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**THE CHOICE  
OF OWNERSHIP STRUCTURE:  
EVIDENCE FROM RUSSIAN  
MASS PRIVATIZATION**

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In a large data set of Russian manufacturing firms we observe high and gradually decreasing ownership stakes of firm insiders, i.e. managers and workers. We estimate the determinants of the decision to privatize a firm in the mass privatization program (1992–1994) and of the resulting initial ownership distribution. For estimating the latter we use a tobit model with sample selection. The paper presents empirical tests for predictions of the model of ownership choice in insider privatization by Aghion and Blanchard (1998). In particular, we find that collusion among workers is important in their decision to sell shares to outsiders and raises their stake. Also, firms in financial distress show a higher incidence of insiders selecting the option of privatization leading to high insider ownership. This can be explained by the desire of insiders to insure against unemployment by acquiring more shares in those companies. No evidence is found of a sequencing in privatization according to the performance of firms before privatization.

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## 1 Introduction

Most studies on the outcomes of privatization in transition countries focus on the impact that ownership structure has on firm performance and on indices of restructuring. Brown et al. (2006) find that the effect of privatization on productivity is large and positive in Hungary and Romania, but small or even negative in Ukraine and Russia. Only privatization by foreign investors had large positive effects in all four countries under investigation. Furthermore, Djankov and Murrell (2002), conducting a meta-analysis of a large number of studies on the subject, came to the conclusion that privatization by outsiders is associated with the largest restructuring gains, while privatization by workers has no effect in Central and Eastern Europe and is detrimental in the CIS. In this type of studies, performance is the dependent variable which is explained by a variety of factors, among them ownership.

Equally important, yet less investigated, are the following questions: What determines the choice of inclusion of firms in the privatization program, what determines the privatization option that a firm chooses, and, last but not least, what determines the distribution of ownership and its change over time? In this study, we address these questions. In particular, we aim to explain the ownership structure using as explanatory variables the pre-privatization characteristics of the firm.

Privatization is a unique opportunity for overcoming the problem of endogeneity in the relation between company performance and ownership structure. Usually the causation between both variables runs in both directions, but in our situation, where all industrial assets were state-owned before, pre-privatization performance (the quality of the firm) exogenously determines the post-privatization ownership structure.

We concentrate on the case of Russia, both because of the importance of Russia as a country and because lessons for other countries can be learned from the failure of the Russian privatization policy to

promote restructuring of old state enterprises, which was one of the main goals of economic reform in transition countries. To give an example of why our research question is an interesting one, we might ask why the Russian mass privatization program gave such huge benefits to firm insiders to purchase shares instead of using vouchers more broadly for all citizens. The answer is two-fold. First, insider privatization aimed to legalize the previous spontaneous privatization where, for example, directors of state-owned firms had established related private companies to siphon off profits or had simply started the physical transfer of assets to these newly founded companies. Second, insider ownership was seen as an insurance against unemployment. While the first hypothesis is difficult to test directly, we find indirect evidence for the second hypothesis: employees choose the privatization option which facilitates outsider ownership less often when a firm is in financial distress, thereby trying to avoid job losses associated with restructuring.

We investigate two dimensions of the ownership structure: the types of owners and the concentration of ownership. As for the types of owners, we distinguish between all private (non-state) owners, insiders (disaggregated into workers and managers) and outsiders. We find a high degree of insider ownership at the end of the mass privatization program in 1994. We also document the changes in ownership structure in Russian enterprises between 1994 and 1999. Contrary to the hope of the designers of the privatization program, secondary markets did not lead to a fast ownership transfer to outside owners who are presumed to be more efficient. The initial distribution of corporate ownership after privatization was mainly influenced by privatization policy, and by the absence of effective legal rules regulating the relations between minority, majority shareholders and managers. However, we still observe a considerable variety of ownership patterns in Russian firms given this common environment.

We estimate the determinants of:

- the decision whether to privatize a firm or not
- the choice among different privatization options that to some extent predetermined the ownership structure,
- the initial ownership distribution after the end of the mass privatization program and
- the ownership change between 1994 and 1999.

We find that the decision to privatize was positively associated with firm size and two measures of pre-privatization performance: labor productivity and average wages. Firms with relatively high expenses for social benefits to employees were less likely to be privatized, both before 1994 and before 1999. In deciding on the privatization option, wage arrears led employees to choose less frequently an option that would have given more scope for outside ownership. Our interpretation is that the decision of insiders to acquire shares was driven by their motivation to insure against unemployment, a more likely event in a firm in financial distress. As for the ownership stakes, the ability to collude among workers (as measured by the degree of unionization) matters in the decision to sell shares to outsiders and affects positively the share of workers. We also find that insiders hold smaller stakes in large firms, presumably because they do not have the necessary funds to acquire shares beyond what they are assigned in the privatization program on highly-preferential terms. Furthermore, insiders may be unable to raise the necessary funds for the restructuring of large firms. Managers are found to increase their stake more in firms with wage arrears. This is in line with anecdotal evidence that managers purposely accumulated wage arrears in order to force workers to sell them their shares. We do not find evidence either that insiders are able to acquire the best-performing firms, or that sequencing in privatization according to the pre-privatization performance of firms occurs.

Apart from the empirical results, this paper contributes to the literature in several ways:

1. The object of our study is the reverse causality going from a firm's characteristics, including pre-privatization performance, to the likelihood of privatization and the firm's ownership structure. This important issue was neglected in some of the existing literature on the impact of privatization. Our approach contributes to address the problem of endogeneity of the ownership structure when its effect on firm performance is investigated.
2. A part of the hypotheses for our empirical research is derived from a theoretical model on ownership change under conditions of insider ownership by Aghion and Blanchard (1998). To our knowledge, our paper is the first direct test of the predictions of this model.
3. The quality and size of the data set are unique. We use a comprehensive data set of 530 Russian manufacturing firms that is representative of the whole industrial sector of the Russian economy. All information on ownership is available at two points in time: mid-1994, right after the end of the mass privatization program, and at the beginning of 1999. The survey contains rich panel data on all the main characteristics of the firm.
4. Our estimation methodology for the determinants of ownership stakes uses a two-limit tobit model with selection due to the privatization decision. That is a non-standard model and has not been applied in this context before. The model is able to account both for the peculiarity of the ownership variables and the sequence of stages in the privatization process.

In the following section we review the theoretical and empirical literature on the choice of the ownership structure of a firm. This literature motivates a part of our hypotheses for the empirical research. Section 3 gives an overview of the institutional features of the Russian privatization program. Section 4 describes the sample properties, provides descriptive statistics for the ownership variables, and describes

the econometric methodology. In section 5, we derive the hypotheses that we want to test, and the empirical results are given in section 6. Section 7 concludes.

## 2 Related Literature

A good starting point for the analysis is the seminal paper by Demsetz and Lehn (1985) who argue that ownership structure is the result of shareholders' optimal decisions and the outcome of market forces in the market for corporate control. It needs therefore to be treated as an endogenous variable in the ownership - performance relationship.

Admati et al. (1994) and DeMarzo and Urošević (2006) analyze ownership choices of a large shareholder. Ownership distribution is the result of the trade-off between the need for diversification on the part of the large shareholder and efficiency gains when the large shareholder manages or monitors the firm. In the latter model the large shareholder diversifies his or her stake over time. This result can be modified if one assumes in addition that the large shareholder enjoys private benefits of control. If these are large enough, they can lead to an increase in the stake of the large shareholder (Edelstein et al., 2005).

Aghion and Blanchard (1998) provide a model that is more specific to the situation of post-privatization firm that we are considering. The authors derive conditions for the resale of shares once firms have been privatized to company insiders as was the case in Russia. The main assumption is that outsider ownership facilitates restructuring and raises output per worker. However, restructuring leads to layoffs for a proportion of the workforce.

The model predicts that, using reasonable assumptions, insider ownership will be persistent. Insider ownership is essentially insurance for workers and managers against becoming unemployed. Higher reservation wages (unemployment benefits and the presence of other potential employers) make a transfer of control more likely. If workers are able to collude in the decision to sell their shares, they will demand

a higher price since they internalize the probability of becoming unemployed. That makes the control transfer less likely. However, there is a certain mobility of workers across firms, especially into the new sectors such as services (see Brown and Earle, 2003). There are two factors why nevertheless worker mobility did not lead to larger reductions in insider ownership: the general illiquidity of the equity markets, and the ability of managers to obstruct share sales to outsiders (Filatotchev et al., 1999a).

Empirical studies on the ownership - performance relation face problems of endogeneity of different types. Demsetz and Villalonga (2001) provide a survey of the earlier literature on the performance effects of ownership, and estimate this relation using instrumental variables in order to control for the simultaneity between ownership and performance. They find no systematic effect of ownership concentration on firm performance. (Himmelberg et al., 1999) focus on the problem of unobserved heterogeneity among firms, and use panel data models and instrumental variables to estimate the effect of managerial ownership on performance. This work does not find any systematic effect either.

Numerous studies have been dedicated to the question of how privatization and various dimensions of the ownership structure of privatized enterprises affect firm performance in transition countries.<sup>1</sup> In many cases, these studies do establish systematic effects of ownership. Djankov and Murrell (2002) and Estrin et al. (2009) provide comprehensive surveys of this literature. In the case of Russia, Earle and Estrin (1997) and Earle (1998) have found that managerial ownership, ownership of investment funds and concentrated outsider shareholdings have a positive impact on performance. Kuznetsov and Muravyev (2001) use a sample of Russian blue chip companies and find no consistent effects of the categories of owners on performance. Interestingly, ownership concentration increases technical efficiency but this is not

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<sup>1</sup>See Carlin et al. (2001), Angelucci et al. (2002), Barberis et al. (1996), Jones (1998), Frydam et al. (1999), Grosfeld and Tressel (2002), Brown et al. (2006), Hanousek et al. (2007) and Gorodnichenko and Grygorenko (2008), to name a few.



reflected in higher profitability and market valuation of those companies, suggesting that large shareholders extract private benefits of control. Guriev and Rachinsky (2005) find that productivity growth in firms owned by oligarchs<sup>2</sup> is higher than in firms owned by other private domestic owners. Positive productivity effects are also found by Gorodnichenko and Grygorenko (2008) for the case of Ukraine.<sup>3</sup>

In our paper, we concentrate on the reverse causation and do a more careful analysis of what determines ownership structures after privatization. A good starting point for this empirical analysis is the seminal study of Demsetz and Lehn (1985). It investigates empirically systematic variations in the concentration of ownership of U.S. corporations and considers firm size (the need for diversification), potential gains obtained from control, systematic regulation and the amenity value of output to owners.

Earle and Estrin (1997) extend significantly this set of explanatory variables, taking into account the specific environment after privatization in Russia. The paper does not only look at ownership concentration, but also at the type of owners, suggesting that different types of owners have different objectives and budget constraints that make a particular firm more or less attractive to them. In our empirical analysis, we draw upon their hypotheses for possible determinants of the ownership structure. We extend the set of possible determinants and improve the estimation methodology.

Bishop et al. (2002) investigate the determinants of the post-privatization ownership structure in Hungary and find for example that exporting firms and larger firms are more likely to be acquired by foreign owners. Grosfeld and Hashi (2007) analyze two sets of firm-level data for Poland and the Czech Republic. While past performance did not affect ownership concentration in Poland, good performance led

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<sup>2</sup>Oligarchs are the 22 largest private domestic owners in terms of sales and employment of the companies under their control.

<sup>3</sup>They provide a detailed first-stage estimation for the determinants of oligarch ownership. It turns out that the capital stock and volume of sales are positive predictors of ownership by oligarchs.

to an increase in ownership concentration in the Czech Republic. This is arguably due to the motivation of large investors to extract value from these firms, and the absence of regulations that could prevent this from happening. Both studies, however, do not use full information contained in the reported ownership stakes.<sup>4</sup> Jones and Mygind (1999) study the determinants of ownership after privatization in Estonia. They observe a high degree of inertia in ownership distribution. They also find that big and capital intensive firms are more likely to be owned by outsiders and that that economic performance is not a decisive factor for ownership. They apply a tobit model similar to our study. However, they do not control for sample selection in the process of privatization.

### 3 The Privatization Process in Russia

The process of privatization is with no doubt the main determinant of the current distribution of ownership in Russia. During the *perestroika* era, especially between 1989 and 1991, control of the branch ministries over the enterprises ceased and gave rise to incidents of spontaneous privatization. In 1989, employees were given the opportunity to lease the assets of state enterprises with the right of a later buyout. In our sample, 16 per cent of firms were finally privatized by a lease-buyout, which usually resulted in 100 per cent insider (employee) ownership. This early method of privatization was stopped when the mass privatization program started.

In the mass privatization program from the end of 1992 until mid-1994, virtually all small enterprises and approximately 15.000 out of 24.000 medium and large enterprises were transferred into private ownership.<sup>5</sup> The program, however, was conducted in a politically

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<sup>4</sup>Bishop et al. (2002) use logit and multinomial logit regressions for five categorical variables based on the ownership stakes of domestic and foreign owners, and Grosfeld and Hashi (2007) use probit regressions for the event that the stake of the largest shareholder increases and for the existence of a large shareholder.

<sup>5</sup>For more details on the Russian privatization program see Frydman et al.

highly unstable period with changing governments, a tremendous fall in real output and high inflation. After price and foreign trade liberalization in January 1992, neither macroeconomic stability nor financial discipline at the enterprise level was achieved. The design of the privatization program for medium and large firms, which form the major part of the industrial sector, was mainly influenced by a strong preference for rapid privatization by the reform government and by the interests of enterprise insiders and the industrial lobby.

We can divide the privatization process into three stages: the decision to privatize, the choice of a privatization option, and tenders, auctions and first secondary sales.

*Stage 1:* The privatization law either mandated or prohibited the privatization of a particular firm, or left the decision to the privatization agency and the employees. For certain sectors, such as a part of the military-industrial complex, natural resources and public utilities, privatization was either postponed or needed a special government approval.<sup>6</sup> The privatization plan developed by every firm to be privatized established the envisaged proportions of shares to be offered to various potential investors. After approval of the plan by the State Property Committee (*Goskomimushchestvo*) or its regional offices the firms were corporatized, i.e. transformed into open joint-stock companies, at this stage still state-owned. The charter capital of enterprises was calculated as the book value of assets other than land, net of outstanding debt. That implied that the prices which had to be paid by employees for shares were very low in real terms due to the extremely high inflation in 1992 and the following two years.

*Stage 2:* Employees then had to vote with a two-thirds majority on one of the three following options for privatizations that the privatization law offered to enterprise insiders<sup>7</sup>:

- Option 1: 25 percent of the shares were transferred for free to

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(1993), Boycko et al. (1995), Blasi et al. (1997) and Hare and Muravyev (2003). For a critical review of the Russian privatization see Black et al. (2000).

<sup>6</sup>See Sprenger (2002) for a short summary of privatization in these sectors.

<sup>7</sup>When no vote was achieved, option 1 was the default.

workers and managers as non-voting shares. A further 10 per cent were sold to employees as voting shares with a 30 per cent discount of the nominal price. Senior managers could purchase an additional 5 per cent of shares.

- Option 2: Workers and managers received up to 51 per cent of the shares at a price 1.7 times the nominal value.
- Option 3 offered the sale of 20 per cent of shares at the nominal price to a managing group proposing a one-year restructuring plan, upon completion of this plan. A further 20 per cent could be purchased by all employees with a 30 per cent discount of the nominal price.

*Stage 3:* The voucher component of the privatization program envisaged that for no less than 29 per cent of shares, voucher auctions had to be held. Vouchers were distributed to all citizens at a low fee and were tradable from the beginning, also for cash. But since reliable information about investment opportunities was scarce, vouchers brought very little value to the vast majority of citizens. A large number of vouchers were used by employees to increase their holdings in their own firms. Fewer were put into voucher investment funds in exchange for shares of these funds. In our sample, investment funds obtained shares in 7.5 per cent of the enterprises, but their average share was very small at 1.3 per cent<sup>8</sup>. The remaining state shares in the firms, typically between 10 and 20 per cent, were sold at cash auctions or investment tenders. Later privatization steps included the loans-for-shares scheme in 1995<sup>9</sup> and case-by-case privatization, regulated by a new privatization law since 1997.

The ownership structures in Russian firms resulting from privatization are reported in the next section. We use our data set as one

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<sup>8</sup>The numbers for 1999 are 12.5 and 2.5 per cent.

<sup>9</sup>The loans-for-shares scheme was probably the most criticized part of privatization in Russia; it gave rise for some of the largest bank-led financial-industrial groups in Russia.

of the best available sources since there are no official statistics about ownership for the whole industrial sector.<sup>10</sup>

## 4 Data and Estimation Strategy

### 4.1 Sample Description

The sample contains 530 Russian manufacturing manufacturing firms. The firms surveyed were selected on the basis of the reported employers of employee-respondents in the Russian Longitudinal Monitoring Survey, a nationwide household survey stratified across 32 regions of the Russian Federation, and by the number of employees. This sampling strategy provided a probability sample of the Russian industrial sector, which matches the official statistics reasonably well.<sup>11</sup>

The survey was conducted between the spring of 1999 and the fall of 2000. Both a representative of the top management and the chief accountant were interviewed. Much of the quantitative information collected by the survey, such as employment data, output, profits, capital, wages, sales, costs and investment relies on standardized accounting principles of the State Statistical Committee of Russia (*Goskomstat*). It is completed with information on the history of the firm, e.g. the founders, major re-organizations, changes in the top management, privatization, ownership structure, labor relations, and distribution of sales and payments.

Since our interest is in the privatization process, we exclude firms that were founded from scratch after 1986, the beginning of *perestroika* in Russia. We report summary statistics for the remaining sample noting that genuinely new firms are a very small part of industrial enterprises in Russia. In our sample, we are left with 497 out of 530 firms. We keep, however, firms in the sample that were not

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<sup>10</sup>The Goskomstat Industrial Registry merely classifies firms into private, state-owned, and firms with mixed ownership.

<sup>11</sup>More details of the sampling and sample representativeness are available from the author on request.

privatized because we are interested in the determinants that drive the privatization decision, too.

The enterprise data set we use is unique in its sample size, representativeness, the number of firm characteristics included and the time period encompassed. It contains data for privatized, non-privatized and newly-founded firms. The quality of survey data essentially depends on the weakest link in a chain of the design of the questionnaire, sampling, fieldwork, data entry, checking and cleaning. The questionnaire underwent several stages of pilot testing, interviewers from the regions were trained and monitored by the participating researchers, and data was double-entered. The author could observe the process of data collection and participated in checking for inconsistencies in the data, preparing the re-interviewing of selected firms and in data cleaning. It should be stressed that the ownership and privatization information was given high priority in the survey.

## 4.2 Summary Statistics for Ownership Variables

The variables of main interest in this paper are the date and form of privatization and the resulting distribution of ownership. To establish the ownership structure of Russian companies we consider the following groups of owners: the state, insiders and outsiders of the firm. The state share is disaggregated into federal, regional and municipal state share. As for insiders, we consider managers and workers separately. Outsiders are disaggregated into domestic legal entities, domestic outside individuals and foreign owners. When we investigate the determinants of the ownership stakes of different groups of owners, we concentrate on private ownership, insider ownership disaggregated into managerial and worker ownership and on outsider ownership. Concentration of ownership is measured by the share of a large shareholder, whom we define as a single outside owner with a stake of at least five per cent. The distribution of ownership is observed at two points in time: July 1, 1994 and January 1, 1999.

Table 1 shows statistics on the date and method of privatization. Out of 487 firms in the sample that provided information on the fact

of privatization, 409 (84.0 per cent) were privatized by the date of the survey (1999/2000). We define a firm as privatized when a majority stake has passed into private hands. The median date of privatization was May 1993 for the whole sample, July 1993 for firms participating in the mass privatization program, and July 1992 for lease-buyout privatizations. The most frequent privatization option was option 2 which guaranteed majority insider ownership (46.5 per cent of the firms).

Table 2 shows the evolution of ownership across types of owners from 1994 to 1999. Right after the end of the mass privatization program in July 1994, the state still owned about one third of industrial assets in Russia. Nearly a half was owned by managers and workers. During the next four and a half years, the average stake of the state decreased 9 percent. At the same time insider ownership decreased 5.4 percent. The decrease in insider ownership is entirely due to the decreasing stakes owned by workers. In contrast, managers increased their stake 2.4 percent on average. Outside ownership also increased, especially holdings of domestic legal entities. The stake of foreigners increased from 1.4 to 3.2 per cent. The table shows also shows differences in the ownership structure depending on which privatization option was chosen in a firm. Lease-buyout has led to significantly higher ownership stakes of managers and workers than options 1 and 2 of the mass privatization program. There are only minor differences between options 1 and 2: State ownership is somewhat lower under option 1, insider ownership is somewhat higher, and any differences in the stakes of outsiders and large outside shareholders are small.

Table 3 looks at large outside shareholders (with a stake of at least five per cent). The fraction of firms with such owners rose considerably from 26.6 to 52.5 per cent between 1994 and 1999. An outside shareholder can be a legal entity of private law, but still controlled by the state. Therefore, we also calculate the average stake of large privately-controlled outside shareholders. Both increased significantly. The same is true for the stakes of the single largest shareholder. In sum, this evidence suggests that ownership concentration increased

between 1994 and 1999.

Figure 1 displays histograms of insider and outsider stakes and their change between 1994 and 1999. We see that insider ownership peaks at 0, 100 and around 50 per cent. Zero per cent insider ownership corresponds either to non-privatized firms or to full outsider ownership. Full insider ownership was often the result of lease-buyouts, or option 2 privatizations with subsequent share purchases by insiders. The particular distribution of ownership variables is important for the estimation methodology (see section 4.3). The changes in ownership stakes peak at zero, suggesting a high persistence in ownership structures.

### 4.3 Data Treatment and Estimation Methods

The empirical model has the general form

$$Y_i^* = \beta_0 + \sum_{j=1}^J \beta_j X_{ij} + u_i = X_i' \beta + u_i \quad (1)$$

where  $Y_i^*$  is a latent variable in limited-dependent variable models of various types. The actual observed dependent variable is either

- binary, i.e. equal to one if the firm was privatized and zero if not,
- an index of the chosen privatization option, or
- the ownership stake of a particular group of owners in firm  $i = 1, 2, \dots, N$ ,
- the change in this ownership between 1994 and 1999.<sup>12</sup>

The vector  $X_i = \{X_{ij}\}$ ,  $j = 1, 2, \dots, J$  describes a firm's characteristics prior to privatization.

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<sup>12</sup>In the latter case, no latent variable is needed, i.e.  $Y_i^* = Y_i$ . See the last paragraph of this section.



The characteristics of the different dependent variables imply the use of different estimation techniques. In the first case, the decision whether to privatize a firm or not, a logit model is used. In the second case, determinants of the choice of a particular privatization option are estimated using a multinomial logit model with four alternatives. For the determinants of the ownership stakes we use a less common estimation method which shall be described next. The special distributional characteristics of the ownership stakes of the various types of owners rule out the use of ordinary least squares regressions. The ownership stakes are continuous variables that range from zero to 100 per cent ownership, but realizations at the two limit points are particularly frequent. For example, a lease-buyout privatization has often led to 100 per cent insider ownership (and therefore zero per cent outside ownership). Such a pattern is best accounted for by a two-limit tobit model with censoring in the ownership stake. The underlying latent variable can be interpreted as the desired ownership stake by a particular group of owners.<sup>13</sup>

In addition, observations with zero ownership stakes are often due to the fact that these firms were not privatized by the date under consideration, July 1, 1994. If we analyze only privatized firms, our sample would not be random any more and the results would be biased. A model structure that integrates both stages, the privatization decision and the extent of ownership by a particular type of owner within its natural limits, is a tobit model with selection.<sup>14</sup> This kind of model is not treated in econometric textbooks. However, a similar model with continuous variables at both stages, called a nested tobit model, was proposed by Lee (1992) and applied by Howe et al. (1994) for the analysis of contingent valuation surveys for public goods.

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<sup>13</sup>With this interpretation, the latent variable could take values lower than zero and higher than 100 per cent when agents wish to short-sell enterprise shares.

<sup>14</sup>The tobit model was applied in the context of ownership regressions by Smith et al. (1997) and Jones and Mygind (1999), but without correcting for sample selection stemming from the privatization decision.

For our purpose, the model structure is the following:

$$D_i = \begin{cases} 1 & \text{if } Z_i'\delta + \varepsilon_i > 0 \\ 0 & \text{if } Z_i'\delta + \varepsilon_i \leq 0 \end{cases} \quad (2)$$

where  $D_i$  is a dummy equal to one if the firm was privatized by July 1, 1994 and equal to zero if not. The vector  $Z_i = \{Z_{ik}\}$ ,  $k = 1, 2, \dots, K$  lists the variables which explain the privatization decision. The ownership stake  $Y_i$  is defined in terms of the latent variable  $Y_i^*$ :

$$Y_i = \begin{cases} 100 & \text{if } Y_i^* \geq 100 \text{ and } D_i = 1 \\ Y_i^* & \text{if } 0 < Y_i^* < 100 \text{ and } D_i = 1 \\ 0 & \text{if } (Y_i^* \leq 0 \text{ and } D_i = 1) \text{ or } D_i = 0 \end{cases}$$

That is, the observed ownership stake is 100 if the latent variable (the desired ownership stake) is greater than or equal to 100 and the firm was privatized. It is equal to the latent variable if the latter is between 0 and 100 and the firm was privatized. Finally, the observed ownership stake is zero if the latent variable is either smaller than or equal to zero and the firm was privatized, or if the firm was not privatized.

The error terms from equations (1) and (2),  $u_i$  and  $\varepsilon_i$ , are assumed to have zero means and to be jointly normally distributed with a covariance matrix  $\begin{pmatrix} \sigma_u^2 & \rho\sigma_u \\ \rho\sigma_u & 1 \end{pmatrix}$ .

Let us define the following indicator functions:

$$I_i = \begin{cases} 1 & \text{if } Y_i^* > 0 \\ 0 & \text{if } Y_i^* \leq 0 \end{cases}$$

$$J_i = \begin{cases} 0 & \text{if } Y_i^* < 100 \\ 1 & \text{if } Y_i^* \geq 100 \end{cases}$$

The log-likelihood function is then given by

$$\begin{aligned}
\ln L = & \sum_{i=1}^N \left\{ (1 - D_i) \ln (1 - \Phi_1 (Z_i' \delta)) \right. \\
& + D_i \left[ (1 - I_i) \ln \Phi_2 \left( Z_i' \delta, -\frac{X_i' \beta}{\sigma_u}; \rho \right) \right. \\
& + I_i J_i \ln \left( \frac{1}{\sigma_u} \phi \left( \frac{Y_i - X_i' \beta}{\sigma_u} \right) \Phi_1 \left( \frac{Z_i' \delta + \rho \frac{Y_i - X_i' \beta}{\sigma_u}}{\sqrt{1 - \rho^2}} \right) \right) \\
& \left. \left. + (1 - J_i) \ln \Phi_2 \left( Z_i' \delta, \frac{X_i' \beta - 100}{\sigma_u}; \rho \right) \right] \right\} \quad (3)
\end{aligned}$$

where  $\phi(\cdot)$  is the density function of the normal distribution,  $\Phi_1(\cdot)$  is the cumulative distribution function (cdf) of the univariate standard normal, and  $\Phi_2(\cdot, \cdot; \rho)$  is the cdf of the bivariate standard normal with the correlation coefficient  $\rho$ . Note that this model nests the tobit model as a special case where  $\rho = 0$ .<sup>15</sup>

For estimating this model we use a Stata d2-evaluator, for which the log-likelihood function and algebraic expressions for its first and second partial derivatives are specified. In terms of the estimation procedure, the model thus consists of four equations, one for the ownership stake, one for the selection (i.e. the privatization decision), one for  $\sigma_u$ , and one for  $\rho$ , the correlation coefficient between  $u_i$  and  $\varepsilon_i$ . Even with the input of the first and second partial derivatives, the likelihood function does not converge easily to a maximum when  $\rho$  is a free parameter. Therefore, we first maximize the likelihood for fixed  $\rho$ . We repeat this for a discrete grid of  $\rho$ 's in the interval (-1,1), choose the estimation with the highest log likelihood, and use these coefficients

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<sup>15</sup>This is the case where the privatization decision and the choice of the ownership stake are independent. For the sake of comparison, the results of the simple tobit model are also reported. See section 6.

as initial values for the unrestricted likelihood estimation.<sup>16</sup>

For all estimations, we look first at regressions that include the full set of explanatory variables. Then we reduce the number of variables included in order to deal with possible problems of multicollinearity, especially within groups of variables that capture a common concept such as quality, attractiveness to the state etc. (see section 5 and the correlation matrix in Table 6). This allows us to use observations for which the dropped variables are missing. For a parsimonious formulation of the logit and multinomial logit models, we only keep explanatory variables that are significant at the 10 per cent level, except for the size, region and industry controls which are always included. If several such models are found we choose the one with the lowest value of the Bayesian and Akaike information criteria.

Getting a parsimonious specification for the tobit model with selection is more cumbersome since the model includes two equations and two scalars which have to be estimated. To avoid problems of multicollinearity, we use for the selection equation only the variables of the parsimonious formulation of the logit model for privatization by 1994 (see Table 8, columns 4 and 5). In several robustness checks we also use alternative formulations of the selection equation.<sup>17</sup> The qualitative findings change only in a few cases, which we report in section 6. For the equation of the ownership stake, we proceed as before, keeping only variables that are significant at the 10 per cent level, plus the controls.

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<sup>16</sup>It turns out that the value of  $\rho$  that maximizes the likelihood functions is always at the upper boundary of the interval.

<sup>17</sup>In particular, we include also variables that become significant in the selection equation if we include all variables in both equations for any type of owners: this adds wage arrears and union membership in 1992 to the equation. We also use a different model for privatization with significant variables only but a higher value of the information criteria. This model uses more observations and includes the dummy variable for military-industrial complex, price controls and average wage. In addition, we look at the union of these two sets of variables and the full set of variables in the selection equation.

Finally, for the determinants of the change in ownership stakes we apply simple OLS regressions. Neither sample selection nor a limited-dependent variable are an issue here (see Figure 1 for the distributions of the change in insider and outsider ownership).

## 5 Hypotheses for the Determinants of Ownership

In this section, we derive hypotheses for the empirical analysis of the choice of ownership structure. The goal is to analyze how firm characteristics prior to privatization affect four types of outcomes:

1. Privatization (the binary decision whether to privatize a firm or not),
2. The Privatization option (the choice of one of the privatization options of the mass privatization program, a lease-buyout, and other options, see section 3),
3. The initial distribution of ownership stakes among types of owners and ownership concentration,
4. The change in ownership structure between 1994 and 1999.

In the estimations for outcomes 3 and 4 we consider the following categories of owners: all private owners (the complement to state ownership at all levels), insiders – as a group as well as disaggregated into managers and workers, and outsiders.<sup>18</sup> Ownership concentration is measured by the stake of all private large shareholders, i.e. those who hold more than 5 per cent of the shares, and are themselves controlled by individuals or private (non-state) entities. In each of the econometric models, we include the following groups of explanatory variables:

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<sup>18</sup>We do not consider state ownership at different levels and different types of outside owners (see section 4.2 for descriptive statistics). In particular, there are not enough firms with foreign ownership to use them for estimations.

1. Measures of firm quality (in order to determine whether initially better performing firms were privatized earlier or later, by different schemes, and whether they went to particular types of owners),
2. Variables that measure how attractive a particular firm is to the state vs. private owners,
3. Variables that measure how attractive a particular firm is to outsiders vs. insiders of the firm (i.e. managers and workers), and
4. Control variables for firm size, region and industry.

The definitions summary statistics of all employed explanatory variables are listed in Tables 4 and 5. In the choice of explanatory variables we follow and extend the framework of Earle and Estrin (1997). In the models for privatization, option choice and initial ownership distribution we use explanatory variables prior to privatization, typically for 1990, 1991 or 1992.<sup>19</sup> For the models of ownership change, we use explanatory variables for 1994. In the rest of this section we discuss the hypotheses leading to the inclusion of these variables in detail. The expected effects are summarized in Table 7.

### 5.1 Firm quality (performance)

In the more recent literature on the relation between ownership structure and performance the issue of endogeneity plays a prominent role (see for example Demsetz and Villalonga (2001), Hanousek et al. (2007) and Gorodnichenko and Grygorenko (2008)). It is found that ownership is not an exogenous factor explaining performance, and that previous performance is not an exogenous factor explaining ownership

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<sup>19</sup>There are a few exceptions due to data availability. See the note below Table 4. One of the exceptions is the fraction of capital costs in total costs, which is only available for 1994 and 1998. However, the numbers for the fraction of capital costs do not differ much between the two years.

structure, and it is not easy to find good instruments to overcome this endogeneity problem. Our approach to study determinants of ownership structure for post-privatization firms makes previous performance an exogenous factor since all firms were state-owned prior to privatization. Therefore, performance prior to privatization could not be affected by the ownership structure. One might argue that prospective owners make their decision to acquire stakes in a particular firm based on expectations about future performance. Since expectations are not observed, yet they are correlated with performance prior to privatization, this might create a potential problem of endogeneity. However, this is unlikely to affect our results since, as pointed out above, the privatization was conducted in a highly unstable and unpredictable environment. We believe therefore that not pre-privatization performance, but at most industry affiliation and perhaps the size of a firm could be predictors of future performance.

We use several measures for firm quality. First, we include the logarithm of accounting pre-tax profits per employee. Since accounting profits are not very reliable data, we also use the logarithm of productivity (sales per employee) and more indirect measures for quality, such as the share of exports in total sales<sup>20</sup>, the proportion of new equipment<sup>21</sup>, and the level of wages. A measure that should be negatively related to performance is the amount of wage arrears. Wage arrears, i.e. non-payment or late payment of wages were a widespread phenomenon in Russia since 1992, decreasing only after the financial crisis in 1998. The main reasons were the overall decline of the economy with the associated liquidity problems, and the poor monitoring of managerial behavior (see Earle and Sabirianova, 2002). Workers often accepted wage arrears since they had only few outside opportunities and benefited from non-wage compensation (e.g. social benefits, payments in kind). We measure wage arrears as multiples of the monthly wage funds of a firm.

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<sup>20</sup>Firms that are able to compete on world markets are assumed to be of better quality.

<sup>21</sup>New equipment refers to equipment that was less than four years old in 1990.

At first glance, all groups of owners should be equally interested in better performing firms. But some groups of owners, especially managers, may be able to pick better firms due to some private information. Workers and the state, in contrast, can be expected then to hold holding shares in worse-performing firms. The reason is that they have a special interest in job security. Since layoffs are more likely in worse-performing firms they might hold shares in order to prevent labor-reducing restructuring. We are able to test another hypothesis concerning the stake of managers, put forward for example by Zhuravskaya (2007, p. 134), namely that managers accumulated wage arrears in order to subsequently force workers to sell their shares to them. By reason of these arguments, we expect a positive sign for profits, export share, new equipment and wages in the estimations for managerial and private ownership (as the complement to state ownership), and a negative sign for worker ownership. The sign of wage arrears is expected to be positive for workers and negative for private owners, but it is ambiguous for managers since "cherry picking" and buying out workers through wage arrears point in opposite directions.

## 5.2 Attractiveness to the state vs. private owners

In the privatization process, the state was represented by governments, state property committees and property funds at the federal and regional levels. We hypothesize that the state has a special interest in the control of companies connected to the military and therefore wants to retain a stake in these firms. We include a dummy variable for a firm being part of the military-industrial complex, and expect a smaller stake of private owners in such companies. Alternatively, private owners might be reluctant to acquire stakes in such companies, which leads to the same negative relation. The reason is that private owners might have expected firms of the military-industrial complex to perform worse than other firms in the future.<sup>22</sup>

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<sup>22</sup>Firms of the military-industrial complex had significantly lower productivity than non-military firms in 1991. The same applies to profits in 1992. Since both



We expect also a greater state interest in firms that serve the government as a supplier or that are subject to regulation. We include the fraction of sales to government agencies and the fraction of sales that are subject to price controls. Demsetz and Lehn (1985) argue that systematic regulation might reduce the benefits of control. We could therefore expect price controls to have a negative effect on ownership concentration, i.e. the stake of large outside shareholders.<sup>23</sup>

All variables capturing the interests of the state should affect the likelihood of a firm being privatized negatively because the state at its different levels had major decision rights in the privatization process.

### 5.3 Attractiveness to outsiders vs. insiders

It is often argued that the need for diversification on the part of investors leads to smaller stakes<sup>24</sup>. Hence, ownership should be less concentrated in large firms. However, Demsetz and Lehn (1985) argue that the size of a firm can be thought of as a proxy for the complexity of the firm, which implies higher potential gains from control. Following this argument, a large firm would be more attractive to large outside shareholders. We measure size by the logarithm of the number of employees.<sup>25</sup> The diversification effect of size would reduce the stake of large shareholders, while the complexity effect would increase them.

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productivity and profits are included in the model, the coefficient of the dummy variable would measure expectations of future performance that go beyond the difference in current performance.

<sup>23</sup>Demsetz and Lehn (1985) also consider firm-specific uncertainty as an indicator of the control potential of a firm. However, in an economy with high aggregate uncertainty, industrial decline and the disruption of supply chains it is difficult to come up with good measures of firm-specific uncertainty. In particular, measures of past variability in sales or profits are unlikely to be good measures.

<sup>24</sup>For example, see DeMarzo and Urošević (2006) for a dynamic model incorporating this effect, and references therein.

<sup>25</sup>Sales would be an alternative measure of size. We include it by defining our productivity measure as the log difference between sales and the number of employees.

We hypothesize that insiders are more cash-constrained than outsiders. Consequently, the cost of the firm's shares should matter in the decision to acquire them, especially for workers, but possibly also for managers. The price of shares to be privatized to company insiders was calculated on the basis of the book value of assets others than land net of outstanding debt in January 1992. The capital-labor ratio (using the book value of capital at the beginning of 1992) should therefore be a good proxy for the cost of a share. Due to the high inflation in 1992, these prices were very low in real terms at the moment of privatization. Alternative measures for capital intensity and thus costliness are the fraction of new equipment and the share of capital costs in total costs. We would thus expect a negative effect of capital-labor ratio, new equipment and capital costs on worker ownership and, to a lesser degree, on managerial ownership.

In addition, capital intensity, together with size, can be a proxy for the financing needs of a firm. In Russia, debt finance was virtually not available to firms at the time of mass privatization – in part due to the lack of collateral (land could not be transferred) and in part due to deficiencies of the banking system. This leaves retained earnings and outside equity as alternative sources of finance. Although privatization by an outside owners did not generate any funds for the firm (the proceeds went to the government), the existence of outside owners could facilitate access to external funds, possibly within some of the emerging financial-industrial groups. Most likely, a large or capital-intensive ex-socialist enterprise could be run on an efficient scale if it had access to external funds. A firm with higher financing needs could thus be expected to attract more outside owners. In sum, we expect a positive effect of firm size, capital-labor ratio, new equipment and capital costs on outside ownership, in particular on the stake of large outside shareholders.

The complement to the costs of obtaining shares is the ability of insiders to acquire shares, which is measured by the average wage. We expect a positive sign in the estimation for worker ownership. Wage arrears, however, could reduce workers' ability to pay for shares. We

can also assess certain anecdotal evidence that managers deliberately accumulated wage arrears in order to force (cash-constrained) workers to sell their shares to them. This would imply a negative effect of the amount of wage arrears on the stake of workers and a positive effect on the stake of managers. In addition, we know from anecdotal evidence that often retained earnings were used for the purchases of shares by insiders. Thus, profits should also serve as a proxy for the ability to pay with positive expected sign for the stakes of managers and, to a lesser degree, of workers.

Sustaining employee ownership may be more difficult when the interests of insiders are not closely aligned. This argument relates to the result of Aghion and Blanchard (1998) that a resale to outsiders is less likely when workers collude, implying a higher stake of insiders on average. We have two proxies for the ability to collude: unionization<sup>26</sup> and the heterogeneity of the workforce measured by the ratio of wages of white-collar (non-production) employees to production workers. A higher wage ratio should decrease the share of insiders, while unionization is expected to have a positive effect on the stake of insiders, in particular of workers. The opposite should hold for outsiders.

The Aghion and Blanchard model also predicts that higher reservation wages would make workers more inclined to sell their shares. We include the average wage in the same region and industry, as well as a measure for the concentration of local labor demand. The latter influences the outside opportunities of managers and workers to find a job in another local firm. If labor demand is very concentrated – in the extreme case, the current employer is the only one in the municipality – insiders should be more concerned with keeping their jobs and acquire a higher stake.

Most Russian firms used to offer social benefits, such as housing, medical services, kindergartens, catering etc., to their employees. The social assets of the enterprise should be an extra incentive for workers to acquire control of the enterprise in order to preserve these benefits.

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<sup>26</sup>Unionization may stand also for the bargaining power of workers in general.

We measure costs of social services provided by the firm as a share of total costs or, alternatively, the number of different types of benefits. All of them are expected to have a positive impact on worker ownership and a negative on outsider ownership.

All variables capturing the interests of insiders may have an impact on the privatization decision, too. As Aghion and Blanchard (1998) argue, when the possibilities for collusion between employees are limited, they may oppose privatization altogether. At least in firms where privatization is non-mandatory, insiders could influence to some degree the decision to privatize their firm. In addition, we are able to test the hypothesis of sequencing in privatization, i.e. that firms with certain characteristics were privatized first (Gupta et al., 2008). For example, if performance measures positively affect the likelihood of privatization by 1994 but not by 1999, this would be a sign of sequencing.

Our hypotheses for the choice of a privatization option are closely related to the ones for ownership shares outlined above. As described in section 3, the first privatization option was intended to facilitate the access of outside owners to firms, whereas option 2 and lease-buyouts would clearly lead to majority insider ownership. All variables that favor outsider or constrain insider ownership should therefore make option 1 more likely, and option 2 and lease-buyout less likely.

#### 5.4 Control variables

In addition to the variables based on our hypotheses for privatization and ownership choice we include control variables for firm size, region and industry. As for size, we include the logarithm of the number of employees and two dummy variables for medium-sized and large firms based on the number of employees in order to capture non-linear effects of firm size.<sup>27</sup> We use regional dummies for the largest cities (Moscow

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<sup>27</sup>An alternative measure of size would be the volume of sales, but this is implicitly included in our regressions since we measure productivity by sales per employee.

or St. Petersburg) and for the Asian part of Russia.<sup>28</sup> Eight industry dummies are listed in Table 4.<sup>29</sup>

## 6 Empirical Results

We estimate first the determinants of the privatization decision and the choice of a privatization option, and turn then to the estimations of the level of ownership stakes in 1994 and their change between 1994 and 1999.

### 6.1 Explaining privatization and the choice of privatization option

We estimate a logit model for the binary decision on whether a firm was privatized or not for two dates: July 1, 1994, the end of the mass privatization program, and the date of the survey (1999/2000). Table 8 contains the results for both dates: in each case a full model with all explanatory variables and for a parsimonious model where only significant variables at a 10 per cent significance level are kept. As explained in section 4.3, this allows us to include additional observations in the estimation.

The estimations show that firms in the energy sector<sup>30</sup> are less likely to be privatized. This is not surprising, since certain sub-sectors were explicitly excluded from the mass privatization program. There is also a negative simple correlation between privatization and the association with the military-industrial complex (-0.15 in 1994), but this does not show up in the multivariate regressions reported in Table 8 since other variables apparently explain the privatization decision better. As described in section 3, the exclusion of certain industries was the main way for the government to influence the privatization

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<sup>28</sup>the European part except Moscow and St. Petersburg is the omitted category.

<sup>29</sup>The omitted industry dummy is coal, gas, fuel, oil extraction and electricity.

<sup>30</sup>This is the omitted industry dummy. It includes fuel, extraction of gas, coal and oil, and electricity/

decision. Thus, the remaining effects should be mostly due to the decision of company insiders whether to privatize their firm or not. At both dates, medium and large firms are more likely to be privatized than small ones. There is some evidence that well-performing firms are more likely to be privatized, namely firms with higher productivity and higher wages. These effects are of approximately the same magnitude in 1994 and 1999. Consequently, our data does not provide evidence of sequencing in privatization in the sense that well-performing firms were privatized first, as was found for the Czech Republic by Gupta et al. (2008). The existence of price controls (1994 only) and the cost share of social benefits in total costs have a negative effect on privatization. All effects are also economically significant.<sup>31</sup>

Using only the set of privatized firms<sup>32</sup>, we want to explain next what determines the choice of a particular privatization option. Table 9 presents the results. This choice has usually been made by the employees of the firm. We set the most frequently chosen option, option 2, as the base category. The other alternatives are option 1, lease-buyout and other options. The last includes the option 3 in the mass privatization program, worker or manager buyouts, privatization of the holding company, and privatization by a special government decree.<sup>33 34</sup>

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<sup>31</sup>For instance, an increase in productivity of one percent increased the likelihood of privatization by 2.5 percentage points in 1994 and by 1.9 percentage points in 1999/2000. For the effect of size, we compute the log-linear effect of firm size (measured by employment) on privatization by 1999/2000, i.e. we omit the dummies for medium and large firms. An increase in employment of one percent increases the likelihood of privatization by 3.5 percentage points.

<sup>32</sup>409 out of 497 firms have been privatized by the date of the survey, and 398 provided information on the privatization option. See also Table 1 for the frequencies of the chosen privatization options.

<sup>33</sup>For the lease-buyout option the date of the explanatory variables might not always be strictly before the date of privatization. Lease-buyouts happened before 1992 in some cases, and several explanatory variables are for 1992 (end of the year). In our sample this applies to 16 out of 54 firms that were privatized by a lease-buyout and provided information on the date of privatization.

<sup>34</sup>For some dummy variables among the regressors there was no variation for

Employees of large and capital-intensive firms are more likely to choose the first privatization option over the second one.<sup>35</sup> With the first option, managers and workers can still hold cash-flow rights via their non-voting shares, but transfer of control to outsiders is facilitated by this option. The result is in line with our hypothesis that higher financing needs of large and capital-intensive firms lead to the choice of a privatization option that allows outsiders to acquire larger equity stakes. Wage arrears have a strong negative impact on the likelihood of choosing option 1. This is partial evidence for our hypothesis that employees want to shield the firm from outside owners when the firm is not performing well and their jobs would be at risk in a possible restructuring.

Firms that choose the lease-buyout option face fewer price controls than firms privatized by the second option. This reflects the smaller state control over these firms. Lease-buyouts were less frequent for large firms with more than 2000 employees although this effect becomes only statistically significant once we drop the linear effect of size (log employment in 1991) and leave the size dummies only. Also, firms privatized by the lease-buyout method have higher pre-tax profits than firms privatized using option 2.

## 6.2 Explaining the level of ownership stakes in 1994

The central purpose of this paper is to find factors that affect the choice of ownership stakes by different groups of owners and the concentration of ownership. By applying a tobit model with sample selection, we control both for corner solution outcomes at zero and 100 per cent ownership and for sample selection coming from the decision to privatize a firm or not. We report two versions of the model for

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some privatization option. In order to estimate all coefficients at least for option 1 and the lease-buyout option, we combined some of the industry controls into wider sectors, and skipped the dummy for the affiliation with the military-industrial complex.

<sup>35</sup>In spite of the opposite sign of the size dummies, the overall effect of size is positive.

each owner category in Table 10. One version of the model includes the full set of explanatory variables, and the other is a parsimonious formulation where only significant variables at the 10 per cent level are kept, plus the size, region and industry control variables.<sup>36</sup> The independent maximization of the likelihood function for a simple tobit model and a probit model for the binary privatization decision (i.e. where  $\rho = 0$ ) is rejected by a likelihood ratio test at the 1% level for all ownership categories. In other words, controlling for sample selection is important.

We conducted the same analysis for voting shares, as opposed to all shares. As noted in section 3, in many cases non-voting shares were created in the privatization process. All our hypothesis apply to shares in the ownership as well as to shares in the voting rights of a company. The results turn out to be very similar, and we report only the results for ownership stakes in Table 10.

In 1994, smaller firms exhibit a higher stake of private owners than larger firms. That is, once we control for the privatization (where size had a positive impact), the state keeps greater stakes in large firms. Consistent with our hypothesis that regulation is an indicator of an interest by the state in a company, firms with a larger fraction of sales subject to price controls have a smaller private share. Somewhat puzzling, social benefits influence the private share in two ways: their share in overall costs reduces the private share, and the number of different benefits increases it. The number of benefits affects the stake of private owners via the higher stakes of insiders, and workers in particular. The negative effect of the cost share of social benefits indicates that either the state tends to retain a greater stake in firms with a large social burden, or that private investors are discouraged by the existing social obligations of a firm.

Insiders (managers and workers combined) tend to have lower stakes in large firms (namely those with more than 2000 employees in 1991).

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<sup>36</sup>See section 4.3 for details on the estimation methodology and how the parsimonious models are obtained.



This may reflect their cash constraints in acquiring large stakes in these companies. There is some evidence that the price of shares matters to insiders since the (book value of) capital to labor ratio has a negative impact on the insider stake in the full model. However, this effect disappears once insignificant variables are excluded, and so it does not show in the parsimonious model. As mentioned above, a high number of different social benefits offered by the firm increases the stake of insiders. Labor market conditions are captured by the average wage in the same region and industry and the concentration of local labor demand. We find no evidence for the hypothesis that worse outside opportunities lead to higher insider stakes. However, these variables possibly do not capture all outside opportunities available to workers and managers, who often found a new employment in the emerging sectors such as retail trade and services. Higher state regulation in the form of price controls decreases the insider stake, especially through a lower stake of workers.

In the regression for managerial ownership, no significant explanatory variables can be found in the reported specification of the parsimonious model. This means that we cannot find support for the hypothesis that managers systematically accumulated wage arrears in order to buy out workers before July, 1994.<sup>37</sup> In the model with all explanatory variables, in two out of three specifications with an alternative selection equation<sup>38</sup>, as well as in the regression for the voting share of managers, union membership of employees appears to be negatively correlated with managerial ownership.

The worker share is positively influenced by the degree of unionization. A higher degree of union membership could reflect a better bargaining position vis-à-vis the management, which explains both the positive coefficient for the ownership stake of workers and the

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<sup>37</sup>In some specifications (with different selection equations, see section 4.3 for details) the hypothesis of a positive coefficient for wage arrears can be rejected in a one-sided test. We do find such an effect however for the change in managerial ownership, see below.

<sup>38</sup>See section 4.3 for details.

negative coefficient for the stake of managers in some specifications. In addition, we can interpret the degree of unionization as a measure of the ability of workers to collude in the decision to sell shares to other groups of owners. The result that union membership is positively correlated with the ownership stake of workers is therefore well in line with the model of Aghion and Blanchard (1998). No evidence is found that firms in financial distress<sup>39</sup> have a higher ownership stake of workers that would serve as an insurance against unemployment. On the contrary, labor productivity as a positive measure of firm quality has a positive impact on the workers' share. The number of different social benefits offered by the firm increases the stake held by workers, but the share of these benefits in total costs does not. So there is partial support in the data for our hypothesis that the preservation of social benefits provides an incentive to workers to acquire and keep an ownership stake in their firm. Neither the price of shares (as approximated by the share of capital costs in total costs or the capital-labor ratio) nor the variables standing for the ability to pay (average wage or profits) are significant. This can be explained by the fact that insiders obtained shares on highly preferential terms.

No significant and robust explanatory variables are found for the stake of outsiders and ownership concentration, as measured by the stake of large private outside shareholders. The only exception is that ownership concentration is higher in small and large firms as compared to in medium-sized firms. In particular, we could find no evidence for the hypothesis that regulation reduces private benefits and therefore reduces ownership concentration.

### **6.3 Explaining the change of ownership stakes between 1994 and 1999**

In this section, we investigate the effects of conditions at the end of the mass privatization program on subsequent changes in the ownership

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<sup>39</sup>We refer to firms with higher wage arrears. We tried also tax arrears which did not turn out to be significant, neither.

distribution. We believe that the initial distribution of ownership has been more influenced by the design of the privatization program than by economic factors. If initial conditions have significant effects on the change of ownership in the period under consideration, we interpret such effects as long-term forces driving ownership shares towards their "equilibrium" levels. We are aware that we might omit factors that affect ownership after 1994, however, we avoid problems of endogeneity with this specification.

Specifically, we try to explain the change in the ownership stake of each of the types of owners between 1994 and 1999 by variables representing firm size, firm quality, relation to the state, capital intensity, internal labor relations and labor market conditions. We use the same explanatory variables as in the estimations of the levels of ownership stakes, now with their values for 1994.<sup>40</sup> In addition, we include the privatization option that had been chosen, as well as the initial stake of private owners, insiders and managers. This allows us to control for the effect of the initial degree of privatization, the initial distribution of ownership among insiders and outsiders, and for the distribution of the insider stake among managers and workers. Results are given in Table 11.

Three effects are worth mentioning for the change in the stake of private owners (or the complementary stake of the state) between 1994 and 1999. First, there are important industry effects. In firms belonging to the military-industrial complex and the energy sector, the share of the state was reduced to a lesser degree after 1994 than in other sectors.<sup>41</sup> Second, medium-sized firms experienced a larger increase of the stake of private owners than large and small firms. Third, the stake of private owners increased most where it was low

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<sup>40</sup>We make the simplifying assumption is that the problem of simultaneity between ownership and performance variables is negligible before 1994.

<sup>41</sup>Note that the energy sector is the omitted industry dummy. The four industries with significant positive coefficient, i.e. where the insider stake decreases less than in the energy sector, comprise more than 75 per cent of the non-energy firms in the sample.

initially. This latter effect just reflects further privatization steps. The initial distribution among insiders and outsiders, however, did not matter for later privatization.

As we discussed in section 4.2, the stakes of insiders as a group and workers in particular decreased between 1994 and 1999, while the stake of managers increased on average. The regression analysis shows that the decrease in the insider stake was more pronounced in large firms and in the energy sector. These effects are particularly present in the estimation for the change in the stake of workers. A high initial stake of private owners, and insiders in particular, leads to a more pronounced decrease in the stake of insiders. For a given initial stake of all insiders, a higher proportion of the ownership in the hands of workers tends to accelerate a decrease in their ownership stake and in the stake of all insiders together. In firms that went through a lease-buyout privatization, insider ownership turns out to be more stable.

There are additional effects for the change in managerial ownership. Managers seem to be responsive to labor market conditions as predicted by the Aghion-Blanchard model. Lower reservation wages, i.e. average wages in the same region and industry, and a higher concentration of local labor demand make them increase their stake in the firm that they are operating. No such effects are observed however for workers. Managers also increase their stake more in firms with a higher initial level of wage arrears. This is (at least partially) evidence for the hypothesis that managers systematically accumulated wage arrears in order to buy out workers.

Large private outside shareholders and other outsiders increase their stakes more in firms with high initial insider ownership, in particular with high workers ownership. There is a more intensive transfer of control from insiders to outsiders in medium-sized and large firms.<sup>42</sup> This pattern is consistent with our hypothesis that firms with more

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<sup>42</sup>For large private outside shareholders, the effect is only significant for medium-sized firms. The effects of sales to the state budget for outsiders, and union membership for large shareholders are significant statistically, but not economically.

need for financing would be more likely to be controlled by outsiders in the long run.

## 7 Conclusion

In the descriptive statistics on ownership change between 1994 and the date of the survey, we found a considerable persistence of the initial ownership distribution. Managers often used insider ownership as a shield against outside owners and a closer monitoring of their activities. While worker ownership decreased between 1994 and 1999, managers on average increased their stake. Anecdotal evidence tells us that they found various ways to impede re-sales from employees to outsiders. Our empirical results are consistent with the hypothesis (and anecdotal evidence) that managers accumulated wage arrears in order to force workers to sell their shares to them. The general illiquidity of capital markets in Russia also contributed to the persistence of insider ownership. Thus the hope of the designers of the privatization program that share trade at secondary markets would lead quickly to optimal ownership structures, has not been realized.

We use a comprehensive data set of Russian manufacturing firms to estimate which factors can explain the decision to privatize, the initial ownership structure after privatization and subsequent changes of ownership stakes. In particular, we test several predictions of the model by Aghion and Blanchard (1998). We find that privatization option 1, which was more conducive to outside ownership, is chosen less frequently in firms that had accumulated more wage arrears. But the actual ownership stakes of insiders in general, and workers in particular, are not sensitive to the amount of wage arrears. Our interpretation of these results is that workers choose a privatization option in order to seek insurance against unemployment, especially in firms in financial distress. However, they do not succeed in terms of their resulting ownership stake after the end of the mass privatization program. Furthermore, we find support for the hypothesis that the ability of workers to collude in the decision to sell their shares

to outsiders (measured by union membership) increases worker ownership. The prediction that better outside opportunities (alternative employment, average wages in the same region and industry) lead to less insider ownership finds support in the change in ownership stakes of managers between 1994 and 1999, but not in the level of managerial ownership in 1994 and not in the ownership of workers. Other variables predicting ownership in 1994 and its evolution thereafter are firm size, the supply of social benefits to employees, price controls, and industry affiliation. In addition, the ownership distribution in 1994 affects its subsequent evolution in systematic ways.

The case of Russia allows us to draw conclusions about privatization policy. For political reasons, or because there were simply not as many wealthy investors, give-away policies have been pursued in many countries. In Russia, there was considerable political pressure for giving ownership to workers and managers before the mass privatization program was implemented. Large benefits to company insiders and the resulting insider majority ownership, however, may not be beneficial in a period when large restructuring and labor shedding are necessary.<sup>43</sup> If a government wants to avoid insider ownership for these reasons, but this is nevertheless the only politically feasible option, then at least collusion should be avoided. In practical terms, shares should be owned individually and should be tradable anonymously with share registries outside the firm. According to our data, at the date of the survey, share registries were kept within the enterprise in 40 per cent of the firms. This is even true for 17 per cent of firms with more than 500 employees where the Law on Joint Stock Companies explicitly stipulates that share registries have to be maintained outside of the firm. Aghion and Blanchard (1998) argue that if collusion is made impossible, insiders might oppose privatization altogether. But we would argue that prolonged state ownership may make them even worse-off, and opposition against a privatization plan

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<sup>43</sup>There is some evidence for its neutral or even detrimental effects for Central and Eastern Europe, summarized in Djankov and Murrell (2002) and Estrin et al. (2009).

that gives insiders majority ownership may be politically difficult.

Policies fostering competition and the entry of new businesses would certainly help increase the reservation wage for workers and managers. Our analysis shows that this may lower the ownership stake of managers. High managerial ownership in Russia has often been often associated with managerial entrenchment (e.g., Filatotchev et al., 1999b).

Although a large body of research on the impact of various ownership structures on performance and restructuring activities of firms has been accumulated, the question is still debated and further studies with more recent data and improved econometric methodology seem to be necessary. The determinants of ownership identified in this paper can potentially serve as instruments to overcome the endogeneity problems inherent in such studies.

## Appendix: Tables and Figures

**Table 1: How and When Firms Were Privatized**

Privatization method	Number of firms	% of firms	Median date of majority privatization
All methods	409	82.3	May 93
Mass privatization Program	305	74.6	July 93
of which:			
Option 1	108	26.4	Sep 93
Option 2	186	45.5	June 93
Option 3	12	2.9	Aug 93
Lease Buyout	67	16.4	July 92
Sale	6	1.5	July 94
Other Method	25	7.3	May 93
No Information on Privatization Method	8	2.0	

Notes: The sample consists of 497 firms which existed in some form in 1986. Percentages of privatization methods refer to the 409 privatized firms (there are 10 missing values on that question). Four firms reported multiple privatization methods. 336 firms provided information on the date of majority privatization. The date of majority privatization is defined as the date at which more than 50% of the property has become owned by non-state legal entities or individuals.



**Table 2: Evolution of Ownership Structure: Average Ownership Stakes of Different Types of Owners in 1994 and 1999, by Privatization Option**

	1994			1999		
	All options	Option 1	Option 2	All options	Option 1	Option 2
State	<b>33.9</b>	26.7	20.2	<b>23.8</b>	14.1	8.0
Federal	<b>19.4</b>	16.6	11.6	<b>13.0</b>	9.4	4.3
Regional	<b>5.5</b>	2.2	3.3	<b>4.6</b>	1.4	1.7
Municipal	<b>8.8</b>	7.6	5.0	<b>6.2</b>	3.7	2.0
Private	<b>66.1</b>	73.3	79.8	<b>76.2</b>	85.9	92.0
Insider	<b>48.5</b>	47.3	57.9	<b>43.7</b>	40.3	50.9
Manager	<b>9.3</b>	9.3	11.5	<b>12.4</b>	9.4	15.7
Worker	<b>36.8</b>	36.5	44.8	<b>30.7</b>	31.7	35.6
Outsider	<b>17.0</b>	24.8	21.6	<b>32.2</b>	45.3	41.1
Legal entity	<b>11.0</b>	18.2	13.1	<b>19.5</b>	28.8	23.2
Individual	<b>4.0</b>	5.7	5.7	<b>8.8</b>	11.1	13.6
Foreigner	<b>1.4</b>	0.5	1.9	<b>3.2</b>	3.6	3.9
Number of obs.	<b>416-464</b>	88-104	157-178	<b>438-490</b>	90-108	161-184
			46-58			55-62

Notes: The sample consists of 497 firms which existed in some form in 1986 (*de novo* firms are excluded). The range of the number of observations in the different owner categories is given in the last line. It is lowest for the disaggregated insider ownership stakes (managers and workers) and highest for state ownership. Average ownership stakes in the disaggregated categories do not exactly add up to the average ownership stakes in the aggregated categories because of this difference in the number of observations.

Regional state ownership was not asked for explicitly in the first round of the survey (371 out of 530 questionnaires) and was most likely added to municipal state ownership. For some firms, however, regional state ownership could be imputed from the Goskomstat registry of Russian enterprises if they were 100 percent owned by a regional state agency in 1993 or after. Therefore, the mean of regional ownership is probably understated.

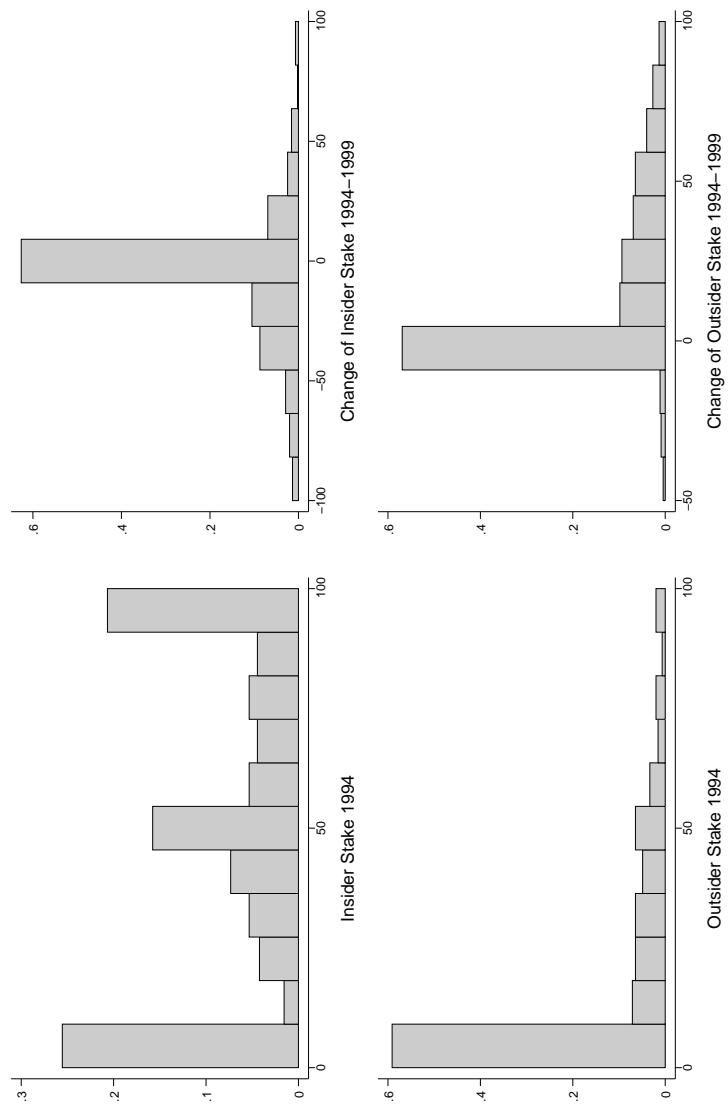
**Table 3: Evolution of Ownership Structure: Ownership Concentration in 1994 and 1999 Measured by the Stake of Large Outside Shareholders, by Privatization Option**

	1994			1999		
	All options	Option 1	Option 2	All options	Option 1	Option 2
Large outside shareholders	9.9	15.6	12.0	22.6	29.3	28.7
Large private outside shareholders	7.1	9.0	9.3	18.2	22.1	24.3
Single largest outside shareholder	8.6	13.6	9.9	16.7	22.7	19.3
Single largest private outside shareholder	4.4	5.4	5.6	10.6	14.1	13.1
Number of observ.	413-456	79-96	149-165	412-474	83-102	146-177
						52-58
						Lease-buyout
						16.1
						14.5
						11.8
						5.5

Notes: A large outside shareholder is defined as an individual not employed by the firm or a private legal entity with an ownership stake of at least five percent. A large private outside shareholder is a large outside shareholder, which is not controlled by the state.

26.6% of firms had a large outside shareholder in 1994, and 52.5% in 1999. Eight firms with at least one large outside shareholder in 1994 or 1999 are not included because they did not provide information on the corresponding ownership stake.

**Figure 1: Frequency Distributions of Ownership Stakes and Their Change**



**Table 4: List of explanatory variables**

<b>Variable</b>	<b>Explanation</b>
<i>Controls(*)</i>	
reg_cap	Moscow/St. Petersburg
reg_asia	Asian part of Russia
ind_mech	ferrous and non-ferrous metallurgy and chemical industry
ind_macb	heavy and light machinery
ind_woco	forestry/construction materials
ind_foli	food/light industry
ind_othr	other industries
<i>Size</i>	
size_mid	500-2000 employees (based on employment 91)
size_big	> 2000 employees (based on employment 91)
lnemp91	log of employment 91
<i>Firm Quality</i>	
lnprod91	log of productivity = log of sales 91(**) minus log of employment 91
exp90	export share in total sales 90
newequip90	fraction of new equipment in the firm 90 (less than 4 years)
lnprofitb92	profitability: log of accounting profits before taxes 92 minus log of employment 91
wagearr92	wage arrears in monthly wage funds 92 (***)
<i>Attractiveness to the State</i>	
mic	military-industrial complex dummy: identified by former ministry subordination and industry code
pricecont92	share of sales subject to price controls 92
budsales90	share of sales to the state budget 90
<i>(continues next page)</i>	

**Table 4: List of explanatory variables, continued**

Variable	Explanation
<i>Attractiveness to Outsiders vs.insiders</i>	
union92	unionization: percentage of union members among all employees, average between numbers for 90 and 94
capcosts94	share of capital costs (depreciation) in total costs 94
lnK_L92	log of the capital-labour ratio (book value of capital in thousands of roubles 92 divided by employment 91)
wagdiff92	ratio between production worker wages and wages of non-production industrial employees 92
lnavwag92	log of the average wage of industrial employees (main activity) 92
labconc92	log of the Herfindahl-Hirshman index of concentration of local labour demand 92
lnregindwage92	log of the average wage in the same region and industry 92
socben_c94	share of social benefits in total costs 94
socben_no94	number of different types of social benefits 94

All variables with a year index 90, 91 or 92 are updated for 1994 in the estimation of the determinants of the change of ownership (except labconc92 and lnregindwage92). Some variables with the year index 94 are only available for that year.

(\*) The dropped regional dummy is for the European part of Russia. The dropped industry dummy is for Coal, Gas, Fuel, Oil Extraction and Electricity. The dropped dummy for size is for small firms with less than 500 employees in 1991.

(\*\*) Some missing values were imputed from sales in the following year (adjusted by average growth rate in sales) or from output in 1991 or the following year.

(\*\*\*) A question on wage on arrears averaged over the year was asked to the director, and the chief accountant was asked about wage arrears at the end of the year. Answers were not always consistent, but when both answers were other than zero, numbers were usually close. We weight a non-zero answer more than a zero, therefore we use the maximum of both answers to construct wagearr92.

**Table 5: Descriptive Statistics of Explanatory Variables**

Variable	for 1990/92			Update 1994		
	Mean	Std. dev.	No. obs.	Mean	Std. dev.	No. obs.
reg_cap	0.13	0.34	497			
reg_asia	0.32	0.47	497			
ind_mech	0.09	0.29	497			
ind_macb	0.38	0.49	497			
ind_woco	0.12	0.33	497			
ind_foli	0.24	0.43	497			
ind_othr	0.07	0.25	497			
size_mid	0.29	0.45	497	0.30	0.46	494
size_big	0.33	0.47	497	0.27	0.44	494
lnemp91	6.73	1.67	497	6.58	1.62	494
lnprod91	4.05	1.72	438	3.17	1.27	434
exp90	2.28	7.88	331	4.75	13.21	367
newequip90	22.05	26.06	438	18.30	24.92	455
lnprofitb92	4.49	1.60	382	7.59	1.84	351
wagearr92	0.25	0.74	462	0.63	1.53	461
mic	0.13	0.34	497			
milsales90	7.01	18.12	324	5.28	16.22	360
budsales90	26.62	38.44	328	20.60	34.43	363
pricecont92	49.36	46.83	443	34.59	44.04	438
union92	91.76	16.99	466	85.88	26.34	467
capcosts94	6.35	6.59	271	6.35	6.59	271
lnK_L92	5.96	1.07	295	9.48	1.13	335
wagdiff92	1.79	3.43	400	2.49	16.15	413
lnavwag92	4.32	0.61	408	7.72	0.63	429
labconc92	-1.93	1.32	497			
lnregindwage92	4.36	0.42	496			
socben_c94	7.45	5.11	271			
socben_no94	5.22	3.37	480			

See notes at the end of Table 4.

Table 6: Correlation Matrix of Explanatory Variables

	reg- cap	reg- asia	ind- met	ind- chem	ind- mach	ind- ind-	ind- for	ind- cons	ind- light	ind- food	ind- othr	size- mid	size- big	size- big	emp91	ln prod91	ln exp 90	new equip90
lnemp91	0.120	0.059	0.128	0.165	0.264	-0.132	-0.135	-0.043	-0.335	-0.124	0.020	0.804	1.000					
lnprod91	0.176	-0.036	-0.037	0.022	-0.194	-0.120	0.061	0.051	0.225	-0.052	0.156	-0.279	-0.198					
exp90	0.067	-0.140	0.144	-0.001	0.175	-0.052	-0.069	-0.097	-0.022	-0.083	0.062	0.192	0.285			1.000		
newequip90	0.074	0.111	0.167	-0.064	0.090	-0.065	0.042	-0.132	-0.021	-0.099	-0.060	0.033	0.023			0.038	1.000	
lnprofitb92	0.095	0.008	0.216	0.129	-0.335	-0.242	-0.001	0.063	0.181	-0.106	0.140	-0.035	0.061			0.394	0.030	0.040
wagearr92	-0.130	0.116	0.047	0.011	0.161	0.037	-0.062	-0.086	-0.172	0.078	-0.031	0.195	0.220			-0.222	0.135	-0.009
mic	-0.013	0.020	-0.073	0.036	0.423	-0.055	-0.098	-0.118	-0.166	-0.093	-0.163	0.430	0.381			-0.251	0.161	0.021
budsales90	0.003	0.065	-0.135	-0.145	0.036	-0.102	0.052	-0.171	0.149	0.103	0.015	-0.069	-0.036			0.034	-0.081	-0.113
pricecont92	-0.095	-0.109	-0.149	-0.028	0.042	0.016	-0.020	-0.189	0.101	-0.182	0.005	-0.014	0.007			0.156	0.071	-0.025
union92	0.039	-0.047	0.081	0.006	-0.039	0.008	-0.134	-0.041	0.081	-0.030	0.005	0.049	0.084			0.143	0.058	0.050
capcosts94	-0.076	-0.106	-0.047	-0.052	0.255	0.244	-0.091	-0.055	-0.181	-0.116	-0.123	0.002	-0.090			-0.073	0.034	-0.102
lnK_L92	0.082	0.051	0.112	0.233	-0.089	-0.250	0.013	-0.344	0.051	-0.114	0.078	0.137	0.246			0.307	0.035	0.094
wagdiff92	0.188	-0.085	-0.035	-0.023	0.002	-0.030	0.002	-0.032	-0.054	0.211	-0.084	0.036	-0.018			0.049	-0.042	-0.006
lnavwag92	-0.085	0.366	0.090	0.016	-0.314	-0.161	-0.039	-0.058	0.213	-0.089	0.074	-0.039	0.047			0.235	-0.072	0.061
labconc92	-0.656	-0.088	-0.081	-0.148	-0.172	0.080	0.076	0.085	0.125	0.021	-0.022	-0.216	-0.267			-0.048	-0.154	-0.070
lnregindwage92	-0.116	0.440	0.152	0.015	-0.424	-0.121	-0.058	-0.185	0.309	-0.092	-0.005	-0.016	0.055			0.119	-0.103	0.002
socben_c94	0.048	0.038	-0.136	-0.042	0.343	0.022	0.109	-0.033	-0.291	0.064	-0.199	0.017	-0.075			-0.137	-0.007	0.104
socben_no94	0.105	0.047	0.006	0.094	0.022	0.021	-0.077	0.053	-0.167	-0.006	0.154	0.311	0.456			0.067	0.113	0.131

	lnpro ftb92	wage arr92	bud sales90	price cont92	union 92	cap costs94	lnK_L 92	wag diff 92	lnav wag92	lab conc92	indwage92	soc ben_c94	soc ben_no94	
lnprofitb92	1.000													
wagearr92	-0.133	1.000												
mic	-0.334	0.234	1.000											
budsales90	-0.058	0.027	0.016	1.000										
pricecont92	-0.019	0.015	0.077	0.265	1.000									
union92	0.124	-0.030	0.020	-0.047	0.026	1.000								
capcosts94	-0.161	0.173	0.103	-0.102	-0.009	-0.065	1.000							
lnK_L92	0.447	0.006	-0.086	0.001	0.266	0.093	0.023	1.000						
wagdiff92	-0.014	-0.068	-0.060	0.046	-0.014	-0.042	-0.086	-0.201	1.000					
lnavwag92	0.532	-0.141	-0.272	0.080	0.104	0.120	-0.134	0.393	0.038	1.000				
labconc92	-0.036	0.090	-0.109	-0.009	0.053	0.056	0.099	-0.099	-0.115	-0.016	1.000			
lnregindwage92	0.411	-0.079	-0.173	0.110	0.169	0.033	-0.189	0.403	-0.030	0.713	0.012	1.000		
socben_c94	-0.521	0.037	0.180	0.110	-0.001	-0.102	0.087	-0.346	0.200	-0.227	-0.030	-0.252	1.000	
socben_no94	0.163	0.130	0.037	0.080	0.115	0.128	-0.135	0.103	-0.011	0.178	-0.062	0.045	-0.017	1.000

**Table 7: Expected signs for estimations of the determinants of ownership levels in 1994**

	Effect on the share of				
	pri- vate	mana- gers	wor- kers	out- si- ders	block- hol- holders
<i>Firm Quality</i>					
Profitability 92	+	+	-		
Productivity 91	+	+	-		
Export Share in Total Sales 90	+	+	-		
Fraction of New Equipment 90	+	+	-		
Average Wage 92	+	+	-		
Wage Arrears 92	-	-	+		
<i>Attractiveness to the State vs. Private Owners</i>					
Price Controls 92	-			-	-
Share of Sales to the State Budget 90	-				
Military-industrial Complex	-				
Share of Sales to the Military 90	-				
<i>Attractiveness to Outsiders vs. Insiders</i>					
Firm Size: Employment 91		-	-	+	-/+
Various Measures for Costliness:					
Capital-labor ratio (book value of capital 92)		-	-	+	
Fraction of New Equipment 90		-	-	+	
Share of Capital Costs in Total Costs 94		-	-	+	
Ability to pay					
Average wage 92			+		
Wage Arrears 92			-		
Profitability 92		+	+		
Insider Power / Ability to Collude					
Heterogeneity of Workforce (wages)		-	-	+	+
Unionization			+	-	-
Outside opportunities					
Concentration of the local labour demand		+	+		
Average Wage, same region and industry		-	-		
Social assets					
as a share of total costs 94		-	+	-	
number of different benefit types 90		-	+	-	

+ positive effect  
- negative effect



**Table 8: Estimation Results: Logit Regression for Privatization by July 1, 1994 and by the Date of the Survey (1999/2000)**

	Privatized by July 1, 1994				Privatized by 1999/2000			
reg_cap	-0.594	<i>-0.37</i>	0.043	<i>0.05</i>	1.021	<i>0.53</i>	0.509	<i>0.45</i>
reg_asia	-1.236	<i>-1.39</i>	-1.105	<i>-2.36**</i>	0.214	<i>-0.24</i>	-0.910	<i>-1.83*</i>
ind_mech	0.130	<i>0.08</i>	0.155	<i>0.19</i>	1.096	<i>0.55</i>	0.988	<i>1.17</i>
ind_macb	1.885	<i>0.95</i>	1.145	<i>1.63</i>	1.654	<i>0.75</i>	2.087	<i>2.78***</i>
ind_woco	2.852	<i>1.27</i>	2.041	<i>2.07</i>	3.163	<i>1.21</i>	2.765	<i>2.60***</i>
ind_ligt	1.481	<i>0.65</i>	1.080	<i>1.09</i>	3.198	<i>1.14</i>	2.786	<i>2.32**</i>
ind_food	0.688	<i>0.43</i>	0.844	<i>1.11</i>	0.621	<i>0.36</i>	1.250	<i>1.59</i>
ind_othr	0.271	<i>0.13</i>	-0.159	<i>-0.18</i>	1.397	<i>0.56</i>	1.758	<i>1.74*</i>
size_mid	0.596	<i>0.48</i>	1.465	<i>2.36**</i>	0.989	<i>0.62</i>	0.978	<i>1.02</i>
size_big	-1.546	<i>-0.86</i>	0.830	<i>1.65*</i>	-3.431	<i>-1.55</i>	-1.410	<i>-1.18</i>
lnemp91	0.557	<i>1.05</i>			1.222	<i>1.89</i>	0.777	<i>2.19**</i>
lnprod91	0.415	<i>1.58</i>	0.248	<i>1.87*</i>	0.134	<i>0.51</i>	0.295	<i>1.87*</i>
exp90	0.044	<i>1.06</i>			0.100	<i>0.87</i>		
newequip90	0.009	<i>0.81</i>			0.015	<i>1.20</i>		
lnprofitb92	0.149	<i>0.40</i>			0.037	<i>0.10</i>		
wagearr92	-0.847	<i>-2.28*</i>			-0.531	<i>-1.13</i>		
mic	-0.421	<i>-0.39</i>			-0.024	<i>-0.02</i>		
budsales90	0.018	<i>1.83</i>			0.016	<i>1.55</i>		
pricecont92	-0.020	<i>-2.27**</i>	-0.009	<i>-1.72*</i>	-0.005	<i>-0.54</i>		
union92	0.006	<i>0.28</i>			0.011	<i>0.51</i>		
capcosts94	0.051	<i>0.91</i>			0.057	<i>1.05</i>		
lnK_L92	0.261	<i>0.62</i>			0.440	<i>0.89</i>		
wagdiff92	0.024	<i>0.40</i>			0.015	<i>0.27</i>		
lnavwag92	-1.386	<i>-1.46</i>	0.730	<i>2.22**</i>	-0.541	<i>-0.59</i>	0.740	<i>2.03**</i>
labconc92	0.383	<i>0.94</i>			0.576	<i>1.20</i>		
lnregindwage92	1.657	<i>0.96</i>			-0.106	<i>-0.06</i>		
socben_c94	-0.159	<i>-2.14**</i>	-0.078	<i>-1.95*</i>	-0.140	<i>-1.68*</i>	-0.072	<i>-1.68*</i>
socben_no94	0.102	<i>0.83</i>			-0.015	<i>-0.12</i>		
constant	-6.251	<i>-0.70</i>	-2.386	<i>-1.45</i>	-6.672	<i>-0.64</i>	-8.038	<i>-2.77**</i>
No. of observations	143		232		144		245	
Pseudo R <sup>2</sup> (%)	33.7		18.2		32.2		21.9	
BIC	235.8		250.9		225.3		227.9	

We report estimates for a model with a full set of explanatory variables and for one with a reduced set, where all coefficients must be significantly different from zero (except for the control variables).

Italic numbers are z-values.

\* significant at 10% level; \*\* significant at 5% level; \*\*\* significant at 1% level

**Table 9: Estimation Results: Multinomial Logit Regressions for the Choice of Privatization Option Given that the Firm Was Privatized. Base Group = 2nd Privatization Option.**

	1st option		Lease-buyout				Other options				
reg_cap	0.536	0.28	-0.469	-0.56	-0.325	-0.16	-0.099	-0.09	-33.361	1.852	1.33
reg_asia	2.895	1.89*	0.294	0.67	-3.044	-2.07**	0.231	0.39	0.936	0.288	0.38
ind_chem	1.790	0.70	-0.110	-0.14	1.690	0.70	0.247	0.17	-31.635	-32.357	.
ind_mach	1.828	0.69	0.473	0.74	1.600	0.71	0.842	0.86	2.444	1.080	1.00
ind_woco	0.570	0.18	-0.252	-0.30	-0.499	-0.26	0.510	0.46	-34.234	-32.646	.
Ind_light	1.803	0.53	1.214	1.34	2.677	1.15	1.509	1.44	2.540	0.80	1.725
ind_food	-4.015	-1.41	-0.465	-0.59	-5.403	-2.07**	-0.662	-0.62	0.188	0.08	-0.149
ind_othr	2.936	0.90	0.516	0.51	-5.015	-1.58	1.104	0.92	-3.051	-0.93	1.144
size_mid	-3.967	-1.94*	-1.150	-1.77*	1.246	0.76	0.009	0.01	1.960	1.04	-0.909
size_big	-2.416	-0.90	-1.241	-1.23	-1.864	-0.79	-2.066	-1.39	5.459	1.56	-1.097
lnemp91	1.007	1.30	0.637	2.22**	-0.636	-0.77	0.093	0.22	-2.980	-2.36**	0.227
lnprod91	0.573	1.78*			0.165	0.50			0.032	0.08	
exp90	0.086	1.89*			-0.002	-0.02			0.075	1.69*	
newequip90	-0.019	-1.04			0.016	0.94			0.000	-0.01	
lnprofitb92	-0.843	-1.61	-0.114	-0.74	-0.083	-0.18	0.414	1.67*	0.651	1.20	0.254
wagearr92	-2.710	-2.65***	-0.693	-2.00**	0.779	1.52	0.117	0.44	1.076	1.79*	0.120
budsales90	0.015	1.18			0.037	1.88*			-0.003	-0.18	
pricecont92	0.014	1.24	0.004	1.02	-0.048	-2.93***	-0.012	-2.16**	0.010	0.75	0.011
union92	0.000	0.01			0.032	0.77			-0.017	-0.39	
capcosts94	0.031	0.44			-0.019	-0.36			-0.047	-0.69	
lnK_L92	1.456	1.71*	0.484	1.82*	-0.374	-0.69	-0.455	-1.42	0.542	0.68	-0.032
wagdiff92	-2.723	-1.75*			-0.271	-0.50			-1.176	-1.22	
lnavwag92	0.627	0.44			2.259	1.65*			-1.240	-0.72	
labcont92	0.128	0.26	-0.040	-0.19	-0.214	-0.41	0.063	0.23	0.583	1.11	0.587
lnregindwage92	-0.009	0.00			1.641	0.65			2.420	1.09	
soeben_c94	-0.122	-0.91			-0.034	-0.24			0.066	0.38	
soeben_no94	-0.212	-1.26			0.064	0.42			0.425	1.90*	
constant	-13.233	-0.96	-7.166	-2.56**	-14.314	-1.13	-0.998	-0.31	3.362	0.26	-4.284

Notes: see next page.

We report estimates for a model with a full set of explanatory variables and for one with a reduced set, where all coefficients must be significantly different from zero for at least one of the options (except for the control variables). Some coefficients and standard errors for dummy variables could not be estimated for “other privatization options” since there were no observation in these categories.

*Italic numbers are z-values.*

Eight firms that reported multiple privatization options were excluded from the sample.

The number of observations is 122 for the full model and 219 for the parsimonious model. The pseudo  $R^2$  is 46.1 per cent and 17.4 per cent, respectively.

\* significant at 10% level; \*\* significant at 5% level; \*\*\* significant at 1% level

**Table 10: Estimation Results: Ownership Stakes in 1994  
(Tobit Regressions with Correction for Selection Bias)**

	Private Stake				Insider Stake			
<i>Ownership equation</i>								
reg_cap	-6.301	<i>-0.24</i>	-2.303	<i>-0.17</i>	-14.100	<i>-0.80</i>	-5.811	<i>-0.64</i>
reg_asia	-22.451	<i>-1.28</i>	-13.518	<i>-1.48</i>	-13.674	<i>-1.42</i>	-6.902	<i>-1.19</i>
ind_met	24.346	<i>0.71</i>	3.015	<i>0.17</i>	26.430	<i>1.16</i>	18.742	<i>1.43</i>
ind_chem	35.567	<i>0.90</i>	1.232	<i>0.06</i>	16.842	<i>0.68</i>	-12.975	<i>-0.87</i>
ind_macb	34.638	<i>0.79</i>	23.087	<i>1.52</i>	37.360	<i>1.47</i>	19.524	<i>1.99**</i>
ind_for	10.684	<i>0.17</i>	10.169	<i>0.32</i>	-22.677	<i>-0.61</i>	-3.970	<i>-0.18</i>
ind_cons	42.138	<i>0.96</i>	27.990	<i>1.49</i>	75.203	<i>2.69***</i>	42.314	<i>3.34***</i>
ind_ligt	45.963	<i>0.99</i>	27.125	<i>1.49</i>	33.396	<i>1.17</i>	31.754	<i>2.66***</i>
ind_food	23.916	<i>0.71</i>	15.097	<i>0.98</i>	31.123	<i>1.42</i>	14.540	<i>1.36</i>
ind_othr	-13.299	<i>-0.32</i>	-9.983	<i>-0.50</i>	33.435	<i>1.20</i>	10.139	<i>0.74</i>
size_mid	13.911	<i>0.70</i>	-20.453	<i>-1.96*</i>	24.405	<i>1.96*</i>	5.170	<i>0.74</i>
size_big	35.738	<i>1.11</i>	-29.216	<i>-2.70***</i>	23.968	<i>1.15</i>	-14.306	<i>-2.03**</i>
lnemp91	-19.458	<i>-1.85*</i>			-9.193	<i>-1.52</i>		
lnprod91	0.791	<i>0.22</i>			2.459	<i>0.98</i>		
exp90	-0.398	<i>-0.85</i>			-0.452	<i>-1.30</i>		
newequip90	0.070	<i>0.37</i>			0.121	<i>0.95</i>		
lnprofitb92	-4.357	<i>-0.80</i>			0.009	<i>0.00</i>		
wagearr92	0.315	<i>0.05</i>			1.211	<i>0.27</i>		
mic	-21.349	<i>-1.06</i>			-1.842	<i>-0.13</i>		
budsales90	0.116	<i>0.73</i>			-0.090	<i>-0.92</i>		
pricecont92	-0.205	<i>-1.23</i>	-0.254	<i>-2.57**</i>	-0.212	<i>-2.30**</i>	-0.192	<i>-3.05***</i>
union92	-0.050	<i>-0.12</i>			0.181	<i>0.64</i>		
capcosts94	1.575	<i>1.48</i>			0.969	<i>1.91*</i>		
lnK_L92	-0.721	<i>-0.10</i>			-10.377	<i>-2.10**</i>		
wagdiff92	1.962	<i>1.23</i>			-0.811	<i>-0.97</i>		
lnavwag92	-4.016	<i>-0.26</i>			15.508	<i>1.41</i>		
labconc92	0.395	<i>0.06</i>			-3.079	<i>-0.78</i>		
lnregindwage92	33.117	<i>1.02</i>			9.452	<i>0.50</i>		
socben_c94	-1.309	<i>-0.92</i>	-2.035	<i>-2.02**</i>	-0.872	<i>-0.98</i>		
socben_no94	4.541	<i>1.91*</i>	4.214	<i>2.72***</i>	2.370	<i>1.87*</i>	1.846	<i>2.05**</i>
constant	72.606	<i>0.44</i>	102.629	<i>5.53***</i>	2.078	<i>0.02</i>	47.943	<i>3.85***</i>
<i>Privatization (selection) equation</i>								
reg_cap	-0.264	<i>-0.26</i>	0.145	<i>0.15</i>	-0.804	<i>-0.73</i>	-0.488	<i>-0.49</i>
reg_asia	-0.933	<i>-1.80</i>	-0.532	<i>-0.89</i>	-1.321	<i>-1.93</i>	-0.895	<i>-1.47</i>
ind_mech	0.154	<i>0.17</i>	0.084	<i>0.09</i>	0.034	<i>0.03</i>	0.112	<i>0.12</i>
ind_macb	0.721	<i>0.95</i>	0.584	<i>0.70</i>	0.741	<i>0.73</i>	0.659	<i>0.69</i>
ind_woco	1.323	<i>1.32</i>	1.058	<i>1.02</i>	1.034	<i>0.94</i>	0.893	<i>0.87</i>
ind_ligt	0.861	<i>0.99</i>	0.740	<i>0.70</i>	0.564	<i>0.49</i>	0.327	<i>0.30</i>
ind_food	0.859	<i>1.16</i>	0.564	<i>0.72</i>	0.316	<i>0.38</i>	0.390	<i>0.49</i>
ind_othr	-0.429	<i>-0.49</i>	0.189	<i>0.22</i>	-0.557	<i>-0.47</i>	-0.207	<i>-0.20</i>
size_mid	1.011	<i>1.32</i>	0.653	<i>0.81</i>	0.613	<i>0.67</i>	0.625	<i>0.76</i>
size_big	0.378	<i>0.63</i>	0.392	<i>0.60</i>	0.056	<i>0.07</i>	0.157	<i>0.22</i>
lnprod91	0.100	<i>0.81</i>	0.083	<i>0.77</i>	0.064	<i>0.46</i>	0.100	<i>0.78</i>
pricecont92	-0.009	<i>-1.71</i>	-0.004	<i>-0.75</i>	-0.008	<i>-1.17</i>	-0.006	<i>-1.03</i>
lnavwag92	0.640	<i>1.69</i>	0.614	<i>1.61</i>	0.691	<i>1.54</i>	0.407	<i>1.06</i>
socben_c94	-0.029	<i>-0.68</i>	-0.058	<i>-1.29</i>	-0.019	<i>-0.37</i>	-0.008	<i>-0.17</i>
constant	-2.390	<i>-1.33</i>	-1.983	<i>-1.14</i>	-2.129	<i>-1.05</i>	-1.098	<i>-0.61</i>
sigma_u	38.440	<i>3.02</i>	44.389	<i>6.03</i>	30.298	<i>6.29</i>	33.253	<i>11.11</i>
rho	1.000	.	1.000	.	1.000	.	1.000	.
log likelihood	-304.66		-552.67		-457.25		-787.76	
no. obs.	151		225		150		223	

Italic numbers are z-values. The standard errors of rho are not properly estimated, but this does not affect those of other coefficients.

Table 10 continued

	Manager Stake				Worker Stake			
<i>Ownership equation</i>								
reg_cap	-0.679	-0.08	-2.86	-0.6	-14.815	-1.02	-6.759	-0.89
reg_asia	6.198	1.34	0.59	0.21	-20.029	-2.69	-7.988	-1.71*
ind_met	3.078	0.23	3.16	0.45	56.717	2.47**	19.826	1.72*
ind_chem	-2.948	-0.21	1.61	0.22	44.417	1.83*	-0.643	-0.05
ind_macb	-4.796	-0.32	6.11	1.21	69.618	2.67***	20.670	2.35**
ind_for	-15.436	-0.74	17.35	1.61	30.512	0.86	-6.281	-0.35
ind_cons	14.189	0.95	17.70	2.89***	69.515	2.70***	21.634	2.15**
ind_ligt	-5.643	-0.36	9.53	1.61	63.086	2.37**	25.920	2.59**
ind_food	9.755	0.77	13.22	2.39**	46.536	2.12**	8.176	0.89
ind_othr	-6.039	-0.37	0.97	0.11	56.979	2.06**	-6.040	-0.45
size_mid	17.201	2.86***	3.02	0.89	12.583	1.23	4.032	0.72
size_big	18.963	1.84*	-4.72	-1.38	14.764	0.85	-5.308	-0.89
lnemp91	-6.648	-2.02			-6.751	-1.26		
lnprod91	-0.210	-0.17			3.847	1.85*	2.559	1.97*
exp90	0.004	0.02			-0.334	-1.19		
newequip90	0.052	0.87			-0.011	-0.11		
lnprofitb92	0.898	0.50			-0.458	-0.15		
wagearr92	-2.862	-1.10			5.360	1.22		
mic	1.031	0.14			2.115	0.17		
budsales90	-0.022	-0.45			-0.075	-0.94		
pricecont92	0.012	0.29			-0.203	-2.96***	-0.164	-3.32***
union92	-0.216	-1.78*			0.290	1.44	0.380	2.88***
capcosts94	0.433	1.80*			0.240	0.60		
lnK_L92	-2.980	-1.25			-2.880	-0.72		
wagdiff92	-2.417	-0.62			-1.425	-0.22		
lnavwag92	0.568	0.11			13.551	1.49		
labconc92	1.055	0.52			-3.271	-0.96		
lnregindwage92	-5.608	-0.6			18.168	1.18		
socben_c94	0.024	0.06			-0.435	-0.61		
socben_no94	0.373	0.58			1.563	1.50	1.440	1.98**
constant	95.478	1.66*	1.36	0.25	-125.536	-1.34	-12.464	-0.72
<i>Privatization (selection) equation</i>								
reg_cap	-0.814	-0.66	-0.01	-0.01	-0.620	-0.53	0.125	0.13
reg_asia	-1.052	-1.46	-0.35	-0.57	-0.856	-1.23	-0.404	-0.66
ind_mech	0.175	0.15	0.09	0.09	0.781	0.73	0.459	0.48
ind_macb	0.943	0.83	0.29	0.33	1.456	1.36	0.821	0.85
ind_woco	1.680	1.37	1.10	1.08	1.005	0.87	0.625	0.60
ind_ligt	0.833	0.66	0.51	0.46	1.227	1.05	0.865	0.79
ind_food	1.427	1.55	0.85	1.06	0.622	0.71	0.412	0.51
ind_othr	-0.596	-0.44	-0.11	-0.13	-0.318	-0.26	-0.090	-0.09
size_mid	0.804	0.78	0.32	0.39	0.562	0.60	0.707	0.87
size_big	0.448	0.53	0.01	0.01	-0.363	-0.45	-0.052	-0.07
lnprod91	0.143	0.96	0.04	0.31	0.079	0.56	0.093	0.71
pricecont92	-0.013	-1.73	0.00	-0.39	-0.007	-0.97	-0.003	-0.47
lnavwag92	0.513	1.15	0.16	0.4	0.543	1.27	0.316	0.83
socben_c94	-0.008	-0.15	-0.01	-0.13	-0.033	-0.65	-0.017	-0.36
constant	-2.374	-1.11	-0.51	-0.28	-2.102	-1.06	-1.168	-0.65
sigma_u	14.287	10.34	16.68	15.31	24.051	8.93	26.141	13.23
rho	1.000	.	1.000	.	1.000	.	1.000	.
log likelihood	-427.71		-731.88		-488.54		-809.60	
no. obs.	139		208		139		205	

**Table 10 continued**

	Outsider Stake				Stake of Large Private Outside Shareholders			
<i>Ownership equation</i>								
reg_cap	13.943	0.74	8.58	0.9	6.733	0.22	-6.083	-0.39
reg_asia	-5.611	-0.53	-1.77	-0.3	5.384	0.27	1.160	0.12
ind_met	3.779	0.15	1.61	0.12	15.257	0.41	7.114	0.32
ind_chem	0.504	0.02	0.11	0.01	45.826	1.38	21.795	1.16
ind_macb	-7.715	-0.27	-8.94	-0.94	14.376	0.41	1.273	0.09
ind_for	40.114	0.93	26.42	1.24	32.685	0.66	-5.404	-0.21
ind_cons	-26.767	-0.88	-20.63	-1.61	2.684	0.07	-27.967	-1.38
ind_ligt	8.039	0.22	-13.68	-1.17	-0.770	-0.02	-32.795	-1.29
ind_food	-5.885	-0.23	2.15	0.2	24.936	0.90	10.466	0.69
ind_othr	-16.994	-0.45	-5.36	-0.32	(*)	(*)	(*)	(*)
size_mid	-16.424	-1.16	-5.94	-0.82	-40.898	-1.87*	-18.789	-1.71*
size_big	-10.302	-0.41	6.86	0.97	-15.897	-0.41	-0.229	-0.02
lnemp91	4.270	0.54			7.140	0.68		
lnprod91	0.815	0.3			3.781	0.77		
exp90	0.035	0.1			0.155	0.36		
newequip90	-0.055	-0.39			-0.236	-0.56		
lnproftb92	-1.833	-0.45			-7.198	-1.23		
wagearr92	-4.174	-0.65			-0.287	-0.04		
mic	-2.492	-0.16			-4.723	-0.24		
budsales90	0.215	2.02**			0.191	1.48		
pricecont92	0.044	0.46			0.013	0.10		
union92	-0.055	-0.18			-0.078	-0.23		
capcosts94	0.301	0.59			0.473	0.77		
lnK_L92	4.660	0.67			2.053	0.20		
wagdiff92	0.741	0.74			-2.807	-0.17		
lnavwag92	-1.974	-0.16			-20.888	-1.31		
labconc92	1.265	0.3			2.646	0.37		
lnregindwage92	0.504	0.02			25.684	0.82		
socben_c94	-0.505	-0.58			-1.393	-0.71		
socben_no94	-0.511	-0.37			1.247	0.64		
constant	-20.872	-0.16	12.33	1.17	-59.084	-0.34	-3.181	-0.21
<i>privatization (selection) equation</i>								
reg_cap	-0.481	-0.44	-0.22	-0.21	-0.269	-0.34	0.135	0.21
reg_asia	-0.305	-0.66	-0.14	-0.25	-0.715	-1.73	-0.174	-0.46
ind_mech	0.236	0.28	0.03	0.03	-0.373	-0.48	-0.152	-0.23
ind_macb	0.386	0.47	0.31	0.35	0.533	0.85	0.225	0.40
ind_woco	0.789	0.95	0.61	0.63	1.314	1.66	1.014	1.59
ind_ligt	0.062	0.07	0.28	0.25	0.652	0.88	0.930	1.40
ind_food	0.780	1	0.65	0.8	-0.097	-0.14	-0.083	-0.13
ind_othr	-0.160	-0.2	-0.17	-0.21	-0.281	-0.38	0.047	0.08
size_mid	0.393	0.69	0.32	0.46	1.096	2.31	0.582	1.31
size_big	0.118	0.2	0.28	0.42	0.232	0.53	0.134	0.32
lnprod91	0.035	0.28	0.08	0.65	0.071	0.73	0.038	0.41
pricecont92	-0.002	-0.52	0.00	-0.26	-0.010	-2.06	-0.002	-0.39
lnavwag92	0.344	0.92	0.27	0.73	0.668	1.76	0.230	0.81
socben_c94	-0.019	-0.45	0.00	0.1	-0.023	-0.75	-0.011	-0.38
constant	-1.517	-0.84	-1.63	-0.94	-2.653	-1.47	-1.106	-0.82
sigma_u	29.866	7.15	33.48	12.11	24.523	6.71	35.988	7.78
rho	1.000	.	1.000	.	1.000	.	1.000	.
log likelihood	-370.70		-638.80		-174.67		-299.09	
no. obs.	150		223		134		193	

(\*) The dummy for other industries had to be dropped in the estimations for the share of large private outside shareholders since there is no variation in this variable.

Table 11: Estimation Results: Change in Ownership Stakes from 1994 to 1999 (OLS)

	Private Share			Insider Share			Manager Share					
reg_cap	-5.264	-0.70	-2.866	-0.94	-9.787	-0.86	-7.783	-1.55	5.120	7.70	8.982	2.54**
reg_cap	0.039	0.01	-0.388	-0.18	-0.840	-0.15	-1.736	-0.55	2.372	0.70	4.455	2.33**
ind_net	15.316	1.85	9.163	1.72*	2.540	0.15	-2.213	-0.26	11.698	1.15	3.134	0.71
ind_chem	10.516	0.91	7.855	1.51	9.574	0.54	11.820	1.44	-4.358	-0.42	-2.639	-0.57
ind_macb	4.837	0.40	7.317	2.06**	9.980	0.54	15.461	2.52**	-5.784	-0.53	-2.462	-0.56
ind_for	-11.304	-0.59	7.225	1.92	13.536	0.47	14.223	1.54	-12.961	-0.76	-3.436	-0.57
ind_cons	5.925	0.52	7.677	1.61*	10.043	0.57	18.210	2.48**	-2.781	-0.27	-2.367	-0.54
ind_ligt	5.508	0.44	7.467	1.71*	17.385	0.92	23.492	3.27**	-6.272	-0.56	0.252	0.06
ind_food	8.568	0.82	4.835	1.20	11.393	0.71	22.461	3.33**	-0.650	-0.07	3.844	1.00
ind_lothr	19.478	1.31	2.418	0.50	3.047	0.14	2.768	0.30	-13.411	-1.01	-5.275	-1.03
ind_mid94	1.263	0.21	7.565	3.23**	-2.081	-0.22	-2.756	-0.78	-10.737	-1.95*	0.067	0.04
size_big94	0.028	0.00	4.083	1.55	-12.439	-0.84	-9.235	-2.25**	-16.257	-1.86*	-3.228	-1.55
lnemp94	-0.459	-0.15	1.522	0.33	1.522	0.33	1.522	0.33	2.372	0.87		
lnprod94	1.303	0.48	0.501	0.12	0.501	0.12	0.501	0.12	1.545	0.63		
exp94	0.146	1.14	0.164	0.85	0.164	0.85	0.164	0.85	0.125	1.10		
newequip94	0.021	0.28	-0.058	-0.70	-0.058	-0.70	-0.058	-0.70	-0.090	-1.84		
lnprofitb94	-0.766	-0.67	-1.479	-0.63	-1.479	-0.63	-1.479	-0.63	0.467	0.46		
wagearr94	3.268	2.13**	-9.286	-2.80**	-5.594	-0.64	0.079	1.73*	1.886	1.37	0.894	1.73*
mic	-13.507	-2.97**	0.044	0.56	0.044	0.56	0.079	1.73*	0.056	1.23		
budsales94	0.010	0.20	0.074	1.15	0.074	1.15	0.074	1.15	0.033	0.88		
pricecont94	0.022	0.51	-0.004	-0.04	-0.004	-0.04	-0.004	-0.04	0.024	0.39		
union94	0.007	0.09	0.010	0.02	0.010	0.02	0.010	0.02	-0.062	-0.23		
capcosts94	0.012	0.04	-0.860	-0.30	-0.860	-0.30	-0.860	-0.30	0.576	0.35		
lnK_L94	-0.336	-0.18	6.956	1.24	6.956	1.24	6.956	1.24	1.798	0.54		
wagdiff94	2.801	0.75	7.986	1.01	7.986	1.01	7.986	1.01	4.158	0.89		
lnavwag94	1.804	0.34	-0.334	-0.12	-0.334	-0.12	-0.334	-0.12	1.571	0.93	1.563	1.86*
labconc92	-0.951	-0.50	-19.445	-1.76*	-19.445	-1.76*	-19.445	-1.76*	-18.720	-2.91**	-6.657	-1.99**
lnregindwage92	-8.579	-1.18	0.089	0.15	0.089	0.15	0.089	0.15	0.383	1.11		
soctben_c94	0.727	1.87*	1.606	2.03**	1.606	2.03**	1.606	2.03**	1.278	2.75**		
soctben_no94	0.294	0.57	-0.228	-9.10**	-0.380	-5.41**	-0.305	-4.60**	-0.156	-2.37**	-0.064	-2.36**
privsh94	-0.570	-7.80**	-0.185	-1.49	-0.185	-1.49	-0.313	-4.51**	-0.021	-0.29		
inssh94	-0.071	-0.86	0.392	2.10	0.392	2.10	0.214	2.10*	0.019	0.18	-0.149	-3.02**
mansh94	0.099	0.81	-1.394	-0.20	-1.394	-0.20	-1.394	-0.20	-1.315	-0.33	-2.441	-1.34
option 1	-4.762	-1.05	3.300	0.46	3.300	0.46	10.831	2.40**	4.530	1.08	1.844	0.83
lease-buyout	2.037	0.43	6.231	0.85	6.231	0.85	6.205	1.22	5.473	1.27	4.484	1.71
other options	3.629	0.74	27.662	4.47**	27.662	4.47**	21.640	2.87**	31.457	0.70	40.080	2.34
constant	67.719	1.33	18.1	47.6	18.1	47.6	39.0	44.4	15.4			
R <sup>2</sup> (%)	70.9		15.5	23.5	15.5	23.5	34.0	34.0	18.7		9.3	
adj. R <sup>2</sup> (%)	57.6		11.6	11.6	11.5	11.5	25.1	25.1	11.5		30.0	
no. observations	116		451	451	115	115	251	251	115		300	

Italic numbers are t-ratios. \* significant at 10% level; \*\* significant at 5% level; \*\*\* significant at 1% level.

Table 11 continued

	Worker Share	Outsider Share	Share of private outside blockholders
reg_cap	-1.4691	-1.37	-5.647
reg_asia	-3.169	-0.59	-1.24
ind_met	-8.619	-0.53	-7.777
ind_chem	14.552	0.88	6.440
ind_mach	16.560	0.96	8.866
ind_for	27.300	1.01	11.720
ind_cons	13.579	0.83	15.948
ind_ligt	24.431	1.38	16.147
ind_food	12.548	0.84	13.569
ind_othr	17.284	0.82	18.747
size_mid94	8.477	0.97	-6.415
size_big94	3.551	0.26	-6.992
lnemp94	-0.779	-0.18	-2.842
lnprod94	-1.012	-0.26	1.580
exp94	0.038	0.21	-0.009
newequip94	0.033	0.42	0.085
lnprofitb94	-0.826	-0.51	-0.470
wagearr94	-3.351	-1.53	4.375
mic	-5.682	-0.70	-6.741
budsales94	-0.015	-0.21	-0.044
pricecont94	0.041	0.69	-0.052
union94	-0.027	-0.27	0.009
capcosts94	0.068	0.16	0.004
lnK_L94	-1.349	-0.51	0.728
wagdiff94	5.193	0.99	-4.650
lnavwag94	3.816	0.52	-6.812
labconc92	-1.829	-0.68	-0.311
lnregindwage92	-0.432	-0.04	10.860
soctben_c94	-0.295	-0.54	0.658
soctben_no94	0.335	0.45	-1.416
privsh94	-0.223	-2.14	-0.172
inssh94	-0.166	-1.43	0.121
mansh94	0.376	2.15	-0.318
option_1	-0.031	0.00	2.147
lease-buyout	-1.164	-0.17	8.030
other options	0.744	0.11	1.600
constant	-6.959	-0.10	19.278
R <sup>2</sup> (%)	45.8		37.0
adj. R <sup>2</sup> (%)	20.8		33.2
no. observations	115		314
		5.429	0.44
		1.110	0.18
		15.821	0.86
		3.615	0.19
		-2.320	-0.12
		-21.107	-0.68
		-1.222	-0.07
		-9.250	-0.46
		-0.585	-0.03
		18.747	0.78
		5.087	0.52
		15.014	0.95
		-2.842	-0.58
		1.580	0.36
		-0.009	-0.04
		0.085	0.95
		-0.470	-0.25
		4.375	1.75
		-6.741	-0.73
		-0.044	-0.52
		-0.052	-0.74
		0.009	0.08
		0.004	0.01
		0.728	0.24
		-4.650	-0.77
		-6.812	-0.80
		-0.311	-0.10
		10.860	0.92
		0.658	1.04
		-1.416	-1.68
		-0.172	-1.45
		0.121	0.90
		-0.318	-1.59
		2.147	0.74
		8.030	2.18
		1.600	0.39
		19.278	3.36
		37.0	
		33.2	
		116	
		7.936	1.72
		3.824	1.37
		20.205	2.59
		-1.062	-0.15
		-6.901	-1.38
		-1.083	-0.15
		-4.130	-0.68
		-17.774	-0.85
		-10.469	-1.90
		5.094	0.74
		9.680	3.00
		14.765	3.92
		-1.735	-0.35
		10.685	2.42
		0.154	0.72
		0.054	0.63
		-2.913	-1.61
		1.602	0.63
		-9.869	-1.09
		0.045	0.60
		-0.046	-0.64
		-0.038	-0.37
		0.353	0.74
		2.969	0.49
		-17.325	-1.96
		1.069	0.35
		13.222	1.21
		0.631	1.04
		-0.328	-0.39
		-0.071	-0.59
		0.034	0.25
		-0.348	-1.90
		-6.093	-0.82
		1.255	0.18
		-13.461	-1.73
		85.360	0.97
		46.2	
		16.3	
		99	
		315	
		116	
		19.0	
		14.7	
		8.6	
		341	



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*Препринт WP9/2009/02*  
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*Исследования по экономике и финансам*

**Шпренгер К. Выбор структуры собственности: эмпирическое исследование массовой приватизации в России: Препринт WP9/2009/02. — М.: Государственный университет — Высшая школа экономики, 2009. — 64 с. (на англ. яз.).**

Для российских промышленных предприятий, входящих в рассматриваемую в этой статье большую выборку, характерны высокие и постепенно убывающие доли акций, находящиеся в руках менеджеров и работников. В настоящей статье мы оцениваем параметры, оказавшие влияние на принятие решений о приватизации в 1992–1994 гг. и на сложившееся по итогам приватизации первоначальное распределение собственности. Для оценки распределения нами используется тобит-модель с переключением между выборками. Статья представляет собой эмпирическую проверку выводов из модели выбора структуры собственности при инсайдерской приватизации (Агийон, Бланшар 1998). В частности, нами было обнаружено, что сговор между работниками снижает вероятность продажи акций внешним лицам и увеличивает долю работников во владении компанией. Кроме того, для предприятий, находившихся в тяжелом финансовом положении, характерно большее стремление инсайдеров (работников и менеджеров) к приватизации, приводящее к более высокой инсайдерской доле акций приватизированного предприятия. Такой результат может быть объяснен стремлением работников и менеджеров застраховаться от риска остаться без работы. Нами не было найдено никаких свидетельств в пользу гипотезы о влиянии сравнительных результатов работы предприятий на очередность их приватизации.

Шпренгер Карстен

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