

Jones, Derek C.; Kalmi, Panu; Mygind, Niels

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## Choice of ownership structure and firm performance: Evidence from Estonia

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2003 • No. 7

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Derek C. Jones, Panu Kalmi and Niels Mygind

Choice of ownership structure and firm  
performance: Evidence from Estonia

Bank of Finland  
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# BOFIT personnel 2003

## Economists

**Mr Pekka Sutela, head**

Russian economy and economic policy  
Russia's international economic relations  
Baltic economies  
Pekka.Sutela@bof.fi

**Ms Tuuli Koivu, economist**

Baltic economies  
Tuuli.Koivu@bof.fi

**Mr Tuomas Komulainen, economist**

Russian financial system  
Polish economy  
Currency crises  
Tuomas.Komulainen@bof.fi

**Mr Iikka Korhonen, research supervisor**

Baltic economies  
Issues related to the EU enlargement  
Iikka.Korhonen@bof.fi

**Mr Vesa Korhonen, economist**

Russia's international economic relations  
Russia's banking system  
Issues related to the EU enlargement  
Vesa.Korhonen@bof.fi

**Ms Seija Lainela, economist**

Russian economy and economic policy  
Seija.Lainela@bof.fi

**Mr Jouko Rautava, economist**

Russian economy and economic policy  
Jouko.Rautava@bof.fi

**Mr Jian-Guang Shen, economist**

Chinese economy and economic policy  
Financial crises  
Jian-Guang.Shen@bof.fi

**Ms Laura Solanko, economist**

Russian regional issues  
Public economics  
Laura.Solanko@bof.fi

**Ms Merja Tekoniemi, economist**

Russian economy and economic policy  
Merja.Tekoniemi@bof.fi

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Timo.Harell@bof.fi

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Internet sites  
Tiina.Saajasto@bof.fi

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## Contact us

Bank of Finland  
Institute for Economies in Transition, BOFIT  
PO Box 160  
FIN-00101 Helsinki

Phone: +358 9 183 2268

Fax: +358 9 183 2294

E-mail: bofit@bof.fi

Internet: www.bof.fi/bofit

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All opinions expressed are those of the authors and do not necessarily reflect the views of Hamilton Collage, Helsinki School of Economics or Copenhagen Business School

Derek C. Jones\*, Panu Kalmi\*\* and Niels Mygind\*\*\*

## Choice of ownership structure and firm performance: Evidence from Estonia

### Abstract

In this paper we use rich panel data for a representative sample of Estonian enterprises to analyse diverse issues related to the determinants of ownership structures and ownership changes after privatisation. A key focus is to determine whether ownership *changes* are related to economic efficiency. While employee owned firms are found to be much more prone than other firms to switch ownership categories, often “employee owned” firms remain “insider-owned” as ownership passes from current employees to managers and former employees. Logit analyses of the determinants of ownership structures and ownership changes provides mixed support for several hypotheses. As predicted: (i) wealth and resource constraints play a crucial role in the determination of ownership, with foreigners buying firms with the highest equity levels and insiders buying firms with the lowest equity valuations; (ii) risk aversion explains subsequent ownership changes, especially away from employee ownership; (iii) allocation of ownership depends on the pre-privatisation origin and location of the firm, and these factors also influence subsequent ownership changes. Finally we compare our findings with those achieved by using more conventional approaches to analyze efficiency that use very similar data. Reassuringly the evidence presented in this paper is consistent with the view that efficiency considerations drive ownership changes (while earlier analysis for Estonia and for many other transition economies has identified the impact of ownership on economic performance.) However, the findings in this paper also establish that there are important influences besides economic efficiency that affect enterprise ownership and ownership changes.

**JEL-numbers:** G3, J5, P2, P3

**Key words:** Privatisation, ownership change, employee ownership, transition economies, Estonia

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\* Dept. of Economics, Hamilton College, Clinton, NY 13323. [djones@hamilton.edu](mailto:djones@hamilton.edu). Jones is corresponding author.

\*\* Helsinki School of Economics, department of economics, PO Box 1210, 00101 Helsinki, Finland, E-mail: [kalmi@hkkk.fi](mailto:kalmi@hkkk.fi)

\*\*\* Center for East European Studies, Copenhagen Business School, Howitzvej 60.2, 2000 Frederiksberg, Denmark, [nm.cees@cbs.dk](mailto:nm.cees@cbs.dk)

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Derek C. Jones, Panu Kalmi and Niels Mygind

## Choice of ownership structure and firm performance: Evidence from Estonia

### Tiivistelmä

Tässä tutkimuksessa analysoidaan yrityksen omistusrakenteen ja sen muutoksen määräytymiseen vaikuttavia tekijöitä. Työssä käytetään runsasta paneeliaineistoa, joka pohjautuu edustavaan otokseen virolaisista yksityistetyistä yrityksistä. Keskeinen tutkittava asia on omistusrakenteiden muutosten yhteys taloudelliseen tehokkuuteen. Havaitaan, että henkilöstön omistamat yritykset siirtyvät muita yrityksiä todennäköisemmin toisiin omistusrakenteisiin. Henkilöstöomisteiset yritykset pysyvät kuitenkin usein yrityksen sisäpiiriläisten omistamina, sillä omistus siirtyy työntekijöiltä johdolle tai entisille työntekijöille. Omistusrakenteiden muodostumista tarkasteleva ekonometrinen analyysi tukee useita esitettyjä tutkimushypoteeseja. Ensinnäkin varallisuusrajoitteilla on suuri merkitys omistuksen allokoinnissa. Ulkomaalaiset ostavat ne yritykset, joissa osakepääoma on suurin. Sisäpiiriläisten omistamissa yrityksissä osakepääoma on pienin. Toiseksi riskin kaihtaminen selittää omistuksen muutoksia erityisesti henkilöstöomisteisissa yrityksissä. Kolmanneksi omistuksen jakautuminen riippuu yrityksen organisaatiomuodosta ennen yksityistämistä sekä yrityksen sijainnista. Nämä tekijät vaikuttavat myös myöhempiin omistuksen muutoksiin. Lopuksi työn tuloksia vertaillaan virolaisyriksien tavanomaisiin tehokkuusanalyysihin. Havaitaan, että tulokset ovat melko hyvin linjassa tehokkuusanalyysien kanssa ja että omistussuhteiden muutokset ovat yhteydessä taloudelliseen tehokkuuteen. Tutkimukssamme tuodaan kuitenkin esiin myös muutamia tehokkuudesta riippumattomia tekijöitä, jotka vaikuttavat omistussuhteisiin.

**Avainsanat:** yksityistäminen, omistussuhteiden muutos, henkilöstöomistus, siirtymätaloudet, Viro

# 1 Introduction

Since privatisation processes in Eastern Europe have resulted in the emergence of diverse ownership structures, an unprecedented opportunity to examine various issues concerning the nature and effects of different ownership configurations has been provided. One crucial area of inquiry that has received much attention is the comparative efficiency of differing ownership structures. Moreover, research on transition economies in this area overwhelmingly has adopted methods that might be labelled “conventional approaches”, including the estimation of production functions that are augmented by various measures of ownership (as reviewed, for example, in Djankov and Murrell, 2002.) In this paper we take a different tack and instead focus on the nature and the determinants of ownership *changes*.

We argue that approaching the issue in this alternative way has some benefits to using mainstream methods and that it produces findings that at least are complementary to the information derived from other approaches. Some of the reasons for approaching the issue this way reflect potential problems with using conventional approaches in transition economies. One argument is based on Demsetz and Lehn (1985). Since firms are likely to adopt an ownership structure that minimises transaction costs for a given firm or industry, they claim that studies of the comparative efficiency of varying ownership structures may be biased. In other words, a test which regresses performance on ownership is not likely to find the true differences in comparative efficiency. Another important potential deficiency of traditional efficiency analysis reflects the extent of measurement error in key variables. As many have noted (e.g. Filer and Hanousek, 2002), the accounting data for transition economies, especially during early transition, was often regarded as unreliable.

The alternative approach is based on ownership *dynamics* and results from invoking the Coase theorem (Coase, 1960.) This recognizes that, since privatisation in all transition economies was a highly politicized process (e.g. Estrin, 1994; Uvalic and Vaughan-Whitehead, 1997), the initial ownership structures that emerged from this process were unlikely to be optimal from the economic point of view. However, in keeping with the Coase theorem, it was expected that freely tradable property rights would lead to resale of shares which, in turn, would produce efficiency-enhancing ownership changes (Boycko, Shleifer and Vishny, 1995). According to this view, one of the reasons why ownership markets are expected to select the most efficient ownership structures is because of the opportunities for mutually beneficial transactions – more efficient owners (who, by definition are able to create more value) would buy shares from less efficient owners (Jensen and Meckling, 1979; Demsetz and Lehn, 1985; Hansmann, 1996). Another reason is that product market competition would force high-cost enterprises out of the market. If the costs of ownership in a particular firm are high, in order to survive, such firms may be forced to sell equity to other investors. In other words, the *direction* of ownership changes should be highly informative concerning the advantages of different ownership forms.

Why different ownership structures emerge and change is also of interest for reasons other than a narrow focus on comparative efficiency. These broader concerns are of special note in transition economies where an astonishing feature has been the widespread emergence of insider, and notably employee, ownership (Estrin and Wright, 1999; Uvalic and Vaughan-Whitehead, 1997). Moreover, the transition from insider ownership to conventional ownership structures has been regarded as a prerequisite for strategic restructuring of enterprises (Aghion and Blanchard, 1998). Hence in this paper, of the diverse possible ownership transitions, we concentrate on issues surrounding insider vs.

investor ownership. Our investigation examines several related matters including: the characteristics of firms that are changing from insider to outsider ownership; the determinants of these transitions; the nature of firms in which insider ownership is proving to be more durable; and whether broad-based employee ownership structures are able to persist or whether there concentration of ownership among managerial insiders must occur.<sup>1</sup> The structure of the paper is as follows.

In the next section we briefly review the literature on the choice of ownership form, paying particular attention to issues concerning the adoption and the stability of insider ownership. Since some authors have expressed concerns that ownership dynamics may also be a biased indicator of economic efficiency, we also review these arguments in this section. To provide institutional context for our empirical analysis we then review key aspects of privatization in Estonia. Next we briefly describe our most unusual — panel data for a large stratified random sample of Estonian firms. In addition we are able to combine economic and financial information with several waves of survey data from individual firms collected by the authors, including details of the evolution of firm ownership. In the following three sections we use these rich new data to examine a variety of hypotheses on the determinants of ownership structures and ownership changes. We estimate a variety of binary and multinomial logits and are able to test many hypotheses that have been unable to be examined in previous work because of limited data. Since the first year for which we have a cross-section of firm ownership is 1995, we begin by analyzing the determinants of these *initial* ownership structures in 1995. Importantly, in that process, we are able to use financial data starts for 1993, since that is the first year for which such information are available. Next we analyse ownership *changes* during the period 1995-1999. Finally, we estimate the determinants of ownership structures at the end of the period for which data are available, namely for 1999. In the concluding section, after summarizing our findings, we return to our original point of departure and compare the results in this paper with those achieved by using conventional approaches to analyze the same data.

## 2 Conceptual framework

During recent years, several themes have appeared in the literature that relate to the incidence and stability of employee ownership vis-à-vis other ownership configurations. Dow (2003) has nicely captured the major considerations emerging from some of this work concerning the relative advantage of employee ownership in the phrase “incentive optimism vs. finance pessimism”<sup>2</sup> Even though insider ownership promises to align the incentives of insiders with company performance and should be preferred if judged solely by incentives, for reasons of risk diversification it is deemed better to delegate ownership to risk neutral investors. For this reason, one expects to see less insider ownership in firms and industries where the required equity input and investment requirements are high. This line of reasoning also implies that insiders would be expected to be owners in firms and industries where business is more stable. However, against this, it can be argued that control of the company might be especially valuable in volatile industries, where the likelihood of losing one’s job is higher. In such circumstances, insider ownership provides an insurance effect and control of the company lowers the probability of insiders losing their jobs and their investment in firm-specific human capital. Arguably this consideration is especially relevant in firms owned by managers, since managers have often a lot to lose if they are fired. The gap between current income and outside opportunities is especially

large for “red” managers who have inherited their positions from socialist times (Aghion and Blanchard, 1998; Filatochev, Wright and Bleaney, 1999).

The incentive effect can also depend on the size of the workforce. Alchian and Demsetz (1972) argued that increases in the workforce dilute the impact of group incentive schemes. According to this argument, when the size of the workforce increases, employees would benefit from delegating ownership to a central monitor. In other words, higher employment levels favour managerial ownership over employee ownership, *ceteris paribus*. Furthermore, Hansmann’s (1996) argument that the costs of collective decision-making increase with the size of employees also suggests that employee ownership should be negatively related to the size of the workforce.

As well as greater risk aversion, wealth constraints may lead to insiders having time preferences that favour current consumption over risky future consumption. Other things equal, this leads insiders to favour firms with reliable income flows and high profits. By contrast, investors are expected to take a longer-term view and forego current profits in the expectation of higher profits in the future. Therefore insider ownership should be more prevalent in firms with higher profits.<sup>3</sup>

Turning to ownership *changes*, so far as the movement from insider to outsider ownership is concerned, a key focus in the literature is the role of strong economic performance. According to some literature on employee ownership, especially successful employee-owned firms are often more likely to convert into conventional ownership structures (e.g. Miyazaki, 1984). This result emerges because departing employees are more likely to get a good return by selling shares to outside investors than by selling them internally. In turn, outsider owners are more likely to be interested in firms with a proven performance record. On the other hand, poorly performing firms may have to turn to investors out of necessity – in order to survive. The effect of performance on ownership is thus ambiguous.

Economic performance is also thought to play a crucial role in triggering ownership changes from investor to insider ownership. Thus employee buy-outs are known to be a device of saving failing firms by making downward wage adjustments possible (Ben-Ner and Yun, 1996). In turn, management buy-outs often occur to solve agency problems between managers and owners, and / or when the managers observe entrepreneurial opportunities that existing owners do not realise (e.g. Wright et al., 2001). Management buy-outs are likely to happen when share prices are lower than the management’s subjective valuation of the firm. Thus we tentatively hypothesize that employee buy-outs are related to underperformance, and management buy-outs are related to undervaluation of shares.<sup>4</sup> On the other hand, considerations of risk and time preferences also apply and perhaps prevent some otherwise efficient transitions from investor to insider ownership.

However it should also be noted that the block holder argument of Shleifer and Vishny (1986) applies to both types of ownership change. That is, the more shares a minority owner holds in a given firm, the less costly it is for that minority owner to take over the company. Thus higher minority ownership stakes should facilitate take-overs irrespective of the direction of the ownership switch.

Finally, we consider two arguments that cast doubt on the efficiency of market selection processes, though with rather different implications. First, even though there is empirical evidence that employee ownership, combined with participation in decision-making, improves economic performance (e.g. Doucouligos, 1995; Kruse and Blasi, 1997), as an organisational form it remains rare. To explain this phenomenon, some point to various factors including: limited returns from innovation to individual employee-owners which lead to limited *entry* of employee-owned firms; to difficulties in setting up markets

for shares in employee-owned firms; and to employee wealth constraints and aversion to risk (Ben-Ner, 1988; Dow, 2003). Thus these arguments predict that employee ownership is selected far less often than is optimal. However, in transition economies the circumstances were extraordinarily favourable to the formation of employee-owned firms. The privatisation processes often favoured insiders, e.g. in the form of under priced equity, so that entry barriers were unusually low. However, the underdevelopment of capital markets in transition economies has several negative implications for the entry and stability of employee ownership (Mygind, 2001). During early transition in general bank loans were not available for employees to finance the buy-out of initial equity. Hence, often it was difficult for employees to make the necessary investment, even if the purchasing price was rather low.<sup>5</sup> Moreover, liquidity constraints and lack of credit may cause employees to sell their shares whenever possible. In other words, during early transition imperfect credit markets were expected to work in favour of wealthier investors, especially foreigners, and the elite of domestic investors and managers.

Furthermore, the absence of functioning markets for shares may cause other problems, notably the exclusion of new employees from ownership, which in turn leads to increases in ownership by former employees and concentration of ownership amongst managers. While such developments have been observed, it should be noted that these do not represent changes from insider to outsider ownership, but rather changes in the composition of insider owners.<sup>6</sup>

Aghion and Blanchard (1998) make a diametrically opposite claim. They argue that insiders are crucially concerned about job security and thus they sell to outsiders less often than would be optimal.

In sum, the early literature raises several issues concerning the efficiency of the selection process.<sup>7</sup> While some of these influences favour outsider ownership, others point in the opposite direction. Consequently, questions such as whether the net bias is stronger in one direction or another and whether particular groups of insider and outsider owners are influenced by issues unrelated to efficiency remain unresolved.<sup>8</sup> We return to these issues in the concluding section.

### 3 Privatisation in Estonia

Privatisation in Estonia took place in three distinct stages.<sup>9</sup> The first stage was connected to Gorbachev's reform attempts in the Soviet Union after 1986. Related to Gorbachev's *perestroika* programme, several hundred co-operatives were established in Estonia. A related development was the establishment of small state enterprises that nominally remained in state ownership and existed in a symbiotic relationship with state enterprises, but where employees had control over production, investment, wages, product prices, and distribution of profits. Co-operatives were privately owned from the start, so they were excluded from the privatisation programmes, and were the earliest employee-owned enterprises in Estonia. Typically small state enterprises were privatised later to their employees. Another important programme starting from 1987 was the possibility of establishing joint ventures with foreign partners. Later on these firms were taken over mostly by foreigners.

The last effort of the Soviet authorities to speed up privatisation in Estonia was the industrial leasing programme whereby the workforce collectively leased the assets from the state for an agreed fee, and in return gained rights to control and to receive revenues.

While the programme was of little importance in Estonia (only 12 enterprises were privatised under this programme), it did serve as a model for the Estonian leasing programmes that were introduced between 1990-92 and which proved to be a major source of employee ownership in Estonia. The establishment of new private companies became legal in late 1989 and the small privatisation programme was launched in late 1990. These programmes created a vibrant entrepreneurial sector in Estonia, where widespread involvement of foreigners was a special characteristic (Liuhto, 1995, 1996).

Privatisation of the collective sector was also an important development. During the socialist era Estonia had a large consumer co-operative sector, as well as collective and state farms, rural construction associations, and rural machinery associations. Typically the assets of collective and state farms were privatised to their employees (excluding land). However, consumer and supply co-operatives remained in the hands of their members (though some related firms became daughter companies of central co-operatives). The property of construction and machinery associations was transferred to private firms (often formed by former employees). Thus, in these ways, privatisation of the collective sector led to the formation of both outsider ownership and employee ownership.<sup>10</sup>

The centralised privatisation programme started with the establishment of the Estonian Privatisation Enterprise (EPE) in September 1992, followed by the introduction of a law on privatisation in June 1993, and the establishment of the Estonian Privatisation Agency (EPA, the successor of EPE) in September 1993. This development led to preferences for privatisation through tenders to strategic investors and for large concentrated investors rather than insiders or dispersed investors. It should be noted that our sample includes only companies that were private by 1<sup>st</sup> of January 1995, and thus excludes a substantial number of firms that were privatised in the centralised privatisation programme (especially in 1995-1997). For this reason, our data somewhat exaggerate the importance of insider privatisation. However, since many other researchers have focused exclusively on the centralised privatisation programmes (e.g. Terk, 2000), our work serves as a useful reminder on the diversity of Estonian privatisation processes and the resulting ownership structures that often have been overlooked.

## 4 Data and summary statistics on ownership changes

Our data are for a panel of Estonian firms. The panel is derived from a representative sample of 500 enterprises, stratified by size and industry, which were private in 1995. For these firms we merge data from a number of sources but mainly by combining fresh ownership information for 1995-1999 that were collected from new surveys, with accounting data from 1993-1998.<sup>11</sup> Of the original 500 firms, 409 (82%) cooperated in an initial special survey undertaken in 1995 and designed by the authors to provide additional data especially on ownership. Respondents were asked to indicate the number of shares held by different groups both currently (in fact on January 1<sup>st</sup> 1995) as well as at the time of privatisation. Subsequent ownership surveys were administered annually with the last survey in 1999. These ownership data were then matched with economic and financial data for corresponding firms, as well as with information on firm origin (privatised, former collective, new, or former joint venture). Further reductions in sample size resulted from excluding the smallest firms (with fewer than 10 employees in 1995) from the analysis.

Table 1 shows the association between ownership at the time of privatisation and the origin of the firm. Ownership groups are determined according to the widely used “dominant owners” approach, where the firm is assigned to the ownership group holding more shares than any other group. As the table indicates, the history of a firm clearly affects to whom the firm is privatised. Of state-owned firms privatised before 1995, employees had taken over more firms than had any other groups (38), closely followed by domestic investors (33) and managers (26). At this stage foreign involvement in privatisation was clearly less significant than that of domestic players. Thus domestic investors and employees had taken the largest share of privatized firms that formerly were collective firms, including former consumer co-operatives, rural construction associations, and collective and state firms. Typically firms emerging from the consumer co-operative sector or construction association were owned by domestic investors (either members of co-operatives or by central co-operatives) and the successor firms of collective and state farms were taken over by their employees. Almost all joint ventures were taken over by the foreign partner, and new firms were mainly set up by managers or by foreigners.

Table 2 presents ownership changes between January 1<sup>st</sup> 1995, which is the earliest time for which we have ownership data, and January 1<sup>st</sup> 1999. Importantly, a new group, namely former employees, has entered the picture. Table 2 reveals that there are many individuals who owned shares in their company when they were employed, and who have kept their shares after ceasing employment. This suggests that there is a limited market for shares. Note also that there is considerable attrition – around one-third of firms drop from the panel, either because the firm is liquidated or because the respondent does not want to answer to the questions in successive rounds.<sup>12</sup>

It is also clear from Table 2 that employee ownership is diminishing rapidly. During 1995-1999, the number of employee-owned firms fell from 46 to 19. Note also that 12 of these firms were also employee-owned at the start of the period. In contrast, there has been a sharp increase in managerially-owned firms (from 65 to 87). Ownership by foreigners and domestic outsiders has remained relatively stable, while firms owned by former employees have increased from 5 to 15. However, it can be seen that most changes among insider-owned companies happen internally: the relative positions of insider ownership and outsider ownership remain virtually unchanged. In fact, the number of insider-owned firms increased by 5, from 116 to 121. This development does not support the hypothesis that insider ownership would be declining rapidly, and it appears more supportive to the Aghion and Blanchard (1998) hypothesis that insider ownership is relatively stable.

## 5 Determinants of initial ownership structures

Table 3 presents summary statistics for variables that are used in the empirical analysis of the determinants of initial ownership structures (see the appendix for variable definitions.) Equity capital per employee (EQEMPL93) is designed to capture financing constraints. Since the privatisation price typically determines the nominal capital of the firm, this is a good proxy for equity investment requirements. However, for new firms, the interpretation is somewhat different and, in this case, nominal capital is also likely to reflect owners’ investments in firm equity. Capital intensity (CAPINTENS93) is a proxy for the investment requirements of the enterprise and higher values of capital intensity are expected to lead to higher investment. Earlier literature on the incidence of employee ownership in developed economies has also related this variable to work organisation,

although in conflicting ways. Thus Jones and Kato (1993) assume that higher capital intensity means more machine-paced production and less worker discretion and hence less need for share schemes. On the other hand, Kruse (1996) interprets higher capital intensity as requiring higher worker effort and an increased need for share schemes. Since both studies find evidence to support their hypotheses, this issue remains ambiguous. However, since in a previous study for Estonia (Jones and Mygind, 1999) it was found that higher capital intensity was negatively related to the incidence of insider ownership, we predict that the incidence of insider ownership is negatively related to capital intensity or equity investment. The number of employees (EMPLOY93) is related to the free-rider and collective decision-making problems, and is thought to be negatively related to employee ownership. *Ceteris paribus*, firms with higher profit-margins (PROFITMARGIN93) are believed more likely to be insider owned (because of insiders' preferences for current consumption). An alternative performance measure is productivity (PRODUCTIV93). If insiders are able to select the best firms (e.g. Frydman et al., 1999) productivity is expected to be positively related to insider ownership. In addition, we include controls for location, industry, and origin and also a variable that examines the importance of the time of privatisation<sup>13</sup>.

One thing that is apparent from Table 3 is that the hypothesis that employee-owned firms would be smaller than other firms does not hold for this sample. If anything, employee-owned firms are bigger than firms with other ownership structures. The mean of employment for employee-owned firms is 175 employees, while it is 112 employees for all firms. For two categories, namely foreign-owned and managerially-owned firms, the average number of employees is clearly smaller than in other groups. However, this is partly because the proportion of new firms (that are smaller than privatised firms) is larger in these two ownership categories. Turning to performance measures, we see that productivity (measured by output per employee) is clearly higher for foreign-owned firms than for other firms.<sup>14</sup> However, the situation regarding profits is quite different. Employee-owned firms have the highest profit margin and foreign-owned firms the lowest. Examining capital intensity and nominal equity capital per employee, again there are clear differences between firms. These variables are both much higher in foreign-owned firms than in other firms, and there is also quite a difference between domestic investor-owned firms and insider-owned firms. Since nominal capital often reflects the privatisation price, this suggests that outsiders have had to pay much more than insiders for assets.<sup>15</sup> There are various explanations for this phenomenon. It may indicate that insider-owned firms are more constrained than others, either by the limited wealth of their owners or by the more restricted availability of credit for insiders. An alternative explanation is that the assets of these firms were assigned a lower value than the assets in firms sold to outsiders, and thereby insiders were (at least implicitly, if not explicitly) given preference in the privatisation process. A third alternative is that there were fewer assets per employees in insider-owned firms (they were less capital intensive) or the assets were of poorer quality. We address these issues in our econometric analysis.

Over 70% of foreign-owned firms in the sample are located in the five largest Estonian cities, while only 45% of employee-owned firms and 33% of firms owned by former employees are based in these towns. More than 50% of employee-owned firms in the sample are former state-owned firms, while only 10% of foreign-owned firms are former state firms. Of foreign firms, more than half are newly-established, while only a quarter of employee-owned firms are new. Managerially-owned firms are most commonly new firms: 68 % of managerially-owned firms are new. Finally, among domestically-owned firms, the largest group comprises former collectives and joint ventures. This is



because of the large number of firms from the former co-operative sector that are now classified as domestically-owned. There are no pronounced differences in privatisation time across firms in the different ownership categories.

Table 4 presents the results from a simple logit analysis of the determinants of initial ownership by insiders. The first column gives the raw logit parameter coefficients together with standard errors and significance levels, while the second column gives the marginal probability effects for statistically significant coefficients. An important finding is that equity investment (EQEMPL93) is statistically significantly lower in firms owned by insiders.<sup>16</sup> Moreover, the parameter coefficient is very high: doubling the equity investment reduces the probability that the firm is owned by insiders by around 5 percentage points (from the baseline probability of 37%). This supports the contention that insiders have made a smaller investment in share capital. Since we also control for capital intensity, it appears that insiders have paid a lower price for the same amount of capital. This suggests that shares in insider-owned firms have possibly been undervalued. The sign of the capital intensity coefficient is negative, but insignificant.<sup>17</sup>

Unsurprisingly in view of the findings contained in the summary statistics presented in Table 3, we also find that the two origin dummies are also significant. The conditional probability of a new firm being insider-owned is 72 % and, for a formerly state-owned firm, it is 69%. Moreover, insider-owned firms are more often located outside the largest cities. Location in town reduces the probability of observing insider ownership by around 15 percentage points.

One especially interesting finding is that insiders appear to have bought firms with lower productivity. Increasing productivity by 100% reduces the probability of observing insider ownership by around 6 percentage points. This runs counter to some earlier results for other transition economies that insiders are able to select the best firms (Frydman *et al.*, 1999). However, since productivity is from the year 1993 (and not always immediately after privatisation), we cannot be sure that there is not a reverse causality effect. Outsiders may have been able to improve the performance of firms so much that the difference in productivity has become significant. The second measure for firm quality, profitability has a positive sign, although it is statistically insignificant. Other variables are not statistically significant, including all the industry dummies and privatisation year. It is notable that, contrary to expectations, the parameter coefficient for employment is positive although it is insignificant.

Additional insights concerning the determinants of initial ownership structures may emerge from estimating multinomial models. In these estimates, outsider-owned firms are divided into foreign- and domestically-owned firms, while insider-owned firms are divided into manager- and employee-owned firms. (The nine firms that were owned by former employees, were assigned to their initial ownership groups, 7 to employee ownership and 2 to managerial ownership). Findings from multinomial estimates are reported in Table 5. The three first columns in Table 5 contrast employee-owned firms with other ownership types. The results suggest that the impact of the explanatory variables is highest when employee-owned firms are contrasted with foreign-owned firms (first column). There are considerable differences in productivity, equity investment and profitability, all at the 1 % level of statistical significance. Employee-owned firms have lower productivity and equity investments than do foreign-owned firms, but they are more profitable. Employee-owned firms are also found to be less capital-intensive, are more often located in the countryside and, compared to foreign-owned firms, they have more employees.

When employee-owned firms are contrasted with domestic outsider-owned firms, again the most significant predictor of ownership structure is equity investment. Domestic outsiders have made considerably larger equity investments in their firms than have

employees in their firms. However, employee-owned firms are more profitable, and the difference is statistically significant at the 5 % level. If the firm is a former state firm or a new firm, rather than a firm from the collective sector, it is more likely to be owned by employees. Firms located in the countryside are more likely to be owned by employees, and firms with higher productivity are more likely to be owned by domestic outsiders than are employees. There are also differences between employee-owned firms and managerially-owned firms, especially in employment (larger firms are employee-owned) and profits (the more profitable firms are employee-owned). Also, new firms are more likely to be owned by managers.

The next three columns contrast the determinants of ownership structures for firms in which dominant owners are foreigners or managers, domestic investors or managers, and foreigners or domestic investors respectively. The results indicate that higher productivity, capital intensity, and equity capital predict foreign rather than managerial ownership. As such the results are not that different from the comparisons discussed above, i.e. for firms in which dominant owners are either foreigners or employees. The multinomial estimates also indicate that privatisation time is also significant, suggesting that the later a firm is privatised, the more likely it is to be in foreign rather than in managerial ownership. This indicates that managers (or, more generally, insiders) were better positioned to seize the early opportunities produced by privatisation than were foreigners. There are fewer differences between the determinants of initial ownership for firms owned by domestic investors and managers, though a higher level of equity capital is found to predict investor rather than managerial ownership. Urban location also increases the probability of investor rather than managerial ownership. Finally, it is interesting to find that higher productivity, capital intensity and equity capital predict foreign rather than domestic investor ownership. Hence foreign ownership is rather distinct in these respects. However, a higher level of employment is found to predict domestic investor ownership rather than foreign ownership. In addition, the origin dummies are often statistically significant, again highlighting the role of different privatisation programmes in the emergence of initial ownership configurations.

In sum, findings based on both the simple logit and the multinomial results concerning factors influencing ownership structures do not support the hypothesis that the determinants of initial (post privatization) ownership structures were completely random. Several forces are consistently found to play important roles in these processes. Thus equity investment is always found to be clearly lower in insider-owned firms. This may reflect the fact that insiders were unable to buy firms with high capital requirements; on the other hand, it may mean that insiders were favoured in the privatisation process and were able to buy the firms cheaper. The effect of lower equity investment extends also to new firms, meaning that firms started up by outsider investors are much better capitalised than those that are run by manager-owners or groups of employees. Since outsider-owned new firms in our sample are usually owned by foreigners, an interpretation of this finding based on wealth constraints is very plausible. Moreover, we find that the origin and location of the firm are clearly related to the initial assignment of insider and outsider ownership.

## 6 The determinants of ownership changes

In the previous section several factors that bear on the determination of initial ownership structures were identified. While some of these variables are linked with economic efficiency concerns, such considerations clearly did not drive the whole process. Therefore, it is important to carefully examine ownership changes, to see what motivates subsequent ownership changes. Hence, in this section, we examine ownership *changes*. Consistent with our earlier discussion, we focus on transitions from insider to outsider ownership, and vice versa.

As background for the logit analysis, in Table 6 we show ownership changes for each year.<sup>18</sup> In 1995, six firms moved from outsider to insider ownership, while only one firm moved from insider to outsider ownership. After that, there have been the same number of changes in either direction. Most of the changes took place in 1996 and 1998. In both of these years, eight firms moved in each direction.<sup>19</sup>

We use many of the same variables for modelling ownership changes that were used when modelling ownership structures. However, in addition we are able to use information on time-variant characteristics of firms including annual growth rates for sales, capital stock, capital intensity and productivity, as well as averages for profit margins and sales volatility. In order to better identify the impact on ownership changes, we measure these variables only prior to ownership change.<sup>20</sup>

Table 7 presents the means for these time-dependent variables, and also for minority ownership in 1995 (for outsider-owned firms the amount of insider ownership, and for insider-owned firms the amount of outsider ownership), according to firm ownership in 1995. Foreign-owned firms are clearly growing fastest, both in terms of employment and sales. Surprisingly, perhaps, foreign-owned firms have experienced a slower growth of capital stock than firms owned by domestic investors or managers, and their productivity growth is lower than that of any other group.<sup>21</sup> Foreign-owned firms are also least profitable and, on average, are becoming more labour-intensive. Their sales volatility is also the highest. Firms owned by domestic investors and managers are behaving in quite similar ways. Firms in both groups were investing quite heavily and growing moderately. Employment remains stable in manager-owned firms, while domestic-owned firms are shrinking, although not as much as in employee-owned firms in which employment decreases by almost 10 % annually. Sales in employee-owned firms are also shrinking, but they are the most profitable of all firms (though not by a great deal), and their sales volatility is clearly lower than that of other groups. When levels of minority ownership are examined, it appears that minority ownership in insider-owned firms is very low, while in outsider-owned firms it is of moderate importance, especially in firms owned by domestic outsiders. In these firms, insider ownership more often assumes the form of managerial, rather than employee ownership.

To evaluate the determinants of ownership change, firms are divided into two groups – those that were initially classified as insider owned, and those that were initially categorized as outsider owned. In analyzing the determinants of the change from insider to outsider ownership we have information for 112 firms in our sample that begin as insider owned. While in the main, the variables that are used are very similar to those used in earlier empirical work, there are some modest changes.<sup>22</sup>

Findings for two alternative specifications are reported in Table 8. While in the first estimate we use sales growth and investment, in the second specification these are replaced by the growth in productivity, capital intensity and employment. Alternative specifications are employed because employment growth is heavily correlated with sales growth and

investment and, if we wish to estimate the impact of employment growth on ownership changes, then it may be better to use per capita indicators for remaining variables. However, the results reported in Table 8 indicate that parameter coefficients remain very stable across both specifications. Also, in both cases, the likelihood ratio indicates that the hypothesis of joint insignificance of all variables must be rejected. Since the likelihood ratio is slightly higher in specification 1 (and there is one more significant coefficient than in specification 2) we therefore focus our comments on the first specification.

Our results indicate that ownership change is positively related to the number of employees, initial productivity, and new firm status, while there is a negative relationship with sales volatility, sales growth and initial managerial ownership. However, the precise interpretation to place on the findings is sometimes unclear. Thus the finding that outsiders take over firms that have more employees is as expected.<sup>23</sup> Together with a negative coefficient for employment growth, this suggests that outsiders take over large firms with falling employment, which arguably gives support to the notion that outsiders take over somewhat problematic firms. However, the effect of performance on ownership change remains unclear. While the positive and significant parameter coefficient for initial productivity suggests that outsiders take over better firms, the coefficient for sales growth is negative and significant. In addition, the coefficients for productivity growth and profitability are negative, though insignificant.

The coefficient on sales volatility is negative and statistically significant which, contrary to expectations, suggests that outsiders take over less risky firms. Alternatively, this finding may lend support to the hypothesis that insider control is more valuable in volatile firms. One reason for this is that employee-owned firms that have lower sales volatility were especially likely to be taken over by outsiders. Furthermore, additional unreported analysis of the data reveals that the coefficient of variation for sales was not different between firms that were employee-owned in 1998 and firms that became outsider-owned, while a t-test indicated that it was statistically significantly higher in managerially-owned firms compared to the rest of the sample. This suggests that high volatility is typical for firms that have remained or have become managerially-owned. As such this squares quite nicely with the Aghion-Blanchard (1998) argument that control in transition economies is especially valuable for managers.

The results also indicate that the status of being a new firm significantly raises the chance of the firm being taken over by outsiders. One interpretation for this finding is that in former state firms and collective firms, even weak traditions of insider control may have produced barriers to ownership changes. By contrast, the founders of new firms may always have had the explicit aim of selling their firm after a few years of operations. Alternatively, it may be that outsiders regard new firms as more lucrative investments than old firms. The existence of differences in ownership dynamics between employee- and managerially-owned firms and firm origins is also revealed by the following facts. Initially, there were 40 new firms in the sample that were under dominant managerial ownership. Only 3 of them (7.5%) changed to outsider ownership. But of the 11 new firms initially in employee ownership, 7 (63.6 %) moved to outsider ownership. By contrast, of 35 privatised firms that were initially majority-owned by employees, only 7 (20 %) moved to outsider ownership, while the corresponding figure for privatised managerially-owned firms was 3 of 25 (12 %). This interesting finding shows that it is the combination of initial employee ownership and de novo status that renders the firm especially likely to move to outsider ownership, rather than either of these variables in isolation. Many of the new, employee-owned firms are likely to be co-operatives established in the late 1980s that had a strongly managerial character from the beginning.

The last column gives the marginal effects on the basis of specification 1 in table 8. The baseline probability is calculated for a former collective firm that is initially employee-owned, and all other relevant variables are calculated at sample means. The baseline probability of an ownership change for such a firm is very small, only 1.5%. However, for managerially-owned firms, the probability is calculated to be only a quarter of that rate, namely 0.4%. When employment is doubled, the probability rises to around 10%, whereas when initial productivity is doubled, the probability is around 5%. However, a 10 percentage point increase in the annual growth rate of sales would decrease the probability of an ownership change by about a third, to 1%. A 100% increase in the variance of sales would decrease the probability by around 50%. The most dramatic effect results from the status of being a new firm. Our findings indicate that if the firm is new (rather than being a former collective), the probability of ownership change increases by 37 percentage points, or by more than 25 times. For a new firm under employee ownership, the expected probability of ownership change is a little over 38 %, while the observed probability was around 60 %.

We now turn to modelling the change from outsider to insider ownership. Essentially we employ specifications that are similar to those used in analysing the change from insider to outsider ownership. However, in this case we introduce new variables to capture the picture concerning foreign dominant ownership and minority insider ownership in 1995. Again two specifications are estimated. Findings are reported in Table 9.

One of the variables that is statistically significant in predicting the change from outsider to insider ownership is the size of the initial minority stake.<sup>24</sup> Insider takeovers are also related to the initial equity stake of insiders. These findings, that point to the importance of lower initial equity investments and the size of the initial minority stake for insider takeovers, are consistent with theoretical expectations. Thus Shleifer and Vishny (1986) stress that the more shares the buyer owns in advance the more this reduces the costs of the takeover. Moreover, the initial equity investment is likely to influence the later trading price of shares<sup>25</sup>, so lower equity investment also lowers the cost of takeover. The two variables also seem to be interrelated: the mean (and standard deviation) of log of share capital per employee is 9.84 (2.35) for firms with less than 10% minority insider ownership, while it is 8.21 (1.89) for firms with at least 10% insider ownership. This difference in means is significant at the 1% level. This indicates again that raising equity may be a substantial deterrent to insider ownership.

Sales volatility is also significantly related to the adoption of insider ownership; moreover, as expected, insiders take over less volatile firms. Given the initial equity investment, insiders also seem to take over firms with higher capital intensity, which apparently is contrary to predictions. There is no discernible evidence that firm quality, employment or employment changes affect the likelihood of the adoption of insider ownership. In particular, we do not find support for the hypothesis that switches into insider ownership would be driven by relative underperformance. Neither is there evidence that investment, origin of the firm, location or privatisation time influence an ownership change.

The rightmost column of table 9 presents the marginal effects that are based on these estimates. The baseline probability for an ownership change that is calculated for a domestically owned firm from the collective sector, is around 14.5%. A 100% increase in capital intensity would increase the probability of an insider takeover by around 6 percentage points. In turn, increasing equity investment by 100% would decrease the probability of an insider takeover by 4 percentage points, while a 100% increase in sales volatility would decrease the probability of insider takeover by 3 percentage points. A 10

% increase in initial minority insider ownership is calculated to increase the probability of an ownership change by 8 percentage points.

Taken together, the results indicate that, as hypothesized, outsiders take over larger insider-owned firms. However, this result may also reflect the fact that larger firms tended to be employee-owned *and* more vulnerable to take-overs than managerially-owned firms. However, when undertaking a similar analysis of ownership changes, though restricting this to only employee-owned companies, we also found that larger employee-owned firms were more vulnerable to take-overs.

Our findings also point to significant effects flowing from risk (volatility), but the effects are not consistent. Thus for firms that are initially insider-owned, we find that outsiders are more likely to take over less risky firms. But among firms that are initially owned by outsiders, insiders also take over less risky firms. It is, of course, possible that a high volatility of sales reduces the demand for control in such firms, *ceteris paribus*. Also, the result that insiders retain ownership in riskier firms may point out that managerial control may be especially valuable in riskier firms.

The results concerning the effects of performance, capital intensity or investment were mainly insignificant and yield no clear patterns. However, the empirical work also indicates that other variables are important. Outsider takeovers are much more common in newly-established firms than in privatised firms or in firms from the former collective sector. A closer examination revealed that the new firms that changed ownership were mainly employee-owned initially, rather than firms that were managerially-owned. In turn, insider takeovers were related to the initial minority stake of insiders and to low equity investments. These factors reduce the capital requirements for a takeover. Since insiders are likely to be liquidity constrained, it is not surprising that these two variables exercise such an influence concerning insider takeovers.

## 7 The determinants of ownership structures in 1999

In this section, we conclude our empirical work by analysing the determinants of ownership at the end of the period for which data are available, i.e. in 1999. A strategy similar to that reported earlier in the analysis of initial ownership structures is used. The first step is to report findings from a binomial logit analysis for the two broadest ownership groups, insiders and outsiders. Next, we analyse the determinants of ownership within a multinomial logit framework and use five groups (foreigners, domestic investors, managers, employees, former employees). Finally these results are compared to the results concerning initial ownership structures.

Table 10 presents the summary statistics for selected variables in 1998. An important difference between the variables in this section and those reported earlier is that here the time-dependent covariates are measured throughout the period 1993-1998 for all firms, while previously they were measured only up to the time of the ownership change. This difference in measures reflects the shift in focus—away from factors influencing *initial* ownership structures, towards ownership structures *at the end of the period*.

It is especially interesting to compare these summary statistics with those presented in table 3 for 1995. No longer are employee-owned firms larger than other firms. However, similar differences prevail concerning capital-intensity and productivity. Also equity capital per employee is much lower in insider-owned firms, and employee-owned firms

continue to be most profitable. Sales volatility is clearly lowest in employee-owned firms and those owned by former employees while sales growth is fastest in firms that are majority-owned by foreigners. The proportion of employee-owned firms in towns is much reduced, and the proportion of employee-owned firms that are new firms also has decreased drastically, from 25% to 5%. In contrast, the proportion of the successors of collective farms has increased from a little over 20 % to almost 50% (this is the residual after subtracting the frequencies for former state-owned and new firms). Moreover, the proportion of employee-owned firms in manufacturing has increased from slightly over 30% to over 50%. This suggests that among employee-owned firms, the most resilient are those that are successors of collective farms, operate in agriculture, and are located in rural areas. This supports the view of Earle and Estrin (1996) that employee-owned firms bring benefits to depressed areas and industries, and / or nobody else other than employees is interested in these firms.

Table 11 presents the results of the binary logit analysis. As before, we use two different specifications. In the first we include sales growth and investment, while the other includes growth in employment, productivity and capital intensity. The new results make for interesting findings compared to those reported in table 4, concerning the determinants of initial ownership structures in 1995. While both productivity and location had statistically discernible impacts on initial ownership, by 1999 neither is a significant predictor of ownership. However, equity investment is an important determinant both of initial ownership structures as well as of ownership at the end of the period. Also, insider ownership has remained much more common in firms that were formerly state-owned and in new firms, compared to firms that have arisen from the former collective sector. Interestingly, privatisation time is also now statistically significant with the negative parameter coefficient indicating that firms privatised earlier are more often owned by insiders than are firms that were privatised later. Also, the findings from specification 2 in table 11 suggest that increases in employment during 1993-1998 are positively related to insider ownership, though this result is significant only at a 10% level.

The rightmost column in Table 11 presents the marginal effects, calculated from specification 1. The baseline probability is calculated for a firm from the former collective sector located in the countryside and the probability of such a firm being majority owned by insiders is almost the same as in 1995, around 38%. This is not surprising, since the relative frequency of insider-owned firms has remained stable. It is interesting to compare the marginal effects from table 11 to those reported in table 4. For instance, the impact of equity investment is even bigger in 1999 than in 1995 with a 100 % increase in equity investment per employee now decreasing the probability of insider ownership by over 8 percentage points, or over 20 %. As in table 4, the dummy variables have a strong impact on the probabilities. If the firm is a former state-owned firm or a new firm, it is more likely that it is owned by insiders than by outsiders. For a former state firm the probability of being insider owned is 66 % (representing 28 percentage points increase in the probability), and for new firms it is 57 % (18 percentage points increase). If privatisation time is increased by one year, then the probability of insider ownership decreases by 6.7 % points.

In the previous multinomial analysis of initial ownership structures, we were able to use three comparison groups for employee ownership. By contrast, for 1999, we are also able to include former employees as an additional category. However, since it turns out that the results are quite similar to those for employee-owned companies, for this reason as well as space considerations, we choose to omit reporting these comparisons.<sup>26</sup>

In Table 12 we report the results of the new multinomial analysis. The analysis of initial ownership structures reveals several differences. From Table 12 we see that some of the

differences between employee-owned and outsider-owned firms that were identified in the analysis of initial ownership configurations have remained. At the same time, the new results indicate that some of these differences have disappeared. One persistent finding is that, despite the many changes away from employee ownership, in both years employee ownership remains quite distinct from other companies. Somewhat surprisingly, in 1999 higher capital intensity predicts employee ownership rather than any other ownership structure; in addition, the difference with foreign ownership is statistically significant. This is surprising given that it appears that foreign-owned firms are more capital-intensive than employee-owned firms (Table 10)<sup>27</sup> As before higher equity capital consistently increases the odds for outsider rather than insider ownership. What is more, the differences seem to have become more pronounced over time. Lower sales volatility and higher profitability consistently increase the odds for employee ownership. Both of these findings are consistent with the hypotheses outlined earlier, namely that employees prefer to be owners in less volatile firms (or industries) and, other things equal, that they put heavy weight on the profitability of the firm. Higher productivity increases the probability of foreign ownership. Privatisation time is significant in the comparison between firms that are majority owned by managers and employees. This is consistent with the fact that many initially employee-owned firms have shifted into managerial ownership, but this change takes some time. The coefficient on privatization time is also statistically significant between the comparisons of managerial ownership and both types of investor ownership — again, earlier privatisation predicts managerial ownership. Finally, and consistent with earlier observations, origin dummies are often significant.

## 8 Conclusions and implications

In this paper we use rich panel data to examine diverse issues relating to the nature and determinants of ownership structures and ownership changes. In many cases our findings provide evidence of important regularities and support for several hypotheses. The strongest findings are related to the predictions of risk aversion. Firms owned by insiders are less capitalised. This supports the hypothesis that insufficient wealth to invest in equity limits the possibilities to establish employee-owned firms, and points out that the unusual circumstances created by the privatisation process have helped employees to temporarily overcome this obstacle.

A second major finding is related to risk. Our results clearly show that employee ownership is most durable in less volatile firms. This finding supports similar arguments made recently by Blair, Kruse and Blasi (2000), though we have to be careful about the causality (Blair *et al.* argued that employee ownership tends to stabilise firm performance). In addition, we find that there are important differences between employee- and managerially-owned firms: Managerially-owned firms are associated with significantly higher volatility than employee-owned firms, suggesting that managerial control becomes especially valuable in risky firms.

Employee ownership is especially transient in new firms. This finding was somewhat unexpected. One possible interpretation of this finding is that, in privatised firms, the resistance to outsiders is stronger because of a long shared history. Alternatively, the finding may be explained by outsiders being more interested in new firms that may have better performance potential. A related finding is that employee ownership has survived



better in firms that were successors to former collective farms. This also helps to explain why employee ownership has remained important in agriculture. These firms are probably not very attractive to outsider investors, and employee ownership in these firms may be seen as an attempt to save jobs and maintain social stability (e.g., Earle and Estrin, 1996.)

Other empirical work on Estonian firms sheds more light on issues of selectivity. The survey evidence reported in Kalmi (2003) as well as the case study evidence reported in Kalmi and Mygind (2003) points out that Estonian firms invariably apply by-laws that limit the group of potential shareholders. As stressed by Aghion and Blanchard (1998), this reduces outsider take-overs. The restrictions can be understood as devices for protecting workplace-specific rents. On the other hand, outsider-owned firms also place similar restrictions, thus preventing potential efficiency-enhancing management-employee buy-outs. These restrictions mean that the number of take-overs is smaller than it would be in the absence of restrictions, and that the market for enterprise control is not working as efficiently as it otherwise might.

There is also evidence concerning the other problem mentioned in section 2, namely the tendency for the number of employee-owners to decline over time (Kalmi, 2002, 2003). This is also found to be a result of the restrictions on share trading – it is not possible for outsiders to buy shares and new employees face similar difficulties. In contrast, retiring employees often keep their shares, or they sell them to the managers. Consequently, we observe less employee ownership, fewer employee owners, increased ownership by former employees (which is typically transitory), more managerial ownership, and more concentrated ownership. It is difficult to say whether these changes in the character of insider owners increases or decreases the likelihood of sell-out to outsiders. However, a key finding emerging from this research is that it is often the inactivity in the market for shares – or indeed the absence of any market – more than active trading of shares that shapes the ownership relations. Since the process is biased in ways that systematically influences outcomes, e.g. by promoting managerial ownership and discouraging employee ownership and ownership changes in general, the efficiency implications of ownership changes remain somewhat uncertain. For this reason, we now review the results from conventional efficiency analysis.

In the main the findings from conventional efficiency analysis are consistent with findings reported in this paper. Thus previous work that uses a neoclassical growth framework shows that, amongst all ownership categories of Estonian firms, foreign-owned firms record the highest growth rates (Jones and Mygind, 2000). In addition, based on productivity analysis within a production function framework, Jones and Mygind (2002) find that foreign-owned firms are somewhat more productive than are other firms. Manager-owned firms also display better performance than do domestic or employee-owned firms. Finally, Kalmi and Mygind (2003) present case study evidence that ownership change from employees to managers speeds up restructuring. Consequently, these studies imply that most ownership changes would be expected to be towards foreign ownership and to a somewhat lesser extent in the direction of managerial ownership.

At the same time, findings from all of these conventional efficiency studies, including both econometric analyses and case studies, do not support the conclusion that rapid decline in employee ownership is expected – employee owned firms do not *grossly* underperform. In fact, since the results of conventional analyses find that the differences between insider and outsider ownership are not pronounced, one might expect that enterprise ownership would remain rather stable. To the extent that ownership switches do occur, changes in favour of outsider ownership might be anticipated, because of the problems of risk aversion and liquidity that insiders face. Again, these predictions are not fully borne out by the data. Most obviously, there are few changes to foreign ownership,

despite its promise of fast growth and good performance. However, it is possible that foreigners increase their ownership by setting up new startups, rather than by entering into time-consuming and difficult bargaining processes with incumbent owners. Our data do not capture this possibility well. On the other hand, we find that managers are increasing their ownership stakes, and perhaps are doing so to even greater extents than pure efficiency considerations would warrant. No doubt their informational advantages and hierarchical positions over employees helps managers to increase their ownership stakes. Perhaps the most surprising finding is that the changes from outsider to insider ownership outnumber the changes from insider to outsider ownership (although the difference is not large) and this is mainly due to the prevalence of managerial take-overs.

In sum the evidence presented in this paper is consistent with the view that efficiency considerations drive ownership changes, but we also recognise that there are other important influences as well. In future work that seeks to identify the varying importance of efficiency and non-efficiency considerations we see scope for different types of analysis, including conventional efficiency analysis, the analysis of ownership changes and survival analysis. In this future work it will be important to try to capture the impact of ownership changes alongside conventional determinants of efficiency.<sup>28</sup>

## Appendix

### Variable definitions

EMPLOY93 (98)	Average number of employees in 1993 (1998)
LNEMPLOY93 (98)	Natural logarithm of average number of employees in 1993 (98)
PRODUCTIV93 (98)	Sales per employee in 1993 (98) in 1000 EEK
LNPRODUCTIV93 (98)	Natural logarithm of sales per employee in 1993 (98) in EEK
CAPINTENS93 (98)	Fixed assets per employee in 1993 (98), in 1000 EEK
LNCAPINTENS93 (98)	Natural logarithm of fixed assets per employee in 1993 (98), in EEK
EQEMPL94 (98)	Nominal share capital per employee in 1994 (98), in 1000 EEK
LNEQEMPL94 (98)	Natural logarithm of nominal share capital per employee in 1994 (98), in EEK
PROFITMARGIN93	Net profits per unit of sales in 1993
CITY	Dummy variable, takes value 1 if firm located in one of the 5 biggest Estonian cities (Tallinn, Tartu, Narva, Kohtla-Järve and Pärnu), 0 otherwise
AGRI	The firm is operating in agriculture
MANU	The firm is operating in manufacturing
STATEOWN	Dummy variable, takes value 1 if the firm is formerly state-owned, 0 otherwise
NEW	Dummy variable, takes value 1 if the firm is new, 0 otherwise
TIMEPRIV	Time of privatisation where 1988=1, 1989=2,... 1994=7.
SALESGROWTH	Annual growth rate of real sales. Sales are deflated by using the EBRD consumer price index for Estonia.
INVESTMENT	Annual growth rate of real fixed capital. The capital stock is deflated by using the EBRD consumer price index for Estonia.
EMPLOYGROWTH	Annual growth rate of employment.
PRODGROWTH	Annual growth rate of real sales per employee. Sales are deflated by using the EBRD consumer price index for Estonia.
CAPINTGROWTH	Annual growth rate of real fixed assets per employee. The capital stock is deflated by using the EBRD consumer price index for Estonia.
AVERPROF	Average of annual real profits per unit of sales. Both profits and sales are deflated by using the EBRD consumer price index for Estonia.
INS95 (for firms initially in outsider ownership)	The percentage of minority insider ownership in 1995
MANAGER	Firm in dominant managerial ownership in 1995
FOREIGN	Firm in dominant foreign ownership in 1995
VARSALE1	Natural logarithm of variance of real sales. Sales are deflated by using the EBRD consumer price index for Estonia.
SALESVOLA2	Variation coefficient of sales (standard deviation to average sales)

Table 1. Origin and ownership category at the time of privatisation

	Former state firms	Former collectives	Former joint ventures	New firms	Total
Foreign	9	1	30	48	88
Domestic outsiders	33	46	3	34	116
Managers	26	4	0	58	88
Employees	38	16	0	18	72
Total	106	67	33	158	364

Source: For this and all other tables, the database of Estonian enterprises at CEES, Copenhagen Business School.

Note: This table includes firms that were private at the beginning of 1995.

Table 2. Transition matrix: ownership changes between 1995 and 1999

Dominant owners in January 1<sup>st</sup> 1995 (rows)/ Dominant owners in 1999 (columns)

	Foreigners 99	Domestic investors 99	Managers 99	Employees 99	Former employees 99	Total 95
Foreigners 95	50	3	7	0	0	60
Domestic investors 95	4	53	12	4	3	76
Managers 95	1	5	54	1	4	65
Employees 95	5	9	13	12	7	46
Former employees 95	0	1	1	2	1	5
Total 99	60	71	87	19	15	252

Table 3. Summary statistics: variables used in initial ownership analysis: means (standard deviations)

	All N=364 <sup>1</sup>	Foreign-owned N=89	Domestic-owned N=121	Manager-owned N=90	Employee-owned N=55	Owned by former employees N=9
EMPLOY93	111.555 (176.525)	64.562 (114.413)	149.273 (186.451)	69.556 (129.177)	174.927 (260.472)	101.889 (106.001)
PRODUCTIV93	216.862 (661.374)	616.764 (1239.16)	89.509 (92.790)	103.393 (173.174)	56.531 (45.288)	56.994 (54.642)
CAPINTENS93	59.529 (159.683)	144.405 (270.541)	43.068 (84.258)	28.511 (100.973)	12.047 (11.181)	17.200 (21.772)
EQEMPL93	74.415 (571.647)	291.498 (1234.20)	33.671 (68.789)	4.804 (8.076)	4.920 (8.140)	6.338 (8.142)
PROFITMARGIN 93	0.0095 (0.154)	-0.025 (0.227)	0.016 (0.143)	0.0047 (0.104)	0.054 (0.086)	0.035 (0.071)
CITY	0.563 (0.497)	0.719 (0.452)	0.537 (0.501)	0.533 (0.502)	0.455 (0.503)	0.333 (0.500)
AGRI	0.225 (0.418)	0.101 (0.303)	0.339 (0.475)	0.156 (0.364)	0.309 (0.466)	0.111 (0.333)
MANU	0.354 (0.479)	0.360 (0.483)	0.355 (0.481)	0.333 (0.474)	0.364 (0.485)	0.444 (0.527)
STATEOWN	0.291 (0.455)	0.101 (0.303)	0.322 (0.469)	0.278 (0.450)	0.527 (0.504)	0.444 (0.527)
NEW	0.434 (0.496)	0.562 (0.499)	0.240 (0.429)	0.678 (0.470)	0.255 (0.440)	0.444 (1.236)
TIMEPRIV	4.624 (1.291)	4.674 (1.116)	4.835 (1.374)	4.167 (1.318)	4.855 (1.177)	4.444 (1.236)

Notes.

1. Due to missing observations, N varies between 344 and 364. The exception is for TIMEPRIV where N is 206 (i.e. only for firms that were privatized and excluding the 158 new firms.)
2. For definitions of variables, see the Appendix.

Table 4. Determinants of initial ownership: binary logits

	Insider ownership (N): 144 Outsider ownership (N):181	Marginal effects (in percentage points, change from baseline probability)
Intercept	7.806*** (1.956)	Baseline probability for insider ownership: 37.1%
LNEMPLOY93	0.104 (0.143)	
LNPRODUCTIV93	-0.366** (0.157)	-5.7
LNCAPINTENS93	-0.126 (0.106)	
LNEQEMPL94	-0.322*** (0.071)	-5.0
PROFITMARGIN93	0.746 (0.996)	
CITY	-0.795** (0.310)	-15.1
NEW	1.475*** (0.416)	35.0
STATEOWN	1.332*** (0.399)	32.0
TIMEPRIV	-0.168 (0.112)	
Industry controls	Yes	
Lr statistics	107.873*** (0.0001)	
Pseudo R-square	0.283	
Nr of observations	325	

Notes:

1. Significance levels: \*- 10% level of significance; \*\* - 5% level of significance; \*\*\* - 1% level of significance.
2. Marginal effects were calculated for the following changes: For the underlying continuous (non-logarithmic) variables, 100 % increase. For dummy variables, unit increase. Calculations are reported only for statistically significant coefficients.

Table 5. Determinants of employee ownership: multinomial logits

	Employees vs. Foreign	Employees vs. domestic outsiders	Employees vs. managers	Foreign vs. managers	Domestic investors vs. managers	Foreigners vs. domestic investors
INTERCEPT	18.788*** (3.499)	4.582* (2.518)	1.370 (2.730)	-16.705*** (3.24)	-2.300 (2.456)	-14.405*** (3.001) (0.0001)
LNEMPLOY93	0.557** (0.236)	0.148 (0.184)	0.451** (0.209)	-0.159 (0.219)	0.243 (0.185)	-0.409** (0.196) (0.037)
LNPRODUCTI V93	-1.000*** (0.267)	-0.395* (0.224)	-0.347 (0.234)	0.639*** (0.223)	0.021 (0.203)	0.617*** (0.215) (0.004)
LNCAPINTEN S93	-0.376** (0.184)	0.068 (0.145)	0.088 (0.145)	0.457*** (0.158)	0.0181 (0.130)	0.439*** (0.159) (0.006)
LNEQEMPL94	-0.460*** (0.123)	-0.289*** (0.099)	-0.032 (0.104)	0.403*** (0.106)	0.222** (0.091)	0.181* (0.105) (0.085)
PROFITMARG IN93	5.561*** (1.694)	3.983** (1.621)	5.163*** (1.713)	-0.531 (1.270)	1.082 (1.265)	-1.613 (1.212) (0.183)
CITY	-1.088** (0.511)	-0.867** (0.403)	-0.274 (0.422)	0.843 (0.459)	0.637* (0.384)	0.206 (0.440) (0.640)
STATEOWN	0.503 (0.669)	1.130** (0.452)	-0.937 (0.673)	-1.543** (0.777)	-2.198*** (0.620)	0.655 (0.581) (0.260)
NEW	-0.992 (0.680)	1.004* (0.532)	-1.802*** (0.697)	-0.875 (0.740)	-2.919*** (0.628)	2.044*** (0.560) (0.0001)
TIMEPRIV	-0.289 (0.194)	-0.015 (0.143)	0.137 (0.159)	0.398** (0.178)	0.123 (0.140)	0.275* (0.166) (0.097)
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes

Note:

1. Significance levels: \*- 10% level of significance; \*\* - 5% level of significance; \*\*\* - 1% level of significance.

Table 6. Ownership changes by year

	Initial insider ownership	Initial outsider ownership
No change	88	95
Change in year	Insider -> outsider ownership	Outsider -> insider ownership
1998	8	8
1997	4	4
1996	8	8
1995	1	6
Changes/total	21/109 (19.3%)	26/121 (21.5%)

Table 7. Summary statistics: additional variables used in analysis of ownership changes

	Foreign	Domestic outsiders	Managers	Employees and former employees
SALESGROWTH	0.188 (0.558)	0.042 (0.307)	0.039 (0.218)	-0.035 (0.187)
PRODGROWTH	0.039 (0.317)	0.153 (0.318)	0.053 (0.194)	0.074 (0.196)
INVESTMENT	0.109 (0.515)	0.168 (0.940)	0.247 (0.429)	0.073 (0.419)
CAPINTENSGROWTH	-0.025 (0.388)	0.324 (0.927)	0.266 (0.394)	0.197 (0.453)
EMPLOYGROWTH	0.167 (0.398)	-0.071 (0.237)	0.0004 (0.203)	-0.096 (0.126)
SALESVOLA	0.399 (0.280)	0.346 (0.278)	0.338 (0.190)	0.246 (0.163)
AVERPROF	-0.012 (0.469)	0.015 (0.239)	0.032 (0.073)	0.035 (0.102)
Minority share by insiders / outsiders	0.0614 (0.140)	0.137 (0.178)	0.0192 (0.0835)	0.0102 (0.0366)

Notes:

1. Entries are average annual growth rates and their standard deviations except for profits and sales volatility, which are averages for the period. Minority ownership is measured in the beginning of the year of ownership change.

2. N=230

Table 8. Determinants of ownership changes in insider-owned firms, 1995-1999: binary logits

	Change from insider to outsider ownership (21/112)	Change from insider to outsider ownership (21/112)	Marginal effects
Intercept	-25.517*** (9.163)	-25.421*** (9.377)	Baseline probability of change: 1.5%
LNEMPLOY93	2.896*** (0.892)	2.961*** (0.908)	8.5
LNPRODUCTIV93	1.765** (0.886)	1.882** (0.900)	
LNCAPINTENS93	0.127 (0.348)	-0.026 (0.352)	
LNEQEMPL94	0.088 (0.202)	0.084 (0.203)	
SALESGROWTH	-4.317* (2.244)		-0.5
PRODGROWTH		-2.536 (1.846)	
INVESTMENT	-0.754 (0.989)		
CAPINTGROWTH		-1.064 (0.920)	
EMPLOYGROWTH		-4.207 (2.994)	
AVERPROF	-1.320 (3.208)	-1.876 (3.206)	
VARSALE	-1.066*** (0.373)	-1.062*** (0.374)	-0.8
STATEOWN	1.046 (0.790)	0.839 (1.165)	
NEW	3.749*** (1.451)	3.691** (1.448)	37.2
MANAGER	-1.341* (0.707)	-1.341* (0.727)	-1.1
TIMEPRIV	0.411 (0.296)	0.418 (0.297)	
Industry Controls	Yes	Yes	
LR statistic	39.126*** (0.0002)	37.826*** (0.0006)	
Pseudo R-square	0.295	0.287	
Nr of observations	112	112	

Notes:

1. Significance levels: \*- 10% level of significance; \*\* - 5% level of significance; \*\*\* - 1% level of significance.
2. Marginal effects were calculated as 100% increase for productivity, employment, sales variance and 10 percentage point increase for sales growth. They are reported only for statistically significant coefficients.
3. The total number of observations is 112, of which 21 shifted to outsider ownership.
4. The baseline probability is calculated for an initially employee-owned firm from the collective sector. And all other relevant variables are calculated at their sample means.



Table 9. Determinants of ownership changes in outsider-owned firms

	Change from outsider to insider ownership (26/124)	Change from outsider to insider ownership (26/123)	Marginal effects
Intercept	-2.975 (5.308)	-4.270 (5.891)	Baseline probability of change: 14.5%
LNEMPLOY93	-0.022 (0.444)	0.012 (0.467)	
LNPRODUCTIV93	0.584 (0.471)	0.710 (0.527)	
LNCAPINTENS93	0.590** (0.297)	0.577* (0.314)	5.8
LNEQEMPL94	-0.506*** (0.166)	-0.483*** (0.179)	-3.8
SALESGROWTH	1.171 (1.631)		
PRODGROWTH		2.769 (2.329)	
INVESTMENT	0.113 (0.514)		
CAPINTGROWTH		-0.127 (0.616)	
EMPLOYGROWTH		1.423 (1.938)	
AVERPROF	1.023 (1.882)	0.990 (1.619)	
VARSALE	-0.396** (0.156)	-0.413** (0.170)	-3.1
MINORINS95	0.053*** (0.018)	0.053*** (0.019)	7.8
STATEOWN	-0.068 (0.805)	0.027 (0.817)	
NEW	-0.0041 (0.888)	0.098 (0.889)	
FOREIGN	-1.086 (0.832)	-1.217 (0.860)	
TIMEPRIV	-0.305 (0.242)	-0.358 (0.249)	
Industry Controls	Yes	Yes	
LR statistic	46.715*** (0.0001)	48.155*** (0.0001)	
Pseudo R-square	0.314	0.324	
Nr of observations	124	123	

Notes:

1. Significance levels: \*- 10% level of significance; \*\* - 5% level of significance; \*\*\* - 1% level of significance.
2. Marginal effects were calculated as 100% increase for productivity, employment, sales variance and 10 percentage point increase
3. The total number of observations is 124, 26 of which shifted from outsider ownership

Table 10. Summary statistics for variables used in end-of-period ownership analysis: Means (standard deviations)

Variable	All (N=252)	Foreign (N=60)	Domestic investors (N=71)	Managers (N=87)	Employees (N=19)	Former employees (N=15)
EMPLOY98	82.604 (115.910)	102.769 (148.708)	101.706 (114.703)	55.345 (102.243)	83.579 (85.315)	74.733 (58.913)
PRODUCTIV98	195.349 (357.228)	430.008 (660.833)	139.607 (174.982)	136.137 (122.686)	68.905 (56.318)	95.027 (66.647)
CAPINTENS98	123.848 (565.045)	112.864 (161.229)	292.522 (1034.980)	36.144 (49.036)	21.786 (19.098)	19.147 (14.064)
EQEMPL98	135.569 (860.987)	165.277 (525.912)	323.729 (1573.152)	17.327 (22.350)	9.278 (9.673)	13.748 (15.429)
AVERPROFIT	0.0171 (0.256)	-0.00753 (0.439)	-0.00337 (0.251)	0.0315 (0.0980)	0.0722 (0.0510)	0.0536 (0.0480)
SALESVOLA	0.385 (0.266)	0.438 (0.299)	0.406 (0.305)	0.392 (0.237)	0.261 (0.180)	0.252 (0.103)
PRODGROWTH	0.0898 (0.239)	0.107 (0.366)	0.116 (0.189)	0.055 (0.193)	0.107 (0.170)	0.0811 (0.122)
SALESGROWTH	0.0685 (0.352)	0.238 (0.582)	-0.0132 (0.258)	0.0458 (0.216)	0.0414 (0.183)	-0.0227 (0.120)
CAPINTGROWTH	0.185 (0.440)	0.0717 (0.430)	0.280 (0.539)	0.188 (0.382)	0.150 (0.264)	0.192 (0.405)
INVESTMENT	0.139 (0.418)	0.185 (0.527)	0.0835 (0.362)	0.180 (0.421)	0.0836 (0.273)	0.0745 (0.355)
EMPLOYGROWTH	-0.0147 (0.212)	0.109 (0.222)	-0.108 (0.198)	0.00111 (0.205)	-0.0565 (0.106)	-0.900 (0.113)
CITY	0.516 (0.501)	0.650 (0.481)	0.493 (0.504)	0.540 (0.501)	0.263 (0.452)	0.267 (0.458)
AGRI	0.234 (0.424)	0.183 (0.390)	0.268 (0.446)	0.161 (0.370)	0.474 (0.513)	0.400 (0.507)
MANU	0.361 (0.481)	0.400 (0.494)	0.394 (0.492)	0.310 (0.465)	0.368 (0.496)	0.333 (0.488)
STATEOWN	0.306 (0.462)	0.133 (0.343)	0.338 (0.476)	0.356 (0.482)	0.474 (0.513)	0.333 (0.488)
NEW	0.409 (0.493)	0.550 (0.502)	0.239 (0.430)	0.563 (0.499)	0.0526 (0.229)	0.200 (0.414)
TIMEPRIV	4.706 (1.269)	4.75 (1.035)	5.099 (1.255)	4.184 (1.334)	5.368 (0.895)	4.867 (1.187)

Note: For variable definitions, see the appendix.

Table 11. Determinants of ownership structures in 1999: binary logits

	IO: 112 OO: 110	IO: 112 OO: 110	Marginal effects
Intercept	8.134*** (2.766)	9.247*** (2.991)	Baseline probability of insider ownership: 38.1%
LNEMPLOY98	-0.163 (0.209)	-0.290 (0.227)	
LNPRODUCTIV98	-0.072 (0.277)	-0.150 (0.297)	
LNCAPINTENS98	0.133 (0.160)	0.183 (0.165)	
LNEQEMPL98	-0.540*** (0.138)	-0.560*** (0.139)	-8.4
SALESGROWTH	0.345 (0.809)		
PRODGROWTH		-0.132 (1.119)	
INVESTMENT	0.164 (0.113)		
CAPINTGROWTH		-0.090 (0.516)	
EMPLOYGROWTH		2.009* (1.150)	
AVERPROF	0.884 (1.055)	0.930 (1.129)	
VARSALE	-0.131 (0.093)	-0.128 (0.097)	
CITY	-0.105 (0.359)	-0.156 (0.364)	
STATEOWN	1.158** (0.451)	1.341*** (0.469)	28.1
NEW	0.757* (0.437)	0.635 (0.446)	18.6
TIMEPRIV	-0.300** (0.133)	-0.297** (0.135)	-6.7
Industry controls	YES	YES	
LR statistic	60.893*** (0.0001)	64.484*** (0.0001)	
Pseudo R-square	0.240	0.252	
Nr of observations	222	222	

Notes:

1. Significance levels: \*- 10% level of significance; \*\* - 5% level of significance; \*\*\* - 1% level of significance.

2. Marginal effects are changes in percentage units, when equity capital increases 100%, when time of privatisation increases by one year, or when the dummy variables increase by one unit.

Table 12. Determinants of ownership in 1999: multinomial logits

	Employees vs. Foreign	Employees vs. Domestic outsiders	Employees vs. Managers	Foreign vs. Managers	Domestic investors vs. Managers	Foreigners vs. Domestic investors
Intercept	17.965*** (6.763)	5.736 (5.888)	0.902 (6.049)	-17.064*** (4.391)	-4.834 (3.552)	-12.230*** (4.283)
LNEMPLOY98	0.328 (0.477)	0.083 (0.434)	0.655 (0.436)	0.328 (0.311)	0.572** (0.269)	-0.245 (0.299)
LNPRODUCTIV98	-1.109 (0.720)	-0.154 (0.646)	-0.355 (0.647)	0.754* (0.423)	-0.201 (0.352)	0.955** (0.438)
LNCAPINTENS98	0.724* (0.424)	0.505 (0.395)	0.407 (0.399)	-0.317 (0.231)	-0.0976 (0.196)	-0.219 (0.223)
LNEQEMPL98	-1.064*** (0.323)	-0.844*** (0.287)	-0.331 (0.295)	0.734*** (0.210)	0.513*** (0.170)	0.221 (0.200)
SALESGROWTH	2.565 (2.634)	3.939 (2.617)	2.394 (2.569)	-0.171 (1.041)	-1.545 (1.182)	1.374 (1.207)
INVESTMENT	-1.141 (1.390)	-1.631 (1.319)	-1.754 (1.307)	-0.613 (0.675)	-0.123 (0.633)	-0.490 (0.745)
AVERPROF	7.775* (3.981)	8.567** (3.909)	7.324* (3.940)	-0.451 (1.179)	-1.243 (1.283)	0.792 (1.295)
VARSALE	-0.517** (0.233)	-0.410** (0.208)	-0.414** (0.206)	0.102 (0.144)	-0.00416 (0.114)	0.107 (0.149)
CITY	-0.150 (0.812)	-0.161 (0.744)	-0.376 (0.745)	-0.226 (0.508)	-0.215 (0.444)	-0.0109 (0.499)
STATEOWN	1.176 (0.882)	1.284* (0.741)	-0.660 (0.811)	-1.835** (0.754)	-1.944*** (0.608)	0.108 (0.634)
NEW	-2.469* (1.318)	-1.412 (1.258)	-3.487*** (1.290)	-1.017 (0.667)	-2.075*** (0.065)	1.057 (0.560)
TIMEPRIV	0.358 (0.296)	0.180 (0.262)	0.701** (0.274)	0.344* (0.202)	0.521*** (0.178)	0.177 (0.196)
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes

Note:

1. Significance levels: \* - 10% level of significance; \*\* - 5% level of significance; \*\*\* - 1% level of significance.

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## Notes

<sup>1</sup> While this paper builds on earlier work (in particular, Jones and Mygind, 1999) there are several innovations in the present paper that together we believe yield more reliable estimates on issues examined in previous work such as the determinants of ownership changes. For example, some of our variables constructed used in this paper were not previously available – especially proxies for potentially crucial variables such as risk aversion and wealth constraints. Moreover, in this paper we are also able to analyse the impact of important preconditions, such as pre-privatisation origin of enterprise, to subsequent ownership development. Also, since there have been additional waves of data collection, in this paper we are able to use data for a longer time period than was previously available.

<sup>2</sup> This claim can be generalised to include managerial ownership.

<sup>3</sup> Insiders may also prefer to pay out rents as higher wages. Whether insiders are more concerned with the level of profits and dividends than wages depends, among other things, on the distribution of shares among the workforce. See Nuti (1997).

<sup>4</sup> The undervaluation of shares is often difficult to discern directly, since it is based on private information held by the managers.

<sup>5</sup> Even if bank loans were available for buy-outs, bankers are expected to be more likely to give credit to outside investors or managers than to employees. The low equity employees can offer makes employee-owned firms more risky from a banker's perspective. See Bowles and Gintis (1993) for a formal model.

<sup>6</sup> For the case of Russia see, for example, Jones and Weisskopf (1996).

<sup>7</sup> Not all researchers are convinced by these arguments. For instance Hansmann (1996), while admitting that the selection does not work perfectly, maintains that the selection is sufficiently unbiased so that the researchers can derive efficiency implications from ownership changes.

<sup>8</sup> For instance, managers possess informational advantages that may favour them in ownership processes relative to other employees.

<sup>9</sup> More detailed discussions on Estonian privatisation programmes can be found in Frydman *et al.* (1993) for early privatisation, in Turk (2000) for the centralised privatisation programme, Mygind (1997) and Kalmi (2003) for employee ownership, and Mygind (2000) for the entire privatisation process. Entry of new firms and small privatisation was also of crucial importance, see Liuhto (1996).

<sup>10</sup> In the analysis below, co-operatives that are not owned by their workers (mainly various consumer co-operatives and agricultural marketing co-operatives) are classified as being owned by outside investors. This is a standard application of the insider-outsider typology whereby all firms not owned by their workforces are assigned to the broad and heterogeneous category of outsider ownership.



<sup>11</sup> The economic and financial data were provided by the Estonian Statistical Office.

<sup>12</sup> While unfortunately, in most cases we cannot distinguish reliably between these two possibilities, anecdotal evidence suggests that the bulk of such cases are non respondents.

<sup>13</sup> This is a dummy variable where, for privatized firms, 1988=1, 1989=2,... and 1994=7. For definitions of this and other variables see the list of variable definitions.

<sup>14</sup> Output is here proxied by sales. While value added might be theoretically preferable, it was lacking from a considerable number of firms. However, we experimented with using value added per employee as a proxy for productivity for a smaller sample, and the results remained essentially unchanged.

<sup>15</sup> Of course, this observation does not necessarily hold for start-ups. If a similar difference were found in those firms, it would indicate that insider-owned firms operate with lower equity capital.

<sup>16</sup> This finding is also supported in unreported regressions in which we estimate separate regressions for firms with different origins. In these the only variable that was consistently significant across regressions was equity investment: its coefficient remained negative and significant (and large), for state-owned, collective and new firms. These and other unreported findings are available upon request from the authors.

<sup>17</sup> CAPINT93 AND EQEMPL93 are also correlated with each other ( $r=0.49$ ) that makes precise estimation of coefficients difficult. However, tests of multicollinearity did not suggest a problem.

<sup>18</sup> Note that data are for 230 firms (of the original sample of 252). For the remaining 22 firms, information on crucial variables was missing so that these observations had to be dropped from the regressions.

<sup>19</sup> There were a few cases where ownership changed twice, e.g. in 1995 the firm was owned by insiders, at some later point by outsiders, and in 1999 again by insiders. In these cases, the firm was classified having had no change in ownership. Thus, for all firms that were classified as having experienced a change in ownership structure, it was necessary that the ownership group was different at the beginning and at the end of the period. Our econometric results are not sensitive to re-estimation without including these “double-ownership-switching” firms.

<sup>20</sup> For instance, if on January 1<sup>st</sup> 1995 the firm was owned by insiders and on January 1<sup>st</sup> 1996 (and at every subsequent point) owned by outsiders, the annual change was measured between 1993- 1994. For those firms that remained in the same ownership group (insider or outsider) throughout the whole period, the annual change was measured throughout the whole five-year period of 1993-1998.

<sup>21</sup> In the main these results are not sensitive to the use of medians rather than means.

<sup>22</sup> For example, the variable MANAGER is a dummy variable that is assigned the value 1 if the firm was classified as being in dominant manager in 1995. The variable VARSale is the natural logarithm of variance in sales, not the coefficient of variation as in table 7.

<sup>23</sup> Somewhat surprisingly, however, change in employment is negatively related to the change in ownership (in specification 2). But this effect is not statistically significant.

<sup>24</sup> In all cases where outsiders took over the firm there was no previous outsider ownership. Thus we were unable to include the minority share held by outsiders in the earlier analysis reported in Table 8.

<sup>25</sup> Also there is some case study evidence for Estonia in support of this observation.

<sup>26</sup> There was, however, a significant difference between these two concerning sales growth – employee-owned firms declined less

<sup>27</sup> However this finding may occur because capital intensity (fixed assets per employee) is correlated with equity per employee.

<sup>28</sup> This would require long panels of data on financial information and ownership. Another interesting departure for future research might be to study post-privatisation manager buy-outs. In the early literature on transition, the focus was exclusively on changes from insider to outsider ownership, or from changes from employee to managerial ownership. While there has been much emphasis on manager buy-outs as part of the privatisation process, to our knowledge there have not been many studies of the changes from investor ownership to managerial ownership in transition economies.

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Editor-in-Chief **Iikka Korhonen**

Bank of Finland  
Institute for Economies in Transition BOFIT  
PO Box 160  
FIN-00101 Helsinki

Phone: +358 9 183 2268  
Fax: +358 9 183 2294  
[bofit@bof.fi](mailto:bofit@bof.fi)

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