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**The Nature and Determinants of Ownership Changes after Privatization:
Evidence from Estoniaⁱ**

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Abstract

New panel data for a large random sample of Estonian firms are used to examine the incidence and dynamics of ownership structures that have occurred since privatization. While there is much path dependence in ownership structures, considerable changes in ownership have also taken place. Econometric findings indicate that: (i) inertia in ownership distributions is important; (ii) big firms and capital intensive firms are more likely to be owned by outsiders; (iii) economic performance does not play a decisive role; (iv) large minority ownership stakes increase the probability that initial majority ownership will change and, compared to minority ownership by insiders, when outsiders acquire minority ownership positions they are much more likely to eventually assume majority ownership. These results do not confirm the view that there would be a rapid movement toward efficient ownership structures that underlies much conventional theory on privatization.

JEL Classification numbers P11,P21, O53,H70, H20

1. Introduction.

Since much privatization in transition economies was driven by politics, the ownership structures that initially emerged after privatization often were viewed by economists as second best. To facilitate broad support for rapid privatization, widespread employee ownership, which is often viewed unfavorably by economists, was expected to occur in some cases. However, since initial ownership configurations were believed to be only temporary, disequilibrium arrangements, concerns about such allegedly inefficient ownership structures were ameliorated. As secondary markets emerged, assets were expected to be acquired by new owners, who would respond to economic signals with improved capital allocation soon producing efficient ownership structures. However, and rather unexpectedly, insider ownership, including employee ownership, after privatization has turned out to be not only far more common than originally envisaged (Uvalic and Vaughan-Whitehead, 1997) but also much more resilient than anticipated, e.g. for Russia, (Earle and Estrin, 1996).

These new forms of enterprise ownership in transition economies have generated heated debate on diverse issues. Much literature examines the consequences of particular ownership structures; most studies conclude that the persistence of extensive insider ownership is associated with the often-limited progress in enterprise restructuring (Carlin and Landesman, 1997; Pohl *et al.*, 1997; Frydman *et al.*, 1997). However, much less literature examines the causes of variation in ownership structures. Empirical work too is quite sparse and has focused on establishing patterns of change (Blasi *et al.*, 1997; Estrin and Wright, 1999), rather than on matters that impose more formidable data requirements, such as the systematic examination of the impact of economic forces on ownership levels and their dynamics.ⁱⁱ Moreover, since the available data often have been quite restricted in terms of sample size, its representativeness, and the available range of information, even the limited empirical evidence often has important shortcomings (Aghion and Carlin, 1997). Without rich panel data, even basic issues such as the scope of insider ownership and the speed of ownership changes remain controversial. For example, for Russia, compare Earle and Estrin (1996) and Jones (1998). By contrast, we are able to use new data for 666 Estonian firms that is representative of the entire Estonian economy. This new large panel data set enables us to provide reliable evidence on competing hypotheses on the

determinants of ownership structures and their dynamics since privatization. The plan of the paper is as follows.

In section two, theory on the choice of ownership structures and subsequent changes is considered. Section three contains a brief discussion of the Estonian privatization process. In section four, transition matrices are used to portray ownership configurations with more precision than in previous work. Unusually, our data enable us to investigate firm ownership by constructing measures of *majority* ownership. In section five, by estimating Tobit and multinomial logit models, we provide some of the first econometric evidence on the determinants of ownership structures and transitions for any economy since privatization. In particular, we consider whether evidence indicates that ownership changes are responsive to economic forces. In a concluding section, some implications of the findings are examined.

2. Conceptual Framework

Little formal modeling or informal work on either the expected pace of change in ownership patterns or the specific causes of variation in ownership structures and their dynamics exists. In the formal literature, one exception is Aghion and Blanchard (1998).ⁱⁱⁱ They argue (as do Boycko *et al.*, 1996) that to induce strategic restructuring, additional capital and access to outside expertise is needed; in turn, this requires concentrated ownership by outsiders.^{iv} However, this preferred form of private ownership is unlikely to emerge initially because the political situation often dictates insider ownership. Moreover, since worker shareholders are fearful of unemployment, enterprises will remain trapped in insider ownership. This line of argument provides an intuitively plausible reason for the existence of substantial inertia in employee ownership.^v

The determinants of ownership structures and their changes are not explicitly considered in other theoretical literature in comparative economic systems. However, some theoretical approaches, including the new institutional economics and the economics of organizations (Ben-Ner *et al.*, 1993), are pertinent and also lead to predictions concerning the patterns of ownership changes that differ from those of Aghion and Blanchard (1998). These alternative perspectives typically assume bounded rationality and incomplete information and stress the power of custom and habit (Hodgson, 1998). Such assumptions, and the existence of dispersion in initial

institutional situations and contexts, lead to predictions of heterogeneity in ownership dynamics, including substantial inertia for all types of ownership dynamics and not just for insider-owned firms.

Much of the more informal literature considers specific factors influencing the choice of ownership structures.^{vi} Earle and Estrin (1997) consider how particular firm characteristics may make certain firms more attractive to different types of investors who have different objectives and who may face different budget constraints. For example, it is argued that larger enterprises are apt to be more strategic for the state and, thus, the state is likely to have large ownership stakes in such firms even after privatization. However, this consideration is believed to be especially important for employees who will be less likely to invest in their firms either because they cannot afford to do so or because they are more risk averse (Ben-Ner *et.al.*, 1998). Based on these considerations, it is predicted that outsiders are more likely than insiders to invest in large firms, as are managers compared to employees and institutional investors compared to individual investors.

Similar arguments carry over to capital intensity and financing requirements (Aghion and Blanchard, 1998). Thus, firms with higher capital labor ratios would have higher per worker capital financing requirements. Hence, compared to insiders, outsiders are more likely to invest in firms with large capital-labor ratios. Moreover, financing needs are presumed to constrain large foreign and institutional investors less so than individual investors, and to bind employees more so than managers. Furthermore, financing requirements play a role in triggering ownership changes, in particular, when it is generally recognized by current owners, who are predominantly insiders, that new financial capital is required. Absent the ability to borrow from banks, liquidity constrained insiders may have no recourse but to issue new shares to outsiders, thus producing a change in majority ownership (Filatochev *et. al.*, 1996).

Another determinant may be the quality of the firm (Earle and Estrin, 1997). While all types of investors are interested in high performing firms, such considerations may not be paramount to employees, at least in the short run, as they fear for their jobs, while the state may be worried about the political ramifications of job losses and plant closings.^{vii} Relatedly, the extent and nature of the economic restructuring that has taken place already in a firm may be viewed by some investors as a crucial signal of enterprise quality.

Furthermore, as has been noted by several writers, including Smith *et. al.* (1997) and Mygind and Pedersen (1996), many possible complementarities exist between different ownership configurations and economic theory does not pronounce definitively on ownership structures. For example, although foreigners may be repelled from investing in firms in which insiders are dominant or where the state maintains a large ownership share, insiders holding a significant minority ownership share may signal a commitment on their part and act as an inducement for foreigners.

Apart from matters of complementarities with other types of ownership, employees may be more apt to invest in their firm when more of their peers do so. Having a high fraction of the workforce as owners may contribute to motivating workers to join in restructuring efforts and to use their accumulated experience and firm-specific knowledge. A high ownership rate among employees may provide valuable opportunities for both management and workers to learn about each other in a cooperative atmosphere and to develop stronger trust. Sharing vital business information with worker-owners will help convince them that it is in their interest to improve productivity and firm performance (Blair, 1995). High participation rates by employees in share-ownership, contrasted with high amounts of employee ownership, may be associated with various forms of employee participation (Ben-Ner and Jones, 1995). By providing employees a voice in the firm, and assuming that it is not optimal for the firm to downsize, the costs of exit from the firm will be reduced and specific human capital will be saved.

Finally, significant differences across industries and regions may result from the evolution of ownership structures. For example, even after privatization, the state may wish to maintain an ownership interest in certain strategic sectors and also prevent the development of widespread regional disparities in patterns of ownership.

3. Privatization in Estonia^{viii}

Estonia provides a particularly interesting case for examining ownership issues. As in most transition economies, the formal stock market is still quite embryonic. However, in contrast to other countries, Estonia has a quite sophisticated banking sector and there is no widespread evidence of managers abusing the rights of other shareholders systematically.^{ix} In addition, Estonia's program for large-scale privatization was virtually completed by late 1997 (and small-

scale privatization was finished in 1994).^x For these reasons, institutional infra-structural preconditions, which are often assumed when generating some of the theoretical propositions discussed above, are much more likely to be satisfied than in Russia, and even perhaps the Visegrad countries.

At the same time, the large scale of the private sector has not been achieved by one set of privatization initiatives but rather, as in many countries, has been accomplished by a series of initiatives. In the first stages of privatization, many concessions were made to insiders. In 1989-1991 about 200 companies were leased by employees and in 1991 some so called people's enterprises were transferred to employees free of charge. The early small-scale privatization in 1991-1992 also favored employees, but the advantages were removed in 1992. Most of the large privatization since the end of 1993 has followed the Treuhand model.^{xi} The result is that the now privatized formerly state-owned firms are not homogeneous but rather reflect an array of privatization vintages and differing privatization policies.

These policy and institutional differences should modify some of the theoretical propositions discussed above. Concerning the determinants of ownership structures and their dynamics, insiders may be much more willing to sell shares that were obtained at concessional prices, compared to shares bought at "market value". In designing our empirical strategy we attempt to take institutional considerations into account by the interpretation placed on the timing of privatization and whether or not the state continues to own a part of a privatized firm.

4. Data and Ownership Patterns

With the cooperation of the central statistical authority in Estonia, annual economic and financial data were extracted from company records for 666 firms for 1995-1997 to construct a rich panel. These standard economic data, including profits, assets and employment, have been merged with special surveys that collected detailed data on the distribution of ownership for insiders, available separately for managers and employees, and outsiders, split into foreigners and domestic outsiders, and the state. By selecting a large stratified random sample, we expect to have representation of all the main forms of ownership, as well as firms that had been privatized at different times and firms from a broad range of industries.^{xii}

These data enable not only estimation of diverse specifications, but also construction of measures of key variables. Concerning ownership, most previous studies attempt to classify firms according to which group is the largest or the dominant shareholder (Frydman *et. al.*, 1997; Jones, 1998; Earle *et. al.*,1996). However, for several reasons, this procedure does not necessarily produce the preferred typology of ownership forms. For example, dispersed shareholdings within a category may lead to limited cohesiveness by the dominant ownership group, which may account for as little as 25% of the total voting stock. Fortunately, in most cases in Estonia, we are able to classify firms based on the analytically preferable method of majority ownership. In addition, we can calculate minority ownership shares.

When the economic and ownership data for the original sample were merged, data were available to enable ownership structures to be analyzed for 601 firms from 1995 through 1997.^{xiii} When data on majority owners for these 601 firms are examined, we find that 34.8% of sample firms (209/601) were state majority owned with corresponding figures for other majority ownership groups as follows: outsider domestic owned firms, 22.1% (133); manager-owned firms 16.6% (100); foreign owners 14.6% (88); and 9.8% (59) employee majority ownership. Interestingly, and unlike ownership patterns in many other transition countries, firms with no majority ownership were quite scarce and comprised only 2% of the sample.^{xiv}

Table 1: Transition Matrix - Majority Ownership 1995-1997

Majority Ownership 1995	Majority Owner 1997					
	Outsiders		Insiders		No Majority	Total 1995
	Foreign	Domestic	Managers	Employees		
Foreign	88	4	3	1	0	96
Domestic Outsiders	1	86	9	5	9	110
Managers	1	4	61	1	4	71
Employees	0	9	11	24	9	53
No Majority	1	5	2	3	14	25
Total 1997	91	108	86	34	36	355

To examine the evolution of majority ownership, a transition matrix for 1995-1997 is reported in Table 1. Reflecting our interest in changes in ownership structures that begin as other than state majority ownership, we exclude cases in which there was majority state ownership in 1995. First, much inertia or path dependence are in evidence as in more than three in four cases (in fact in 273/355) no change in majority ownership is exhibited. Second, when a change in majority ownership occurred, firms tended to be owned by employees at the beginning of the period. In more than half of the cases of majority ownership by employees (29/53 cases), majority ownership switched to another group. By contrast, in firms in which managers were the majority owners, the switching rate was only about 14% (10/71). For both forms of majority outsider ownership, the switching rates are lower than for firms that were majority owned by employees in 1995. About 22% of firms initially with majority ownership by domestic outsiders and 8% of firms in which initially majority ownership lay with foreigners changed during the period. Third, firms in which employees have majority ownership are decreasing in number. Relative to other types of firms, this diminishing importance of majority employee owned firms reflects a decreased ability of existing employee owned firms to remain employee owned and also the lessened tendency of firms that formerly were not majority owned by employees to

become employee owned. Thus, while several firms that were not majority owned by employees did switch ownership category, many new firms have also appeared in those groups. For example, while 10 firms that were initially majority owned by managers switched to another category, managers managed to gain a majority ownership position in many other firms including 20% (11/53) of firms that had employee majority ownership and 8% (9/110) of firms in which domestic outsiders had majority ownership.^{xv}

To provide information on minority ownership, we define the largest minority owner as the biggest minority ownership group that owns at least 10% of the total equity.^{xvi} Some interesting patterns of minority ownership emerge. In 1995, foreigners were very rarely the largest minority group in firms owned by insiders, for example, in only one case in which managers were the majority owners. Similarly, although not so acutely, insiders, and especially employees, were unlikely to be the largest minority in firms in which foreigners had majority ownership. By 1997, again there are strong indications that, by this yardstick, ownership structures are often inert. Thus, cases in which employees have large minority ownership continue to occur infrequently in firms in which most ownership lies overseas. At the same time, several changes are apparent. Most interesting is the observed tendency for all minority groups to become more important in firms in which managers have the majority share.

5. The Determinants of Ownership Structures

To examine the determinants of changes in ownership structures, we employ two approaches. First, we estimate separate two-limit Tobit models for the extent or degree of each of the five particular forms of ownership (O), namely, employee, manager, foreign, domestic outsider and state.^{xvii} These models attempt to explain ownership shares at the end of the period, i.e. in 1997 after privatization has occurred for some time, and thus enable us to allow for ownership transitions.^{xviii}

To test hypotheses of path dependence, a vector of measures of the extent of ownership at the beginning of the period is included. Our previous discussion indicates that it may both be easier, and arguably more efficient, for a firm to move from some types of ownership structures to others. For reasons of risk aversion and liquidity considerations, it is more likely that a firm will move from majoritarian employee ownership rather than majority managerial ownership to

outside ownership.^{xix} Hence, we include dummy variables for whether or not the ownership category that is being explained was the majority ownership group at the start of the period. For example, MajFor95 is a dummy variable for whether or not foreigners had the majority of the shares in the beginning of 1995. The corresponding variables for other ownership categories are MajMan95, MajDom95, and MajE95.^{xx} To examine the effect of the role of the ownership rate among employees, we include the variable WkShr.

A vector of firm characteristics for 1995 is included to capture initial firm specific characteristics. To proxy firm size, we use the logarithm of average number of employees in 1995 (lnLabor95); the logarithm of the capital-labor ratio (lnK/Labor) is introduced to account for differences in capital intensity. Several alternative measures are used to proxy firm quality. In the reported regressions, we use productivity or the logarithm of value added per employee in 1995 (lnVA/Labor). However, while in transition economies enterprise productivity may be the preferred measure of enterprise quality, in the special conditions that exist in transition economies, alternative measures may be pertinent (Pohl *et. al.*, 1997). These include other standard measures of economic performance, such as current sales or profits and accounting measures such as return on assets. Also, to deal with measurement error and problems of noisy data, investors may prefer to have information on the growth rates of indicators of economic performance such as sales or labor productivity, rather than only current levels (Frydman *et. al.*, 1997). Hence, in other, unreported regressions, we use alternative proxies for economic performance; these include production and profit as well as the growth rate of sales since privatization. Certain non-traditional measures of firm quality may be arguably relevant. For example, the average wage may proxy performance, with better performing firms paying higher wages on average.^{xxi}

To estimate the importance of privatization type and vintages, as well as differences in institutional features for different environments, we include various measures that capture the time that has elapsed since the firm was privatized. For example, TimePriv is a dummy variable that takes on a value of one for firms that were privatized during or after 1993, after which time major changes in privatization policies had occurred. Finally, to allow for differences in ownership dynamics across industries and regions, dummy variables for industry (IND) and for the capital region, Tallinn, are included.^{xxii}

A second strategy is to estimate multinomial logits to explain the probability of the joint occurrence of a particular initial ownership structure and an ownership configuration in 1997. In principle, since there are five ownership categories, there are twenty-five possible cases. Unfortunately, there are some categories for which there were not many switches. This fact, and the size of the present data set, means that we would not be able to estimate precisely some of these transitions. In these estimates, we choose to focus on those of special interest, namely, insiders (I) and outsiders (O), and exclude the less interesting group of categories involving the state and the few cases of non-majority ownership.^{xxiii} Thus, we have four possible states --I→I; I→O; O→I; O→O.^{xxiv} In these models, the explanatory variables that are included are very similar to those used in the Tobits. However, in order to examine the potential influence on ownership transitions of minority ownership, we also include a dummy variable for whether or not the particular type of majority ownership in 1997 had a large minority ownership in 1995. For example, if the majority owner is one of the two insider groups, then the large minority ownership dummy variable is 1 if either of the outsider groups, domestic or foreign, have at least a 10% stake.^{xxv}

Table 2: Descriptive Statistics: Means (standard deviations)

	All	Employee	Manager	Domesti Outside	Foreign	State
Employee 95	10.8 (22.7)	53.7 (27.9)	16.7 (26.1)	9.8 (17.7)	0.9 (5.5)	0
Manager 95	15.0 (28.4)	18.0 (18.1)	51.8 (38.7)	8.0 (17.6)	3.8 (10.9)	0
Domestic Outside 95	22.4 (34.8)	21.4 (24.3)	14.5 (25.5)	55.1 (40.3)	7.6 (16.7)	.5 (4.4)
Foreign 95	14.8 (31.9)	1.8 (7.3)	3.0 (12.7)	4.3 (13.7)	73.6 (34.4)	1.4 (7.3)
State 95	36.9 (47.2)	5.1 (20.3)	14.1 (34.3)	22.9 (40.7)	14.1 (30.9)	98.2 (8.8)
Value Added	9247 (40929)	3107 (5433)	5182 (15350)	7341 (11255)	8228 (18909)	21023 (89198)
Capital-Labor Ratio	21.9 (2216)	27.1 (30.8)	35.7 (45.3)	114.1 (331.9)	454.9 (1992)	613.3 ((4837)
Employment	12.9 (420)	88.8 (209)	78.2 (156.1)	156. (209)	92.3 (131.7)	242 (921)
Tallin	37.5 (48.5)	23.1 (42.5)	28.3 (45.3)	31.0 (46.4)	54.7 (50.1)	42.7 (49.7)
Avwage	16.0 (7.8)	12.3 (6.9)	13.3 (7.8)	14.5 (6.8)	22.4 (12.1)	15.6 (6.3)
Wkshr	12 (24.0)	50.7 (30.4)	12.3 (21.1)	18.6 (28.2)	0.1 (.11)	0

Note: Columns are majority ownership categories in 1997. Rows are variable values in 1995.

Descriptive statistics for key variables used in the Tobit estimates are presented in Table 2. These show that, compared to firms with outside ownership majorities, on average insider-owned firms are smaller, have much lower capital-labor ratios and also pay the least wages. Among non-state firms, firms with majority ownership by foreigners have by far the highest capital-labor ratios, about seventeen times as large as in firms in which employees are majority owners. State firms are the biggest of all types and also have the most concentrated ownership patterns.

Table 3: Tobit Estimates of the Extent of Ownership in 1997

	(1) Employee	(2) Manager	(3) Domestic Outside	(4) Foreign	(5) State
State 95	-.1105	-.6799**	-.4202*	-.1432**	
Employee 95		-.5343*	-.4287*	-.3707*	-.0865**
Manager 95	-.0009		-.0071**	-.0277*	-.0754*
Domestic Outside 95	-.1626*	-.6094*		-.2815*	-.0676*
Foreign 95	-.2818*	-.7187*	-.6401*		-.0709*
lnVA/Labor	.0365*	.0005	-.0184	.0014	.0011
lnK/L	-.0260*	-.0303**	.0469*	.0265*	.0067****
lnLabor	-.0400**	-.0322**	.0765*	-.0036	.0044
TimePriv	.0031	-.0290	.0917**	-.0091	.0063
Tallin	-.0133	-.0055	.0325	.0044	-.0052
Avwage	.00001	.0014****	.0005	.0024*	-.00001
Wkshr	.2898*	-.0138	.0934	-.0031	-.0099
MajEE 95	.1789*				
MajMan 95		.059****			
MajDom 95			.3236*		
MajFor 95				.1946*	
IND.	Y	Y	Y	Y****	Y****

Notes:

- 1) * significant at 1% level; ** significant at 5% level; *** significant at 10% level
- 2) All entries are marginal effects, i.e. unconditional expected values.
- 3) The number of observations is 305.
- 4) Y = estimates include a set of industry dummies

The findings based on the Tobit estimates are reported in Table 3, in which each column represents a separate estimate for a different type of ownership. Supporting the evidence in the ownership transition matrix, the evidence on the ownership variables all point to strong evidence of inertia in ownership structures.^{xxvi} This is seen most clearly by the coefficients on the dummies for majority ownership at the start of the period. These are always positive and statistically

significant, and usually strongly so. For example, for a firm that began the period with majority employee ownership, that firm would be expected to have 17.9 % more employee ownership in 1997. For firms in which majority ownership initially lies with outsiders the corresponding numbers are even larger, i.e. more than 32% for domestic outsiders and 19% for a firm with majority foreign ownership.

Other evidence that initial ownership structures exert a strong influence on subsequent changes in ways that correspond broadly to theoretical predictions is given by the set of variables that capture the degree of ownership in 1995. For all types of ownership, a likelihood ratio test rejects the hypothesis that the joint effect of these variables is nil. Moreover, in every case, individual coefficients are negative and, in nearly every case, they are also statistically significant. From the estimates in column (1), for the average firm, a 10% increase in domestic outside ownership in 1995, at the expense of employee ownership, would lead to employee ownership being 1.6% lower in 1997 and a 10% increase in foreign ownership in 1995, again at the expense of employee ownership, would lead to employee ownership being 2.8% lower in 1997. However, for the same firm, if the 10% increase in domestic outside ownership in 1995 was instead at the expense of foreign ownership, this would lead to employee ownership being 1.2% higher in 1997.

The final piece of evidence concerning the effects of initial ownership distributions on subsequent outcomes comes from the coefficients on *Wkshr*, i.e. the proportion of employees owning shares. Other things equal, when a larger proportion of workers own shares in 1995, the extent of employee ownership is expected to be higher in 1997. The size of this effect is potentially quite large, for example, if *Wkshr* increases from 50% to 100%, then the employee ownership share in 1997 is predicted to go up by 14.5%. This suggests that, in the average firm, the higher is the rate of participation in ownership by employees, the greater is the likelihood that the firm will remain majority employee owned, or that employees will be less likely to sell their shares to other groups.

Several of the firm-specific characteristics have statistically significant effects on ownership structures; sometimes the direction of these effects is found to differ by type of ownership. This is most apparent with the capital labor ratio, where coefficients are always statistically significant. Thus, consistent with our hypotheses on the expected directions of effects,

a firm with twice the capital-labor ratio of a second firm, would be expected to have a lower ownership share of employees by 2.6% and of managers by about 3%, but higher ownership shares of foreigners by 2.65%, of domestic outsiders by 4.7% and of the state by about 2/3%.

The effects of firm size, measured by the log of employment, are almost as striking. Often the direction of the effects are as predicted although the relative magnitudes do not necessarily accord with theory. Thus, the estimates indicate that doubling the labor force is expected to reduce the ownership shares of employees by 4% and managers by 3.2%. Furthermore, the declining share held by insiders leads to a statistically significant increase in the share of domestic outsiders by 7.6%, while there are no statistically significant effect on ownership shares of foreigners or the state.

Surprisingly, performance, as measured by value added per worker, seems to have an influence that is statistically significant only on the share of employee ownership, i.e. a firm with double the productivity of a second firm is predicted to increase employee ownership by 3.65%. Hence, the effect of economic performance, as measured by labor productivity, in influencing ownership shifts is not discernibly strong. Moreover, findings based on alternative proxies of economic performance, e.g. growth in sales, were not materially different from those reported above. However, if the average wage variable is interpreted as an alternative index of firm quality, then the influence of firm quality becomes stronger.^{xxvii} Thus, there is a statistically significant but numerically small relationship between the average wage and ownership in the average firm and ownership type for managers or foreigners only. For example, in the average firm, raising the average real wage by 800 kroons (which is about 50% of the average wage) is calculated to increase ownership of foreigners by 1.92%.

In the reported regressions, the influence of the time of privatization is examined by using a single dummy, i.e. whether or not the firm was privatized after 1993. In only one case, that of domestic outsiders, do we find a significant effect that is quite large. Firms privatized after 1993 are expected to have 9.2% more domestic outside ownership. However, in unreported regressions, attempts to capture other possible effects by using sets of dummies for different privatization periods were not successful. Finally, there are significant effects stemming from either regional and/or industrial differences. Furthermore, examination of the individual industry coefficients (in the models explaining state and foreign ownership) lends some support to propositions

concerning the state and foreigners having special interest in firms in certain sectors. Thus, our findings indicate that the state regards firms in utilities and heavy industry as of strategic importance (perhaps for reasons including high employment levels) and that foreigners are especially interested in ownership in firms in finance and hotels.

Table 4: Multinomial Logit Estimates of Ownership Transitions from 1995 to 1997

	0	1	3
	Insider → Outsider	Insider → Insider	Outsider → Insider
lnVA	.06 (.0619)	.1818*** (.1060)	.0020 (.0494)*
lnK/L	-.0458** (.0219)	-.1988* (.0455)	-.0323*** (.0182)
lnLabor	-.0396 (.0642)	-.2544** (.1205)	-.0311 (.0500)
Tallinn	-.0231 (.0481)	.1198*** (.0101)	-.0212 (.0390)
lnavwage	-.0851 (.0677)	-.3093** (.1390)	-.0404 (.0571)
Wkshare	.0313 (.0509)	.0728 (.1119)	.0372 (.0442)
Large Minority	.0461 (.0369)	-.1549** (.0760)	.0770* (.0301)
Timepriv	-.0483 (.0411)	0.1197*** (.0608)	-.0203 (.0337)
Ind	Y	Y	Y
n	272		
log likelihood	-255.20		

Notes:

- 1) * significant at 1% level; ** significant at 5% level; *** significant at 10% level.
- 2) Entries are the effect of the explanatory variable on the probability of the event (the three reported states, I→I; I→O; O→I;) occurring. The probability effect of the fourth outcome (O→O) equals the negative reciprocal of the sum of the other three row effects.
- 3) Entries in parentheses are standard errors.
- 4) Y = estimates include a set of industry dummies.

In Table 4, findings from the multinomial logit models are reported for three categories, i.e., I→I; I→O; O→I; the unreported category is O→O. As indicated by the signs of the coefficients on the capital-labor ratio, firms that are highly capital intensive are much more likely to be owned initially by outsiders and also to remain owned by outsiders, the residual category of O→O.

Specifically, when the capital-labor ratio is doubled, the probability of a transition from insider to outsider majority ownership is lowered by 4.6% (and for outsider to insider ownership by 3.2% and of remaining insider owned by almost 20%), and the probability of remaining outsider owned is raised by almost 27.7% (since the four probability effects--the three reported coefficients plus the one for $O \rightarrow O$ --must sum to 0). Consistent with the results from the Tobit estimates, large firms, as indicated by the logarithm of employment, are much more likely to be owned initially by outsiders and to remain owned by outsiders. Specifically, the coefficient estimates imply that if the labor force were to be doubled this would lower the probability of a firm remaining insider owned ($I \rightarrow I$) by more than 25%, but raise the probability of a firm remaining outsider owned by a little more than 32%.

The negative and statistically significant coefficient on the large minority ownership variable in the $I \rightarrow I$ column indicates that, when outsiders have a large minority stake, in firms in which insiders initially own a majority of the stock, there will be more switching because the firm is less likely to remain insider owned. Specifically, the probability of a firm being initially insider owned and remaining insider owned is reduced by 15.5% when there is a large minority ownership stake. This compares with a probability for a firm being outsider owned initially and moving from outside to insider ownership being raised by 7.8% when a large minority ownership stake exists. Moreover, the conditional probability that a firm that is initially insider owned becomes outsider owned increases by 16.6% when there is a large minority ownership stake. By contrast, the conditional probability for a firm that is initially outsider owned becomes insider owned is only 10.5%.^{xxviii} In other words, while there is some evidence that when either outsiders or insiders assume a large minority ownership position, this increases the probability of their eventually assuming a majority position, the likelihood of this happening is much higher when it is outsiders that obtain the large minority stake. Finally, a firm located in Tallinn is 12% more likely to be insider owned and to remain insider owned, while the probability of such a firm being owned by outsiders and remaining outsider owned is 7.5% lower than for the average firm.

VI Conclusions and Implications

By using new panel data for a large random sample of Estonian firms, evidence is presented on competing hypotheses on the determinants of the incidence and dynamics of

ownership structures since privatization. There is enormous variation across Estonian firms in their ownership structures with many examples of firms in which majority owners are different groups of insiders or outsiders. While diverse ownership configurations have been noted for other transition economies, for example, for Russia, similar diversity when using classifications based on majority ownership is unusual even in transition economies. Moreover, by comparison with advanced capitalist economies, such heterogeneity in ownership among firms within an economy is quite unusual.

Classifications based on majority ownership and findings from Tobit models indicate inertia in ownership dynamics. Since many firms began their privatized phase as majority-owned by employees, this evidence is partially consistent with the hypothesis of Aghion and Blanchard (1998) who predict the persistence of employee ownership. In general, it is clear that, to date, initial ownership configurations have not turned out to be temporary, disequilibrium arrangements. Equally, if initial ownership structures were inefficient, institutional changes, such as the development of secondary markets, have not yet been sufficient to facilitate the general emergence of new efficient ownership structures.

Nevertheless, and consistent with the institutionalist hypothesis that outcomes will be heterogenous, there have also been many profound changes in ownership configurations. From 1995 to 1997, about one in four privatized Estonian firms switched their initial ownership category. The decrease in the percentage of firms in which employees have a majority ownership stake has been particularly rapid. Minority ownership patterns for Estonian firms also reveal important changes. While data on ownership dynamics for other transition economies are far less comprehensive, these usually indicate comparable directional changes in ownership structures (Jones, 1998 for Russia). However, it appears that the pace of change, including the erosion of employee ownership, is taking place much more slowly elsewhere.

Some of the changes in ownership that have occurred are consistent with the hypothesis that, over time, more efficient ownership structures will emerge. For reasons of liquidity considerations or risk aversion, employee ownership has tended to fall. In accounting for ownership changes, findings from Tobit models of ownership shares and multinomial models of combinations of initial and final ownership tell a similar story. Consistent with the hypothesis of the crucial importance of financing requirements for employee owned firms (Aghion and

Blanchard, 1998), estimates for both Tobit and multinomial models indicate that highly capital intensive and large firms are much more likely to be owned initially by outsiders and also much more likely to remain owned by outsiders. In addition, partial support for propositions that the state has a special interest in firms in certain strategic sectors including utilities and that foreigners are especially interested in building up ownership in particular sectors such as finance is found.

The multinomial logit results show that large minority ownership stakes increase the probability that the form of the initial majority ownership will change. Moreover, compared to minority ownership by insiders, when outsiders assume minority ownership positions they are almost 60% more likely than insiders to eventually assume a majority position. Finally, typically, economic performance is not found to influence ownership structures or their dynamics.

These results do not confirm the view that there would be a rapid movement toward efficient ownership structures that underlies much conventional theory on privatization. Since Estonia is often listed as one of the most successful transition economies, a key implication of this study is to determine the extent to which this general conclusion carries over to other transition countries. Similarly there is a need to investigate the degree to which specific findings can be generalized. Thus while our findings on economic performance are consistent with evidence for many transition countries that suggests that privatization has not yet delivered pronounced and sustained improvements in enterprise performance, there is some evidence for some countries that foreign ownership may enhance economic performance (Pohl *et. al.*, 1997). Hence, the research agenda will continue to include theoretical and empirical investigation of issues including the complex links between economic performance and restructuring as well as the performance effects of different ownership structures. In addition, it will be important to try to account for the differences in these relationships and in the likely variation in the determinants of ownership structures and their changes across transition countries.

Appendix: The Data and the Variables

The Data

The data resulted from merging two data sets for the same firms. Data were collected from both sources during three years, in 1995, 1996 and 1997. The sample selection process is described in the text. The Estonian Economic Survey collected information on basic economic indicators, for example, employment, sales, assets, costs, debts and taxes. The data were collected in cooperation with the national statistical authorities. The Estonian ownership surveys collected detailed data on ownership from enterprise managers or their representatives during interviews from 1995 to 1997 as well as at the time of privatization

The Variables

Ownership

Shares: State95 is the ownership share of the state in 1995. Analogous variables are defined for Employee 95, Manager95, Domestic Outsider95 and Foreign95. The five variables sum to 1. Similar variables were constructed for 1997.

Majority Ownership: MajEE95 is a dummy variable for whether or not, in 1995, the majority of the firm's ownership was in the hands of employees. Analogous variables are defined for MajMan95 (management), MajDom95 (domestic outsiders), and MajFor (foreigners). The base case is MajSt95 (state). Analogous variables are defined for 1997. Cases without a majority owner are "No majority"

Largest minority: A large minority owner exists (the dummy variable equals 1) when for cases of majority insider ownership, either domestic or foreigners have at least a 10% stake or, for cases of majority outsider ownership, either employees or managers have at least a 10% stake.

Whshr Fraction of the employees that owns shares

Firm Characteristics and Performance

lnVA: The logarithm of value added.

lnK/L: The logarithm of the capital-labor where capital equals fixed assets at the end of 1995 and labor is the average number of employees in 1995.

Ln Labor: The logarithm of employment.

Avwage: Average wage.

Lnavwage: The logarithm of average wage

Timepriv: Dummy variable for whether or not the firm was privatized during or after 1993

Control (Dummy) Variables

TALLINN: Dummy variable equals 1 for firm located in Tallinn, the capital of Estonia

IND*: Set of industry dummy variables.

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Notes

- i. The authors acknowledge support from ACE Phare, NSF SES 9511465, the Danish Research Council for Social Sciences and the National Council on Eurasian and Eastern European Research. In addition the paper has benefitted from research assistance by L.Culbertson and comments from J. Bonin, J. Pliskin, P. Kalmi, L.Tikla, E.Peev and participants at the 9th Conference of the International Association for the Economics of Participation, Bristol, June 1998, the workshop on corporate governance, London Business School, June 1998, the first International Conference on Economic Restructuring and Corporate Governance, Copenhagen Business School, August, 1998 and a seminar at UNWIDER, Helsinki, August 1998.
- ii. However, Smith *et.al.* (1997) and Earle and Estrin (1997) provide preliminary examinations of related matters.
- iii. Brown (1998) uses a broader framework which allows for social efficiency considerations. See also Kalmi (1999) and Chilosi (1996).
- iv. Not all economists accept this first proposition. For a review of the theoretical and empirical evidence on the economic merits of forms of insider ownership see Fitzroy *et. al.* (1998.)
- v. The policy conclusion of the model is that to minimize the likelihood of insiders blocking ownership switches, measures are needed that inhibit insiders from collusion in resale. At the same time, the model makes some very strong assumptions. These include the notion that capital markets are well organized, that there are no informational asymmetries between insider owners and potential buyers and that decision-makers are rational maximizing individuals with given and stable preference functions. However, the institutional realities are often very different. For example, markets for shares are often very thin, and often effectively restricted to an internal share market, and examples of informational asymmetries and incomplete information are legion (Murrell, 1991). Hence, the generality of the prediction that emerges from the model is questionable.
- vi. We restrict our discussion to factors for which data are currently available. Thus we ignore the potential influence of other factors that have been identified by theorists including the

industrial relations climate, the extent of employee involvement in decision-making and the type of the payment system (Ben-Ner *et al.*, 1998).

- vii. There do not appear to be any *de jure* restrictions concerning layoffs in Estonia.
- 8. For more exhaustive accounts, see Mygind and Pedersen (1996) and Mygind (1997).
- ix. For an evaluation of the relevant legal infrastructure in Estonia, see EBRD (1997). For evidence on the voluntary nature of share transfers, see the case study evidence in Mygind and Pedersen (1996), especially pp. 95-122.
- x. However, in many firms the state continues to retain a substantial ownership interest.
- xi. This means that groups with access to capital including foreigners have been in a strong position. It is estimated that foreign investors obtained around 40% of the privatized assets (Mygind, 1997).
- 11. Thus we include some firms that were never privatized and also some privatized firms in which the state remained the majority owner during the period of study.
- xiii. Based on two sample mean t tests, there does not appear to be any significant difference in the nature of the firms for which we have only partial information.
- xiv. See Jones and Mygind (1998) for a fuller description of ownership structures and changes in ownership in Estonia.
- xv. By using data for a longer period, encompassing changes in ownership structures since the time of privatization, similar but typically more pronounced trends are observed (Jones and Mygind,1998).
- xvi. Estonian law requires that owners with at least 10% ownership be provided with representation, for example, by membership on the board of directors.
- xvii. Tobit models are chosen because they allow us to deal with observations at both a lower limit, 0% ownership, and an upper limit, 100%, using existing statistical software.

Essentially we use the two-limit Tobit likelihood function that specifies, for each ownership category, the probability an observation will have 0% ownership, 100% ownership, or any partial ownership between the two limits. We are not aware of an alternative estimation method that is available in the standard statistical packages that might be more appropriate than the two-limit Tobit model in dealing with two mass points. See Maddala, (1983) for an account of the two-limit Tobit model.

- xviii. Unfortunately data are not available for all the variables that our theoretical discussion suggests are potentially important. For example, we do not have measures of employee participation or the types of payment systems or the industrial relations climate.
- xix. Risk aversion of employees is discussed by Ben-Ner *et. al.* (1998). That Estonian workers are more liquidity constrained than managers is indicated by data obtained for a subsample of 208 firms that show average wages of non-managerial workers on average to be 43% of comparable wages for managers.
- xx. All variables are defined in the appendix.
- xxi. However, as noted above, since the average wage may also serve as a crude measure for employee liquidity or cash constraints, the interpretation of this coefficient is ambiguous. .
- xxii. An alternative, although related empirical strategy, which has been suggested (Claessens, *et. al.* 1996), is to estimate changes in ownership shares from 1995-1997. However, it is not clear why such an approach is to be preferred to the Tobit strategy that focuses on ownership levels at the end of the period.
- xxiii. In turn, this reduces the number of observations by 33.
- xxiv. The multinomial logit method assumes that the four categories are independent. To the extent that this is not true, then the coefficient estimates may not be consistent.
- xxv. In this sense there may not be a minority owner at all and, even if there is, it may not be the largest minority.

xxvi. Alternatively, the initial ownership structures may be capturing unobserved firm characteristics that do not change much over the relevant time period.

xxvii. Alternatively, this coefficient can be interpreted as not providing support for notions of liquidity constraints.

xxviii. The details for calculating these conditional probabilities can be obtained from the corresponding author upon request.