.75)	0.018* (3.73)
Internal Funds Squared Parameter	0.0009* (1.32)	0.0015** (2.24)	0.0001 (1.12)	0.0002 (0.97)	0.00008 (0.29)
External Funds Parameter	- 0.001 (- 1.00)	- 0.0047** (- 1.57)	- 0.0037 (- 0.27)	0.00002 (1.09)	0.00013 (0.18)
External Funds Squared Parameter	0.0004 (0.75)	- 0.0015** (- 1.92)	- 0.0003 (- 0.37)	- 0.0001 (- 0.98)	- 0.0005 (- 0.12)
F-test / 5% Critical Value	27.57 / 1.67	15.25 / 1.67	13.54 / 1.67	29.32 / 1.67	21.28 / 1.67
Sargan's Statistic / Degrees of Freedom	17.46 / 14 / 0.20	9.24 / 14 / 0.79	8.75 / 14 / 0.84	17.45 / 14 / 0.19	21.34 / 14 / 0.10
Second Order Autocorrelation Test	- 1.06 / 0.29	- 1.07 / 0.28	- 1.07 / 0.28	- 0.43 / 0.66	- 0.79 / 0.44
No. of Observations	303	212	276	254	240
Adjusted R-Squared	0.201	0.209	0.216	0.222	0.198

[a] Values in brackets denote respective t-statistics. Each model is estimated with time 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, while 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. 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 8. Results of Testing the Existence of Different Objective Functions Across Ownership Groups Using the Davidson and MacKinnon J-Test for Non-Nested Models[a]

Model Ownership Group	With Cash Flow as Measures of Internal Funds		With Value Added as Measures of Internal Funds	
	Dividend Model	Dividend per Worker Model	Dividend Model	Dividend per Worker Model
State	t = 7.78*** (0.000)	t = 12.34*** (0.000)	t = 6.29*** (0.000)	t = 13.19*** (0.000)
Foreign	t = 0.52 (0.602)	t = 9.25*** (0.000)	t = 0.53 (0.593)	t = 12.97*** (0.000)
Domestic	t = 1.23 (0.198)	t = 6.97*** (0.000)	t = 1.28* (0.100)	t = 8.21*** (0.000)
Manager	t = 6.48*** (0.000)	t = 5.12 (0.000)	t = 7.12*** (0.000)	t = 9.54*** (0.000)
Employee	t = 14.36*** (0.000)	t = 0.64 (0.486)	t = 11.72*** (0.000)	t = 0.24 (0.808)

[a] The table reports the results of testing whether firm behavior across ownership groups is better characterized by maximization of the discounted present value of total dividends or by maximization of the discounted present value of dividends per worker. The t-statistic corresponds to the fitted values of the alternative model added as an additional variable in the basic model, which is the one identified in the respective column. Numbers in brackets are the respective p-values. A significant coefficient of the fitted values leads to the rejection of the respective basic model in favor of the alternative one.

***   Denotes significance at 1% significance level.
* *   Denotes significance at 5% significance level.
*   Denotes significance at 10% significance level.

Table 8. GMM Estimates of Investment Functions by Size Group[a]

Size Group Parameters	Small Firms	Medium Firms	Large Firms
Adjustment Cost Parameter, a	2.365** (2.09)	2.612* (3.97)	2.593*** (1.35)
Optimal Investment- Capital Ratio, b	0.21* (4.08)	0.14** (1.57)	0.15* (5.23)
Market Power Parameter, η	1.09** (2.14)	0.95 (1.05)	1.39*** (1.61)
Internal Funds Parameter	0.027 (0.79)	0.043* (3.26)	0.036 (0.94)
Internal Funds Squared Parameter	0.001 (0.87)	0.0006 (0.87)	0.00007 (0.74)
External Funds Parameter	- 0.012 (- 0.68)	- 0.059* (- 2.78)	- 0.037 (- 0.38)
External Funds Squared Parameter	- 0.003 (- 0.52)	- 0.009* (- 2.97)	- 0.006 (- 0.74)
F-test 5% Critical Value	12.37 1.75	9.46 1.75	15.90 1.75
Sargan's Statistic Degrees of Freedom P-value	18.49 14 0.19	16.45 14 0.23	19.19 14 0.14
Second Order Autocorrelation Test P-value	-1.12 0.26	-0.96 0.34	-1.29 0.20
No. of Observations	507	312	468
Adjusted R-Squared	0.221	0.197	0.192

[a] Values in brackets denote respective t-statistics. Each model is estimated with time 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, while 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. 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.

A P P E N D I X

In constructing ownership groups and categories the precise meaning of ownership needs to be defined. In the literature, ownership is considered to be the right to residual returns, i.e., to what remains after the factors of production have been paid their contribution. In addition, some argue that control rights should also be included in the definition of ownership (Hansmann, 1996). This brings up the issue whether formal or real control needs to be taken into account. Measuring control and, especially, distinguishing formal versus real control, in the data used in this paper, is not possible. Establishing this relationship, or the lack of it, would require data, for instance, on owners' board representation, on voting rules, shares classes and voting behavior of different groups of owners, which are not available. Bearing this in mind, for the purposes of this analysis ownership is defined in terms of the percentage of shares held by each group of owners.

Based on the respective direct shareholdings, six broad groups of owners are defined as follows: state, foreign, domestic outsiders, former employees, incumbent employees and managers. A common pitfall in defining ownership stakes for all these groups is that no correction is made for potential cross holding of shares, as the identity of the enterprises that hold shares to each other is not known. This problem could result in understating the real share held by some owner types and overstating the share held by other owner types. For example, due to specifics of privatization legislation[17] foreigners invest in an enterprise through another domestic holding registered in Estonia. This practice assigns the shares held by the domestic holding as being held by domestic outsiders. This issue might also arise in the case of insider ownership when insiders, in order to acquire an enterprise, establish first another company that officially takes over the enterprise to be privatized[18].

Another definitional problem has to do with the distinction of employees and managers as well as with the percentage of employees being owners. The distinction between employees and managers depends on the individual enterprise's classification of middle level managers. There might be cases when the number of managers is overstated. So, for example, in 1995 the mean of managerial employees in the sample is 6. It is not uncommon, though, for an enterprise to report having more than 50 managers and, in one extreme case, one enterprise even reported having 127 managers out of a labor force of 411. The issue of the relative number of employee owners is, however, more problematic. How would, for example, an enterprise where only two or three employees own shares be classified? Kruse and Blasi (1997) argue that at least 50% of employees have to own shares for the enterprise to be considered employee owned. This definition is a bit restrictive as it excludes enterprises with substantial employee ownership. For the purposes of this study an enterprise is classified as employee owned when more than 10% of employees and no less than 5 employees own shares. If these conditions are not satisfied then the enterprise is classified as manager owned. In sum, managerial holdings are defined as the sum of direct shareholdings of managerial employees, as indicated by the respondents, and of direct holdings of non-managerial employees if these comprise less than 10% of the total number of non-managerial employees.

The last, but not the least, problem is the distinction among different owners that make up the domestic outsider group. Two groups of domestic outsider owners emerge from the data: institutional domestic outsiders, i.e. other Estonian enterprises and institutions, and individual domestic outsiders. This distinction might not be of relevance if individual outside investors were "real" outsiders, i.e., they were private individuals who had invested in the enterprise due to financial considerations and would, consequently, display behavior not different from any institutional investor. Yet, quite often, individual investors are people who either have been previously employed by the enterprise or have close connections with enterprise insiders. In this context, former employees are of particularly practical importance. They are often the cause why ownership structure might change, i.e. an enterprise might be shown that it jumps from insider owned to outsider owned, without any single share changing hands. This is the case because when employees either retire or quit the enterprise, but still hold their shares, they are then re-classified as outsiders instead of insiders. Nevertheless, even after leaving the enterprise, it would be hard to conjecture them behaving as "real" outsiders and they would rather display behavior similar

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[17] When privatization through auctions started, domestic outsiders had the possibility to pay by installments and through vouchers, while foreigners did not have this possibility. Later on, this was changed, but, in the meantime, it created incentives for foreigners to bypass the law and acquire enterprises through established domestic holdings.

[18] Kalmi (2002) presents some evidence of this phenomenon occurring in the privatization of state and collective farms.

to that of their former peers[19]. This scenario has strong implications for enterprises where former employees dominate domestic outsider shareholding. These enterprises will more likely display behavior similar to that of insider owned ones than to that of "real" outsider owned ones.

Thus, it becomes important to distinguish the identities of individual investors and separate former employees from the rest. This is not an easy undertaking as, neither the number of individual shareholders nor their connections to the enterprise are known. Starting with the assumption that outsider ownership closely connected with insider ownership always occurs jointly with insider ownership, we classify an enterprise as owned by former employees if all of the following four conditions[20] apply in a given year: 1) the dominant owners are domestic outsiders; 2) domestic individual owners own a larger share than domestic institutions; 3) insiders, i.e., managers plus employees, initially, i.e., at the time of privatization, owned more than 50% of shares; 4) they still own more than 10% of shares. If any of these conditions is not satisfied then the enterprise is classified as owned by domestic outsiders.

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[19] This does not however preclude the possibility that they, for example, might ally themselves with a core institutional investor or other individual investors and, consequently, exercise their ownership and control rights as "real" outsiders.

[20] These criteria are selected among alternative definitions such as to minimize errors. This does not mean, however, that all errors are eliminated and we acknowledge that there are errors in both directions.

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