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Ownership Structure and Firm Performance in Russia

The Case of Blue Chips of the Stock Market

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Based on panel data from 1995 – 1997, the paper focuses on the impact of ownership structure on the performance of Russian non-financial privatized companies that constitute the group of "blue chips" of the country's stock market. We find that ownership concentration results in higher technical efficiency of enterprises, but benefits from productivity improvements do not adequately materialize in higher profitability and market value of companies. This is consistent with the expropriation hypothesis that large owners use their power to extract private benefits of control. We also find that the association between ownership by different groups of owners and firm performance is relatively weak and subject to reversed causality. There is evidence that ownership by Russian non-state shareholders negatively affects firm value suggesting that this group of owners is inclined to the extraction of private benefits of control.

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CONTENTS

NON-TECHNICAL SUMMARY

Russian privatization has been traditionally criticized for giving rise to several defects in enterprise ownership structure. Among them, the domination of insiders — managers and employees — and substantial dispersion of ownership were regarded as the most important. Both insiders and small outside owners were often considered as lacking necessary incentives or having little opportunities for implementing enterprise restructuring. In the 1990s, the success of the economic reform at the micro-level was thought to be connected with the emergence of "efficient owners", who were usually identified with large external shareholders.

The results of the post-privatization redistribution of ownership from insiders to outside shareholders, which was accompanied by its concentration, have proved to be ambiguous. This cast doubts on the correctness of the earlier prevailing suppositions about the impact of ownership structure on enterprise efficiency, in particular, about the role of large shareholders. The question of what pattern of ownership promoted improvement of enterprise performance appeared on the policy agenda.

Our paper attempts to empirically investigate how ownership structure affects performance of companies, whose shares are traded in the stock market. We focus on these enterprises as, by virtue of their size, they are the major players in the Russian economy. They also deserve a special attention due to substantial dispersion of ownership, which is characteristic of large enterprises. These companies certainly differ from the average enterprise in Russia with respect to industry affiliation, size, privatization methods, and many other parameters. At the same time we believe that by analyzing this group of firms we can reveal patterns which are peculiar to the Russian corporate sector at large.

We investigate how ownership structure affects labor productivity, profitability, and company value, which is measured as Tobin's Q. The choice of these three indicators makes it possible to analyze various aspects of firm activity. For example, labor productivity is a measure of technical efficiency while Tobin's Q characterizes the value of companies from the viewpoint of small shareholders. It is not obvious that a company with higher labor productivity has higher market value. The latter is in many respects determined by the policy of profit distribution among shareholders. If controlling shareholders appropriate the lion's share of its profit using transfer pricing or similar techniques, company value will be low regardless of production efficiency. Thus, the selected measures of

performance characterize both technological and profit distribution aspects of firm activity.

Ownership structure of enterprises is described with the help of variables indicating the share of the three largest shareholders, the share of the three largest private shareholders, as well as by variables reflecting the stakes of the state, state holdings, employees and managers of enterprises (insiders), Russian outside shareholders, and foreign investors.

Regression analysis of data, which are represented by the balanced panel 101×3, is conducted using random effects model. Parameter estimates are obtained with the help of the OLS as well as instrumental variables technique, which is employed to correct regression results for endogeneity of ownership.

Our investigation proves the hypothesis that concentration of ownership brings labor productivity improvements. This result can be explained by better monitoring which occurs under more concentrated ownership structures and which restricts opportunities of managers to pursue their own objectives.

Our analysis shows that the relationship between profitability and ownership concentration exhibits a U-shaped pattern, reaching the minimum when concentration approaches 56%. We also find that ownership concentration negatively affects market value of companies. Thus, efficiency improvements (higher productivity of labor) stemming from ownership concentration do not adequately materialize in higher profitability and market value of companies. These results testify to the conflicts arising between large and small shareholders regarding distribution of company profit. Large shareholders, which wield significant power in the company, appropriate its profit, depriving small owners of their part of residual income.

We also find that the controlling blocks of shares at the disposal of the state or state holding companies prevent large private shareholders from expropriating the small ones. Thus, in 1995 – 1997 state ownership in Russian companies played a positive role in corporate governance.

As regards the role of various groups of owners, we find that larger ownership by Russian outside shareholders, who are not connected to the state, negatively affects company value. This result indicates that this group of owners is inclined to the extraction of private benefits of control and expropriation of small shareholders.

1. INTRODUCTION

Ambiguous results of economic reforms in Russia in the 1990s are attributed to many factors among which corporate governance problems seem to play an important role. It was common to blame the privatization process, which resulted in substantial dispersion of ownership as well as in employee ownership unprecedented by any standard, for the lack of restructuring and poor performance of Russian enterprises. The core problem was seen in the slight involvement of atomistic shareholders in corporate affairs, as well as in the prevalence of particular interests of shareholders-employees which prevented or delayed enterprise restructuring. Not surprisingly, redistribution of ownership from insiders to outside investors as well as concentration of ownership, especially in the hands of outside owners, were typically considered as remedies for inefficiencies emerging in the course of privatization. However, post-privatization changes in the distribution of ownership, which were more or less in line with the above-mentioned suppositions, brought uncertain consequences for company performance. On the one hand, there are many success stories with companies that obtained majority shareholders, especially from abroad. On the other hand, there is extensive evidence, sometimes anecdotal, of the behavior of large shareholders which is directed towards extraction of private benefits of control rather than restructuring of production and improving economic efficiency. Thus, the question of what type of ownership contributes to the revitalization of Russian enterprises and the Russian economy at large is far from being resolved. This paper attempts to shed some light on this issue. It starts with a theoretical overview of the relationship between ownership and performance. Then we survey the most important results obtained through empirical studies to date. The last part of the paper describes the data and methodology, and presents the results of our empirical investigation.

2. OWNERSHIP-PERFORMANCE RELATIONSHIP: A THEORETICAL OVERVIEW

2.1. Traditional approach to corporate governance

Consequences of ownership structure for corporate efficiency and performance have been in the focus of scientific debate over the last 70 years after A. Berle and G. Means published their famous work

The Modern Corporation and Private Property (Berle and Means, 1932). Since 1970s this issue has been usually analyzed in the context of principal-agent relationships between shareholders and managers. In corporations, the agency relationship typically, though not necessarily, emerges as a result of diffusion of ownership, where numerous small owners are incapable to run their firm collectively and have to transfer their control rights to a special subject of governance, *i.e.*, to the management team.

In terms of the agency theory, separation of ownership and control gives rise to agency costs, which worsen performance of companies. Since the interests of management (agents) need not and normally do not coincide with those of owners (principals), there is a considerable risk that corporate resources will be used not in the pursuit of shareholder profit. As a result, corporate shareholders are in need of reliable means of control over managerial behavior.

There are four basic control forces bearing on the corporation that act to bring about coincidence of managers' decisions with those that are optimal from shareholders' standpoint. They are the capital markets, the legal and regulatory system, the product and factor markets, and the internal control system (Jensen, 1997). The latter provides participation of shareholders in governance through election and representation in the boards of directors and serves as the most direct mechanism by which shareholders can influence management. However, the efficacy of this mechanism is limited under diffuse ownership structures when the improvement of corporate governance is a public good for small shareholders. Due to free-riding of small owners, managers face little control and can easily use their discretion for pursuing their own objectives. These may include expropriation of investors' funds, building an empire, or simply living an easy life. After Berle and Means' analysis it has been common to state that dispersed shareholders are "powerless" in the face of managerial opportunism.

According to this line of reasoning, concentration of ownership is a straightforward way to mitigate agency problems between owners and managers. The literature on corporate governance says that large owners have stronger incentives and better opportunities to exercise control over managers than small shareholders. Moreover, some scholars argue that most corporate governance mechanisms used in the world can be viewed as examples of concentrated ownership (Shleifer and Vishny, 1997).

To summarize, the traditional approach views the main corporate governance problem as the opposition of self-interested managers and weak dispersed shareholders.

2.2. Modern perspective on corporate governance

In recent years the concept of corporate governance underwent substantial changes. They were evoked by the fact that widely held corporation, which was the main focus of the corporate governance literature, is a rare phenomenon, except for a few countries with common law origin (Bergloef and von Thadden, 1999). In the rest of the world, including most European countries, relatively concentrated ownership prevails. In companies with concentrated ownership, managers are no longer able to act at their own discretion and are constrained to devising company strategies that are subject to non-transparent obligations which large blockholders impose on them. As a result, the framework of corporate governance enlarges to embrace tangled relationships between managers, large blockholders, and minority shareholders.

This new framework introduces substantial complexity in the analysis of ownership-performance relationship. In particular, it becomes clear that concentrated ownership has its costs. They may arise when large shareholders, capable to influence corporate decisions directly, maximize value for themselves and deprive small owners of their part of residual income. This phenomenon has received much attention in the literature under the name of "extraction of private benefits of control" (*e.g.*, Barclay and Holderness, 1989). To the extent these private benefits of controls are pecuniary (as it is the case, *e.g.*, with transfer pricing), corporate performance deteriorates. Other negative consequences of ownership concentration include raised cost of capital due to lower market liquidity or decreased diversification opportunities on the part of investors (Fama and Jensen, 1983). Moreover, concentrated ownership prevents additional monitoring of managers by the stock market, which is available under diffuse ownership with high liquidity of shares (Holmstrom and Tirole, 1993). Some recent studies point out that too high concentration of ownership may lead to excessive monitoring of managers by shareholders which in turn can reduce manager initiative. This initiative is not necessarily considered as harmful; in fact, it can be beneficial as it induces managers to make firm-specific investments (Burkart *et al*., 1996). Hence, there is a trade-off between monitoring gains obtainable through concentration of (outside) ownership and potential benefits from providing managers with some discretion through more diffuse ownership structures.

To summarize, the traditional approach, which focuses on minority shareholders protection from managerial opportunism, is now under fire as "too narrow". Its deficiencies are particularly obvious in applications to developing and transition countries, where large strategic investors

are the major players on the corporate governance scene (Bergloef and von Thadden, 1999).

Recent literature on corporate governance also pays much attention to the issue of shareholder identity. It stresses that the objective functions and the costs of exercising control over managers vary substantially for different types of owners. The implication is that it matters not only how much equity a shareholder owns, but also who is this shareholder — a private person, worker, manager, financial institution or non-financial enterprise.

Among different ownership patterns *managerial ownership* seems to be the most controversial as it has ambivalent effects on firm performance. On the one hand, it is considered as a tool for alignment of managerial interests with those of shareholders. Managerial ownership provides managers with monetary incentives to maximize profit and thus improves company performance (Jensen and Meckling, 1976). On the other hand, managerial ownership promotes entrenchment of managers which is especially costly when they have low qualification or prefer to live an easy life (Morck *et al*., 1988; Stulz, 1988). The overall impact of managerial ownership on corporate performance depends on the relative strengths of the incentive alignment and entrenchment effects. The conclusion is that the optimal stake of managers cannot be derived from the existing theories and should be determined through empirical studies.

The outcome of *outside ownership* depends on the degree to which outsiders are able to monitor and control managers. It is assumed that concentration of outside ownership increases the likelihood that such control will be exercised. However, the effect of ownership concentration in the hands of outside owners on company performance is not necessarily considered as continuous. In fact, a more realistic approach is to view this effect as a discontinuous function depending on the distribution of control over the firm. For example, quite different governance patterns may exist when there is a single majority owner who controls the firm, there are two large shareholders with confronting interests, or there is no clear locus of control.

Some groups of outside investors may deliberately abstain from having large ownership stakes. This is the case with many financial institutions — banks, insurance companies, investment funds, *etc*., which prefer liquidity of their investments to exercising tighter control over companies (Coffee, 1991). Industrial firms, if they are shareholders in other companies, usually tend to take a more active position in corporate governance.

Employee ownership. Frydman and Rapaczynski (1994) point out that from the corporate governance point of view employee ownership has

long been considered a bad idea by Western economists. Yet several theoretical arguments can be presented both in favor of employee ownership, and against it. Hansmann (1990, p. 307) argues that employees of almost all industries are in a very good position to monitor the management of the firm for the following reasons: "the majority of their income typically comes from their work relationship with the firm; they are in daily contact with the firm operations, and knowledgeable about some aspects of them; and they are easily organized for collective decision making". On the other hand, collective actions, and consequently control, are hampered because employees have different objectives due to their difference in age, part of enterprise where they are employed, and their value to the company (Hansmann, 1990).

Monitoring problem is just one of the consequences of employee ownership which affect enterprise performance. Employee ownership also has an impact on the opportunities of firms to raise capital as well as to mitigate agency problems between the manager representing the owner and the employees. Many scholars argue that employee-owned firms have worse opportunities to raise external funds compared to outside-owned firms. The core problem is the risk facing potential investors that the funds will be used to maintain and pay the inputs of labor rather than the inputs of capital. Employee ownership is also said to provide a solution to the agency problem between manager and employee, *i.e.*, to the classical conflict between capital and labor. However, the opponents of this viewpoint claim that employee ownership can hardly result in increased efforts on the part of employees, especially in large firms. Each employee is entitled to a small fraction of extra profit generated by his or her effort; hence, there is a free-rider effect. On the other hand, even if the incentive effects of employee ownership are indeed negligible, it may foster mutual monitoring among employees who have a direct interest in company performance. Thus, the theory seems not to provide us with any definite conclusion on consequences of employee ownership for firm efficiency and performance.

State ownership. With respect to this form of ownership there is much more unanimity in the academic circles. State ownership has been regarded as inefficient, especially during the last two decades. For example, De Alessi (1980) and De Alessi (1982) define state-owned enterprises as "political" firms with general public as a collective owner. A specific characteristic of these firms is that individual citizens have no direct claim on their residual income and are not able to transfer their ownership rights. Ownership rights are exercised by some level in the bureaucracy, which has vague incentives to improve firm performance. Vickers and Yarrow (1988) consider the lack of incentives as the major

argument against state ownership. Other explanations for inefficiency of state ownership include the price policy (Shapiro and Willig, 1990), political intervention (Shleifer and Vishny, 1994), and human capital problems (Krueger, 1990).

3. EMPIRICAL EVIDENCE

3.1. Developed economies

This section provides a review of empirical studies on ownership-performance relationship which have been conducted in the West. Most of them are based on data from the United States and to a large extent follow Berle and Means' traditional approach.

Demsetz and Lehn (1985) use cross-sectional regression of accounting rate of return on a number of variables reflecting ownership concentration (percentage of shares controlled by top five and top 20 shareholders, Herfindahl index of ownership concentration). They report no statistically significant relationship between profitability and ownership concentration and suggest that this finding testifies to that the existing ownership structures have been optimized in the natural selection process.

Prowse (1992) applied Demsetz and Lehn's model to Japanese data. Similarly to the American case, he does not find any statistically significant relationships between ownership concentration and firm performance in Japan.

Morck *et al*. (1988) examine the relationship between Tobin's Q (the ratio of the market value of firm to the replacement value of its assets) and the fraction of stock held by the members of the board of directors using a sample of 371 U.S. firms. They find that ownership concentration is positively related to Tobin's Q as long as the stake of directors does not exceed five per cent, negatively between five and 25 per cent and has some weak positive effect beyond this interval. A weaker relationship is found when accounting rate of return is used as performance indicator. In other words, these findings testify to the presence of two effects associated with managerial ownership: convergence of interests and entrenchment problem. The authors also discuss some other explanations for the positive relationship between performance and managerial ownership when the latter is relatively small. They suggest that reversed causality may play a substantial role there. The argument is that managers of high-performing firms may receive large compensation in the form of

equity, thus it may be performance that affects managerial ownership and not the other way around.

McConell and Servaes (1990) investigate the link between ownership structure and the value of firm, measured by Tobin's Q. Among different ownership categories they distinguish between the stake of insiders (directors), the stake of institutional investors, and the one of large outside blockholders (not represented in the board of directors). They find a reversed U-shaped relationship between Tobin's Q and shareholdings of insiders. Besides, they report a positive relationship between Tobin's Q and the fraction of shares owned by institutional investors.

Zeckhauser and Pound (1990) find that large shareholders, who act as an interested in monitoring group, exert positive influence on performance of firms with low levels of specific capital (firms with low R&D-sales ratio). In such firms, the presence of owners wielding over 15 percent of stock has a positive significant effect on price-earnings ratio. This implies abnormal expected growth of future earnings for such companies.

Agrawal and Knoeber (1996) analyze the interdependence among alternative control mechanisms, namely shareholdings of insiders, institutions, and large blockholders, the use of outside directors, debt policy, the managerial labor market, and the market of corporate control. They report a positive effect of shareholdings of insiders on firm performance measured by Tobin's Q. Also, they find that shareholding by blockholders and institutions are alternative avenues for outsider activism.

Edwards and Weichenrieder (1999) investigate the effect of large shareholders on wealth of minority investors in Germany. They report that two beneficial effects associated with the presence of large shareholders, namely better monitoring of management and reduced incentives to exploit minority shareholders outweigh harmful effects connected to the extraction of greater private benefits of control.

Holderness *et al*. (1999) study how ownership and governance have evolved since the Great Depression. They find that managerial ownership of publicly traded firms increased on average from 13% to 22% between 1935 and 1995. It indicates that the separation of ownership and control was not complete even in the 1930s, when Berle and Means' hypothesis was advanced. Another important finding is that profitability is significantly increasing with increase of management ownership in the $0 - 5\%$ range and decreasing in the $5 - 25\%$ range in the 1935 sample. For the 1995 sample, Tobin's Q is significantly increasing in the $0 - 5\%$ range.

It should be noted that the dominant approach for tackling the issue on ownership-performance relationship has been a regression analysis of cross-sections of firms, in which profitability or Tobin's Q are used as dependent variable and various characteristics of ownership structure play the role of regressors. Yet there are other methodological approaches. For example, Wruck (1988) examines a change in firm value at the announcement of private sale of new equity. The rationale for this study is that private sale of equity, in contrast to public offerings of securities, increases ownership concentration. She reports that ownership concentration exerts positive impact on firm value.

To sum up, there is no complete consistency in findings that have been obtained through empirical investigations in the West. Inconsistencies can partly be attributed to the variations in performance measures employed in different studies. For example, no relationship between ownership and performance is typically found when performance is measured as accounting rate of return. On the contrary, some results obtained for Tobin's Q seem to conform to the theory predicting positive effect of ownership concentration and mixed effect of managerial ownership.

Also, several issues have virtually been left out of quantitative investigations in the West. For example, empirical analysis of investor ownership versus worker ownership is uncommon since these ownership forms prevail in different industries. In the United States worker ownership dominates in the service professions, including law, management consulting, advertising, architecture, engineering and medicine and is rare in industrial firms where investor ownership prevails (Hansmann, 1990).

3.2. Transition economies

The relationship between ownership and performance in transition countries has received enormous attention due to both extensive policy implications and the possibility to gain new insights into the economic theory. As noted by Frydman *et al*. (1997), a great diversity of ownership forms on the early stages of their evolution and the distribution of these forms regardless of their efficiency for particular types of business enable to study the relative advantages of different ownership forms before the less efficient of them will disappear. They also point out that underdevelopment or non-existence in the transition environment of many mechanisms substituting for the role of owners (*e.g.*, the market for corporate control and bankruptcy enforcement) gives a chance to disclose the "real" effect of ownership. This section briefly surveys recent empirical evidence on the link between ownership and performance in transition and developing economies.

Xu and Wang (1997) examine ownership-performance relationship for a sample of Chinese publicly listed companies. They document a positive and significant correlation between ownership concentration and profitability as well as the importance of large institutional shareholders in corporate governance and inefficiency of state ownership.

Frydman *et al*. (1997) find a positive impact of private ownership on revenue-generating, cost restructuring, expanding employment and on overcoming the severe shock of "marketization" in transition economies. They also discuss performance differences among various types of private ownership, and several of their findings in this area run contrary to widely held beliefs concerning the effects of managerial ownership and the role of privatization funds and foreign investors.

Using a cross-section of 706 Czech firms over the period 1992 – 1997, Claessens and Djankov (1999) find that more concentrated ownership is associated with higher profitability and labor productivity. These findings are weakly robust to the inclusion of control variables for the type of ownership, or to the correction for the endogeneity of ownership concentration.

In spite of long history of ownership debates in Russia, empirical evidence on actual ownership-performance relationship is not very extensive. Most papers are based on relatively old data that were collected at the end of the voucher privatization process. Besides, they rarely go far beyond describing various ownership patterns that emerged in the course of privatization. A typical example is *EBRD Transition Report* (1995) that contains strong statements about inefficiency of insider-dominated firms which are supported by vague empirical evidence from the early post-privatization period in Russia and Eastern Europe.

Frydman *et al*. (1996) define Russian economy as "insider-dominated" without drawing clear distinctions between managers and workers. A study by Blasi (1996), which was prepared for the Federal Commission for the Securities Market, leaned on interviews with general directors that were conducted at the end of 1995. According to Blasi, Russian companies were largely owned by insiders with the largest stakes held by workers. He pointed out that workers were often passive shareholders and did not participate in corporate decision-making. Ownership by managers reached a very high level in some companies and was still increasing. Outsider ownership increased since the end of voucher privatization and seemed to level off over 1995.

A paper by Willer (1997) is among those studies which are closely related to the subject of this paper. His study is based on a sample of 140

largest joint-stock companies and shows that large shareholders are able to put more pressure on management. This finding could be extended to substantiate that the presence of large shareholders improves firm performance.

Earle (1998) examines the impact of ownership structure on the performance of Russian firms soon after the conclusion of voucher privatization in 1994. The author uses labor productivity as measure of company performance and employs two-stage instrumental variables estimation to correct regression results for endogeneity of ownership. He reports a positive impact of outside ownership and ownership by managers on firm productivity.

Buck *et al*. (1999) use a survey data from Russia, Belarus, and the Ukraine and find that the influence of employee (and managerial) ownership seems to be fairly benign. Their findings also show that outside ownership is associated with more active asset retrenchment strategies in crisis situations.

Brown and Earle (2000) use an extensive panel dataset from 1993 – 1998, covering 82% of industrial employment in 1993. They find that the best performers are municipally owned firms, which are followed by firms with mixed (state and private) ownership, regionally and federally owned firms, joint ventures, and 100% private firms. Among private ownership types, firms with greater insider stake and shares sold at voucher auctions have performed significantly worse, while firms with holding company shares, foreign shares, and golden shares have performed better.

Kapelyushnikov (2000) sums up the results of three surveys by Russian Economic Barometer conducted in 1995, 1997, and 1999. He reports a non-linear relationship between ownership concentration and performance: the best performing firms have moderate ownership concentration measured by the stake of their largest shareholders. He also stresses the importance of distinguishing between the identities of large shareholders in order to draw credible inferences on the role of ownership concentration. In his study, the worst performance turns out to be typical of firms with the highest ownership concentration. The largest shareholders in such firms are non-financial outsiders (mainly individual shareholders affiliated with managers) or the state. The author suggests that the principal function of non-financial outsiders is to protect a firm (*i.e.*, its managers) from financial outsiders.

To summarize, quite different and sometimes contradictory results have been obtained through numerous investigations in transition countries. Thus, the relationship between ownership and performance deserves additional attention.

4. AIM OF THE STUDY

The principal aim of this study is to investigate the impact of ownership concentration on the performance of Russian non-financial privatized enterprises that constitute the group of "blue chips" of the country's stock market. This is to test the hypothesis once advanced by Berle and Means that company performance to a large extent depends on the degree of ownership concentration, and higher ownership concentration is associated with better performance. The second goal is to examine the impact of different ownership forms or different groups of owners on corporate performance. The main hypothesis is that insider ownership has a negative effect on firm performance while various forms of outside ownership lead to its improvement.

The study focuses on publicly traded companies for several reasons. First, most of these enterprises are large in size and have substantial impact on the Russian economy. Second, significant dispersion of ownership, which is typical of large companies, calls for a special attention. Last but not least, by studying traded companies one faces less severe data problems as ownership and financial information about these firms is relatively easy to obtain.

This study offers a contribution to the debate on corporate ownership in Russia as it employs more recent data and improved methodology in comparison with previous studies. A bulk of existing empirical evidence comes from data collected at the time of privatization or the early post-privatization period. The findings from these studies can be questioned, as it is unclear whether advantages of various ownership structures could be realized within a short period after privatization of firms. Moreover, by dealing with data from 1993 – 1994 a researcher faces a large incidence of residual state ownership, which makes it problematic to investigate the effect of ownership concentration, as it is traditionally perceived in corporate governance studies — concentration of private ownership. Therefore, by using more recent post-privatization data from 1995 – 1997 we may obtain more sound conclusions regarding the impact of ownership on company performance. From the pure technical viewpoint, the study differs from many previous papers as it is based on panel data and employs instrumental variables technique to correct regression results for endogeneity of ownership.

5. DATA AND SAMPLE DESCRIPTION

We have data on Russian companies compiled from the blue chips database of the Skate Financial Press Agency. The original database contains

financial and ownership information for 236 firms, whose shares were traded in the stock market in 1997 – 1998. From this list we excluded companies belonging to the financial sector, newly created firms, as well as firms with no established secondary market for their shares by the end of 1995, 1996, and 1997. In addition, we excluded several firms for which financial and ownership information in 1995 – 1997 was inaccessible[1] and two companies — Gazprom and Unified Energy Systems — which, being virtually states within the state, have a very special position in the Russian economy. In some cases, the data from the Skate Press were supplemented by information from the Federal Commission on Capital Markets web-site,[2] Gnosis and AK&M databases, Brunswick Brokerage's Russian Equity Guide yearbook, and the Russian financial press. The resulting database contains key financials, employment, capitalization, and ownership data for 101 Russian companies.

Sample structure by size. Table 1 presents the distribution of the sampled firms across size categories distinguished in the official Russian statistics: medium-size enterprises (200 – 999 employees), large enterprises (1000 – 9999 employees), and extra-large ones (more than 10000 employees). The sample mainly covers extra-large enterprises, and the distribution of firms across different size categories is rather stable within the period.

Table 1. Sample distribution by size.

	1994	1995	1996	1997
Medium (less than 1000 employees)	2	2	2	1
Large (from 1000 to 10000 employees)	33	33	35	37
Extra-large (more than 10000 employees)	66	66	64	63

More detailed descriptive statistics for some key financials, employment, and capitalization data for the sampled companies are shown in Appendix 1.

Sample structure by industry. Sector affiliation of the sampled companies is reported in Table 2. Five industries, namely oil, gas & chemical,

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[1] Oil holdings ONAKO, Sibneft, Eastern Oil Company are examples of firms that started to provide consolidated financial reporting in 1997 at best.

[2] See http://disclosure.fcsm.ru.

metallurgy, power utilities, telecoms, and engineering together amount to 86% of the total number of firms in the sample. Table 2 also shows the distribution of the top 200 Russian companies with the highest market capitalization across basic industries.[3] The sample can be regarded as reasonably representative with respect to the sector affiliation of the largest publicly traded companies.

Table 2. Sample distribution by industry.

	Sample		"Expert-200"	
	No. of firms	%	No. of firms	%
Oil, gas, and chemical	22	21.8	54	27.0
Metallurgy	18	17.8	14	7.0
Telecommunications	17	16.8	52	26.0
Power utilities	16	15.8	41	20.5
Engineering	14	13.9	23	11.5
Transport	6	5.9	6	3.0
Pulp and paper	3	3.0	2	1.0
Food processing	2	2.0	5	2.5
Others	3	3.0	3	1.5
Total	101	100	200	100

Regional distribution. Distribution of the sampled companies across the major economic regions of the Russian Federation is shown in Table 3. The lion's share of companies (74%) is located in five major regions: the Urals, West Siberia, North-West, Central, and Volga. The table also provides information on the location of the Expert-200 companies with the highest market capitalization in 1998. In a more detailed classification (not reported) the sampled firms are distributed across 33 administrative areas or "subjects of the Federation", among which the capitals as well as Tyumen, Chelyabinsk, Samara, Sverdlovsk, and Irkutsk oblast dominate.

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[3] The data are taken from the Expert-200 list as of September 1998.

Table 3. Regional distribution of the sample.

	Sample		"Expert-200"	
	No. of firms	%	No. of firms	%
North	5	4.9	7	3.5
North West	15	14.9	11	5.5
Central	12	11.9	48	24.0
Volga-Vyatka	3	3.0	17	8.5
Black-earth	3	3.0	9	4.5
Volga	12	11.9	18	9.0
North Caucasus	4	4.0	16	8.0
Urals	19	18.8	27	13.5
West Siberia	17	16.8	24	12.0
East Siberia	6	5.9	10	5.0
Far East	5	4.9	13	6.5
Total	101	100	200	100

Privatization of the sampled companies. With respect to privatization patterns the sampled companies differ substantially from what was observed in Russia at large.[4] The so-called option 2 (majority ownership by workers and managers) was chosen by 40 companies while 61 companies went through option 1 privatization (no majority ownership by insiders). For the whole country the following statistics are available: of all enterprises privatized by the end of voucher privatization 25% chose option 1, 73% — option 2, and only 2% — option 3 (Boycko *et al*., 1995, p. 98). The sample has a very high percentage of firms privatized under option 1 since it includes many large and extra-large capital-intensive companies in which insiders were often incapable to accumulate enough funds to buy 51% of shares.

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[4] The Russian privatization program allowed three major models of privatization, the so-called option 1, option 2, and option 3, the main difference among which was the amount of shares offered for insiders at preferential terms.

There is another distinct feature of the sample. After initial distribution or sale of shares to employees, subsequent privatization of most Russian enterprises was conducted through voucher auctions, money auctions or investment contests. In contrast to that, a lot of the sampled companies were privatized through the transfer of shares remaining at state disposal to some holding company which later on could remain either state-controlled (*e.g.*, Svyazinvest) or fully privatized (*e.g.*, Yukos).[5] In other words, privatization of some of the companies was conducted outside the market, and was determined by political decisions. In most cases holding companies became the owners of controlling blocks of shares accumulating over 51% of voting stock. Such holding privatization was implemented in 48 companies — about half of the sampled firms.

This way of privatization was typical of all telecommunication companies (excluding Rostelecom, in which the government held a significant stake during 1995 – 1997), power utilities (excluding Irkutskenergo), and many oil extraction companies. It should be pointed out that a large number of companies privatized through this method are not a specific characteristic of the sample; rather, it is peculiar to the majority of Russian firms that constitute the basis of the country's stock market.

Thus, with respect to holding privatization the sample seems to be representative if the population is associated with the "blue chips" group and unrepresentative for the population of all Russian privatized enterprises. It should also be emphasized that out of the mentioned 48 companies that underwent holding privatization, 36 were partly owned by some state-controlled holding at the beginning of 1997.[6] Besides, minority blocks of shares of some other companies were also transferred to state-controlled holdings. In 1997 several state holdings had minority ownership stakes in six companies included in the sample.

The last remark with respect to privatization of the sampled companies is that six of them went through "loans-for-shares" scheme in 1995, when a number of Russian banks obtained substantial blocks of their shares as collateral for providing the government with interest-free loans. This scheme was applied to the total of 12 Russian enterprises. Neither of the loans was ever repaid and the banks became the owners of the shares.

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[5] Starting from here the transfer of controlling blocks of shares to holding companies will be referred to as to "holding privatization".

[6] A holding company is defined as state-controlled if the government has a controlling block of its voting stock.

6. METHODOLOGY

6.1. Performance measures

The concept of enterprise performance allows many interpretations. In applied studies it is common to associate improvements in firm performance with increased profitability, higher efficiency, and increased output (Bevan *et al.*, 1999).

The spectrum of alternative profitability measures includes income, return on equity, return on assets, and return on sales. These measures are based on the income before deduction of interest (the return to both equity and debt holders), taxable or net income (the return to equity holders) depending on what is the focus of a specific study.

Total factor productivity, which is the best measure of enterprise efficiency from the theoretical viewpoint, is not widely used due to difficulties in measuring capital stock. Instead, many studies focus on efficiency in terms of labor productivity. This indicator, however, is of short-term nature since it is based on the implicit assumption that the level of capital remains unchanged.

As proxy for expected long-run firm performance many studies use Tobin's Q, which is defined as the ratio of the market value of company to the replacement value of its assets. In most cases Tobin's Q is calculated as the ratio of the market value of equity plus the book value of debt to the book value of assets since the market value of debt and the replacement value of assets are often unknown. The reliability of this indicator clearly depends on the degree of stock market efficiency. Moreover, as this measure is normally constructed using the book value of assets in the denominator, distortions can be expected due to inadequate measurement of capital.

Measurement of enterprise performance in transition economies faces additional difficulties. They primarily stem from high inflation rates and changes in accounting standards. In Russia the problem of measuring capital stock seems to be the most severe one — historical values of fixed assets, which were based on "socialist" prices, underwent several mandatory revaluations during transition period when current values of assets were determined by multiplying their old book value by some coefficient. Moreover, possible distortions of figures reported in income statements must be taken into account. With respect to sales these distortions can be caused, *e.g.*, by arbitrariness of pricing when firms use barter and other non-monetary forms of payment, which are still widespread in Russia. The biggest concern is profit if measured net of taxes

since taxes are often viewed as endogenous rather than parametric (Schaffer, 1998).

Many studies in transition economies rely on labor productivity as the best measure of enterprise performance (see, *e.g.*, Earle, 1998).

Some authors have utilized Tobin's Q to analyze enterprise performance in several transition economies with fairly well developed stock market. Among them, there are a study of Czech firms (Claessens *et al.*, 1996) and an analysis of investment performance in Russian enterprises in 1995 − 1996 (Perotti and Gelfer, 1998). As pointed out by Bevan *et al.* (1998, p. 8), Perotti and Gelfer's findings suggest that before the 1998 economic crisis "Tobin's Q was a reasonably robust explanatory variable" in Russia.

Taking the above discussion into account it should be stressed that no one of possible performance indicators can be given the absolute priority. On this ground it may be advantageous to employ several measures rather than select a single one relying on subjective assumptions about their appropriateness.

In this study we consider three measures of firm performance, namely labor productivity, profitability, and Tobin's Q. This choice is motivated by the assumption that these performance indicators may have different interpretations as characterizing different aspects of firm's operations. For example, labor productivity can be interpreted as a measure of enterprise efficiency that refers to the technological dimension of firms. Unlike labor productivity, Tobin's Q, which is calculated on the basis of share prices, reflects company value for small shareholders. Though there is an obvious connection between these two performance measures (labor productivity improvements should be reflected in higher prices of shares and, consequently, higher Q) the latter indicator captures other significant factors, *e.g.*, risks of expropriation of small shareholders by large owners. The value of a company with high labor productivity (or technical efficiency in general) may be low if large shareholders appropriate the lion's share of company profits using transfer pricing or similar techniques.

Before constructing performance indicators we made some adjustments to the accounting data in order to reduce the impact of inflation and to eliminate several imperfections of the Russian accounting practices. These procedures are described in Appendix 2.

We calculate labor productivity as the ratio of sales revenues excluding VAT and excises (all adjusted for inflation) to year-average number of employees. Profitability is defined as gross profit (net of interest and de-

preciation, but gross of taxes) over book value of equity at the year-end (all adjusted for inflation). Due to substantial discrepancies between the market value of debt and the value of debt in the balance sheets of Russian companies, the traditional market-to-book proxy for Tobin's Q is not used. Following Perotti and Gelfer (1998), Tobin's Q is defined as the ratio of the market value of equity to the book value of equity. To calculate Tobin's Q we use unadjusted year-end values of market capitalization and book values of equity. Descriptive statistics for the mentioned performance measures are given in Appendix 3.

As it follows from Appendix 4, which presents correlations between the selected performance indicators, the correspondence among them is far from perfect. Labor productivity, which is often considered as the best indicator of company performance, turns out to be positively correlated with profitability; the link implies that more productive companies are more profitable. The correlation, however, is rather weak. Tobin's Q is almost unrelated to labor productivity in 1995 and 1996, but is strongly correlated with profitability. The latter result testifies to that Tobin's Q is not completely meaningless indicator of company performance; a more general conclusion is that the selected performance measures characterize different aspects of company operations.

6.2. Ownership variables

There is no well-established tradition of selecting specific ownership measures for the analysis of ownership-performance relationship. In each particular case the choice of these measures depends on availability of information and their appropriateness for specific research questions. For example, papers focusing on the impact of ownership concentration tend to employ the Herfindahl index or the equity stake of several largest investors (typically the top five shareholders). Sometimes these measures undergo a logistic transformation in order to convert bounded ownership variables into unbounded ones, what was implemented by Demsetz and Lehn (1985). Other authors, especially those who investigate transition economies with low availability of data, use equity stake of the largest shareholder (Kapelyushnikov, 2000). When analyzing the role of different groups of owners it is common to distinguish state ownership, ownership by insiders, and ownership by outside owners. The latter two categories are often disaggregated into managerial ownership and worker ownership, and ownership by financial outsiders and non-financial ones correspondingly. Sometimes outside ownership is divided into ownership by domestic shareholders and ownership by foreign investors.

Due to the absence of detailed ownership data in the Skate dataset two simple indicators of ownership concentration are calculated. The first one, the variable *sum3*, measures ownership concentration as percentage of voting shares in the hands of the top three shareholders without drawing distinction between different groups of owners. Since various state-controlled holdings and the state itself are large shareholders in many of the sampled firms, and their objective functions and behavior can be different from those of private investors, the second indicator, the variable *top3*, is defined as percentage of voting shares in the hands of the top three private investors. It reflects concentration of ownership in the hands of shareholders, which are not related to the state.

Among different groups of owners we identify state ownership, ownership by state-controlled holdings, ownership by insiders and by outside investors. The latter category is divided into two sub-categories: ownership by foreign investors, and ownership by domestic physical and legal persons. The quality of data does not allow distinguishing between managerial and worker ownership in the majority of the sampled firms. Yet we can make a plausible conjecture regarding the distribution of insider ownership between workers and managers by looking at size of the sampled companies. In Russia it is a well-documented phenomenon that the smaller the enterprise the larger the equity stake of managers (Afanasiev *et al*., 1997). Thus, for the sampled companies with average employment over 22 thousand people in 1994, it is unlikely that managers are among their largest shareholders. When insider ownership is substantial it is likely to be represented by worker ownership rather than managerial one. This can also lead us to another conjecture that ownership concentration primarily refers to outside owners since worker ownership is dispersed by definition and substantial managerial ownership must be an exception rather than a rule for these companies.

Descriptive statistics for ownership variables are shown in Appendix 5. In 1995 – 1997 the main tendency in the evolution of ownership structures was a steady decrease of insider share and a rapid increase of outside, especially foreign, ownership. The most stable among all ownership variables is ownership by state holdings.

6.3. Model specification

The nature of the data we have allows several research strategies. First, the data can be disaggregated and analyzed separately for each year. In this case there is an opportunity to reveal the impact of rapid institutional changes, which were characteristic of Russia in the 1990s, *e.g*., the adoption of the new law on joint-stock companies. An advantage of this

strategy is the possibility to avoid biases due to inappropriate handling of high inflation in the 1990s. However, the size of the sample that is used in this research (101 firm) is hardly enough to conduct the year-by-year estimation. Since a number of control variables should be included in addition to the explanatory ones, the number of observations for each regressor does not exceed 10 and it can easily be predicted that regression coefficients will be insignificant. Given the nature of the sample that embraces enterprises from a small group of Russian "blue chips" companies there is no opportunity to increase the number of observations. Therefore, in what follows the data are analyzed simultaneously as panel 101×3. The panel is balanced; the number of observations in each regression is 303.

To reveal the impact of various ownership structures on firm performance we estimate equations of the following general form:

$$\text{PERF}_{it} = \alpha_i + \sum_j \beta_j H(j)_{it} + \sum_k \gamma_k Z(k)_{it} + \varepsilon_{it},$$

where PERF is one of the selected performance measures, $H(j)$ is the component number j of the vector of variables representing ownership characteristics of firm (*e.g.*, variable representing ownership concentration), $Z(k)$ is the component number k of the vector of control variables, α_i refers to time-invariant firm-specific effects and ε_{it} is a random disturbance.

Control variables are included in order to prevent the situation when a significant correlation between performance indicator and ownership variable is a spurious result of a correlation between these two variables and a third omitted one. For obvious reasons it is worth to control for different industries. In all the regressions we include dummies for five industries: metallurgy, machine building, oil and gas, power utilities, and telecommunications.

Firm size is another important parameter in our analysis as it can be correlated with both ownership and performance. For example, firm size can be related to ownership concentration since larger companies usually started with more dispersed ownership due to the specifics of the Russian privatization program (extensive employee ownership). The impact of size on firm performance may even be non-monotonic. On the one hand, larger firms have more resources and having access to more resources could lead to higher performance. Besides, larger firms may effectively lobby their interests in the government (to receive tax indulgences or a state order to manufacture certain products, *etc*.). This is especially true of the sampled companies, some of which have over hundred thousand employees. Thus, there may be a positive correlation

between the size and performance of firms. On the other hand, the adjustment of larger companies is typically more complicated and time-consuming process (*e.g.*, political and social reasons may prevent large firms from rapid employment restructuring); as a consequence they may perform worse than smaller companies. Therefore, to control for firm size we use the variable *size*, which equals the logarithm of employment in 1994, and its squared value. The complete list of variables is shown in Appendix 15.

Whenever possible, we use multiplicative models in which the dependent variable is the logarithm of some performance indicator. Linear specifications are applied for profitability whose negative values make computation of logarithms non-feasible.

6.4. Estimation techniques

There are three basic estimation techniques for panel data. First, a panel can be analyzed as simple cross-section in case the variation of individual firm effects (time-invariant characteristics of firms) does not differ significantly from zero. This assumption can be checked up with the help of Breush and Pagan Lagrangian multiplier test. In case the test shows that the variation of individual effects is different from zero, there is a choice between fixed and random effects approaches. The distinction between them is in the interpretation of individual effects and in the underlying assumptions concerning error terms.

Fixed effects model is reasonable if we are confident that the differences between units can be considered as parametric shifts of the regression function. It is argued that fixed effects model may be regarded as applying only to the cross-sectional units in the study, not to additional ones outside the sample. Sometimes it is more appropriate to treat individual specific constant terms as randomly distributed across cross-sectional units (if sampled cross-sectional units were taken from a large population). In this case the random effects model seems to be a more reasonable approach (Greene, 1997). Greene (1997, p. 632) also points out that "the distinction between fixed and random effects models is an erroneous interpretation". There is no clear answer what model should be used in a particular case. One view is that individual effects should always be interpreted as random (Mundlak, 1978). However, to use random effects model one must be confident that its underlying assumptions are met. Hausman test provides means to test for orthogonality of the random effects and regressors, a necessary condition for using this approach.

There are also *a priori* reasons to believe that given the nature of the data random effect estimation is more suitable. The main argument is that for a short panel and explanatory variables with low variation (as it is the case with ownership variables) using fixed-effect approach will lead to the situation when only a handful of firms will drive the results for regressors. Besides improper estimation of the coefficients, the endogeneity problem may be more severe in this case. Thus, following Mundlak and the above-mentioned considerations, the panel is estimated using random-effects approach.

6.5. Endogeneity problem

Analysis of the impact of ownership on firm performance often relies on the implicit assumption that ownership structure is exogenous, *i.e.*, not affected by performance itself. This assumption, however, can be questioned in many ways. As mentioned in the theoretical overview, the most evident case is managerial ownership, which is often affected by firm performance (managers receive compensation in the form of equity). For ownership structures that emerge during transition period, endogeneity problem may be especially severe. Different interest groups might try to select better firms for their investments and this selection may be expected on the part of both outside investors and insiders.

Treatment of the endogeneity problem is now considered an important part of analyses of ownership-performance relationship. In the 1980s it was common to leave the issue out of careful consideration just mentioning possibility of reversed causality between the "dependent" and "independent" variables (*e.g.*, Demsetz and Lehn, 1985; McConnel and Servaes, 1990). Since that time, a number of authors have taken the issue into account when analyzing the role of ownership (Earle, 1998; Claessens and Djankov, 1999; Brown and Earle, 2000). In some cases, this has led to substantial changes in study results.

As applied to our dataset, there are reasons to consider a part of the ownership variables as exogenous and the other part as being subject to endogeneity. The first group embraces state ownership and ownership by state holdings. We believe that after conclusion of mass privatization the values of these variables were determined by political rather than by economic factors (*i.e.*, they were hardly influenced by company performance). In particular, the decision to transfer state blocks of shares to holding companies looks as politically motivated. Also, one can wonder if the decision to "freeze" large blocks of shares of some companies (whose shares were rather liquid and might be relatively easy sold in the

stock market) in state ownership had an economic rationale rather than a political one.[7]

A picture is less clear concerning the other ownership variables. On the one hand, all the above-mentioned arguments about endogeneity hold. On the other hand, owing to holding privatization ownership concentration can be seen as to a large extent "imposed" on the firms rather than determined by the market. Also, the effect of selection of better enterprises on the part of investors may be relatively small — all the sampled enterprises form a relatively homogenous group of "blue chips" of the stock market. Besides, the dataset is constructed in such a way that additionally reduces the scope of the problem. All the ownership variables contain records referring to the beginning of each year and thus may be correlated with firm performance in the previous, but not in the current year. In other words, with respect to performance indicators the ownership variables contain lagged values.

Taking these considerations into account the subsequent analysis is conducted in several steps. First, we present results which are obtained under assumption of exogenous nature of explanatory variables, *i.e.*, when the possibility of reversed causality is overlooked. For that purpose we use random-effects OLS estimation. Second, the instrumental variable (IV) technique is used to control for possible endogeneity of ownership variables. At this stage we use error component two stage least squares (EC2SLS) estimator developed by Baltagi (see Baltagi, 1995).

The essence of the instrumental variable technique is to construct fitted values of bad explanatory variables using auxiliary regressions and then to substitute obtained values into the initial regression. To obtain fitted values of ownership variables we use a number of instruments which include both time-invariant variables and those that vary over time. The instrumental variables can be classified in three groups. The first group contains instruments that characterize the process of privatization of the firms. Instruments from the second group characterize economic and social conditions of the regions in which the sampled enterprises are located. The third group includes variables indicating situation in sectors the companies belong to.

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[7] With respect to state ownership there is still some uncertainty whether it is endogenous or exogenous. Some smaller blocks of shares remained at state disposal only because they had not been sold through voucher or money auctions. In fact, in most cases state ownership is represented by such stakes, and only in a few companies large blocks of shares seem to be "frozen" due to political reasons.

In the first group we place a dummy for option 2 privatization, a dummy for "loan-for-shares" privatization, a dummy for holding privatization, and a variable that reflects time elapsed after privatization (in months). The second group contains variables reflecting the relative position of regions with respect to such factors as development of market economy institutions, investments, overdue receivables of regional enterprises, percentage of loss-making firms, development of small business, and crime rates. The third group embraces two variables indicating relative positions of industries with respect to overdue receivables and output decline. More detailed description of instrumental variables is presented in Appendix 6.

7. STUDY RESULTS

7.1. Ownership variables are treated as exogenous: OLS estimation

Two specifications are used to investigate the effect of ownership concentration on firm performance. In the first specification, there is no distinction between different types of owners; concentration is measured in a rather mechanical way using variable *sum3* (the stake of the top three shareholders). The results (see Appendix 7) indicate that the relationship between ownership concentration on the one hand and profitability and Tobin's Q on the other hand follows a U-shaped pattern. The turning point is about 57.7% for profitability and 80.2% for Tobin's Q. The quadratic term on ownership concentration for the equation with Tobin's Q, however, is only marginally significant at 10% level. Since there are only 25 observations (out of 303) for which ownership concentration exceeds the turning point of 80.2%, the result should be interpreted as a negative relationship between Tobin's Q and concentration which has some curvature rather than as a true U-shaped pattern. On the contrary, the relationship between concentration and profitability seems to follow a U-shaped pattern since there are 170 observations with ownership concentration equal or greater than 57.7%. The analysis does not reveal any association between labor productivity and ownership concentration. Ownership concentration and its squared value are jointly insignificant in the corresponding regression.

In the second specification, concentration is measured among private (unrelated to the state) shareholders. The variables *state* and *sthld*, which represent the stake of the state and state-controlled holdings, are included in regressions as control variables. Regression results are

shown in Appendix 8. They suggest that ownership concentration in the hands of private shareholders has no impact on either labor productivity or profitability. However, ownership concentration has a negative effect on Tobin's Q. This result is significant at 5% level.

To investigate the role of various ownership types in corporate governance, performance is regressed on variables reflecting the stakes of different groups of shareholders, namely insiders, Russian private outside investors, foreign investors, and state-controlled holdings. State ownership is used as base category. The results are reported in Appendix 9. They suggest that there is no link between labor productivity and Tobin's Q on the one hand and shareholdings of different groups of owners on the other. Coefficient on insiders is positive and significant at one per cent level in the equation with profitability, suggesting that greater insider ownership leads to higher profitability. Coefficient on foreign investors is also positive, but significant only at 10% level in the equation with profitability.

7.2. Ownership variables are treated as endogenous: IV estimation

Since there is no certainty about exogenous nature of some ownership variables, all the above-considered models are also estimated using instrumental variables technique. The results are presented in Appendixes 10 – 12.

As regards ownership concentration among all categories of owners, the IV estimation reveals a positive linear impact of it on labor productivity, the result is significant at 5% level (see Appendix 10). In particular, one per cent increase (in nominal terms) in concentration of ownership among all categories of owners increases labor productivity by 0.99%. Its impact on profitability and Tobin's Q generally remains the same as in the OLS estimation and follows a U-shaped pattern. The turning point is 56% for profitability and 62% for Tobin's Q. The quadratic term in the equation with Tobin's Q, however, is only marginally significant.

For concentration of ownership in the hands of private owners we find that it is associated with higher labor productivity but lower Tobin's Q (see Appendix 11). These relationships are linear. In particular, labor productivity grows by 0.86% with increase of ownership concentration by one per cent in nominal terms. There is no evidence that profitability is affected by concentration of ownership in the hands of private shareholders.

Analysis of the role of various groups of owners yields only one statistically significant result: ownership by Russian legal and physical persons negatively affects Tobin's Q (see Appendix 12). This stands in sharp contrast to the results obtained earlier with the help of the OLS estimation when a positive impact on profitability of both insider ownership and foreign ownership was detected. An important point to be made here is that the results seem to confirm the presence of reversed causality in the relationship between ownership and performance.

7.3. The role of majority ownership by the state

This section investigates to what extent our results for ownership concentration, especially in the hands of private owners, are influenced by large incidence of state ownership, in particular, ownership by state holdings, which is often represented by controlling blocks of shares. The interests and the behavior of these shareholders are likely to be different from those of private legal and physical persons. When a state holding is the main shareholder in a company the concentration of ownership in the hands of private shareholders may be of minor importance since these owners can have only limited influence on the decision-making process within the firm.

To investigate this issue we construct additional variable *top3wsc*, which receives the value of the variable *top3* if the state and the state holdings together do not possess a controlling block of shares in a company, and zero otherwise. We include this new variable *top3wsc* in a new regression together with the variables *top3*, *sthld*, and *state* and use random-effects OLS estimation. Regression results are reported in Appendix 13. The new variable becomes significant in the regressions with profitability and Tobin's Q, while the variable *top3* becomes significant in the regression with labor productivity. The regressions show that the effect of concentration of ownership in the hands of private owners on company performance is not continuous. The signs on the coefficients indicate a harmful effect of ownership concentration in the hands of private owners on profitability and Tobin's Q when the state and state holdings together do not have a controlling block of shares. Also, the concentration turns out to have some positive effect on labor productivity. However, the coefficients are only marginally significant at 10% level in the equations with labor productivity and Tobin's Q. Next section contains more extensive discussion of these and the earlier findings, which are summarized in Appendix 14.

8. DISCUSSION

The preceding analysis shows that the relationship between ownership and performance is rather complex and can hardly be confined to simple models like the one developed by Berle and Means.

Higher concentration of ownership — measured either for all categories of owners or for the unrelated to the state shareholders only — is connected with higher labor productivity. This finding is expected as it is in line with the theoretical arguments that more concentrated ownership results in better monitoring of managers and restrains their opportunities to pursue their own interests such as living an easy life. However, the relationships between ownership concentration on the one hand and profitability and Tobin's Q on the other exhibit quite different patterns which deserve special attention.

For profitability and concentration of ownership in the hands of all types of shareholders we find a U-shaped pattern reaching minimum at about 56% level of concentration. This finding together with the earlier result for labor productivity testify to that efficiency gains (higher labor productivity) stemming from ownership concentration do not adequately materialize in higher profits. This may indicate the existence of conflicts between large and small shareholders regarding the distribution of company profits. Large shareholders may be powerful enough to appropriate the lion's share of profit themselves and to deprive small owners of their part of residual income. The more shares they have the more likely they will succeed. However, the incentives of large shareholders to expropriate minority owners are likely to be a decreasing function of ownership concentration: when ownership concentration approaches 100% the large owners have the legal right on almost all profit. Not surprisingly, minority shareholders oppression peaks when ownership concentration is slightly above 50%, which provides the large owners with control over the company.

A further clue to understanding the relationship between profitability and ownership concentration can be obtained by differentiating between private shareholders and those which are related to the state. We find no link between concentration of ownership in the hands of private owners and company profitability. However, when we consider the case of majority ownership by the state, the regression analysis shows that the concentration of private ownership is negatively related to profitability if the state-related entities do not have a controlling block of shares. The implication seems to be that private shareholders are inclined to extract private benefits of control and to expropriate minority owners but majority ownership by the state prevents such behavior. This is consistent with

evidence presented by Black *et al*. (1999) showing that soon after the completion of privatization of profitable oil extraction enterprises many of them suddenly turned into loss-making firms. Thus, we find some evidence that in the pre-crisis Russia majority ownership by the state played a positive role in corporate governance limiting the scope of shareholder expropriation.

Our results for Tobin's Q are close to what we find in the analysis of the concentration-profitability relationship. Concentration of ownership in the hands of all groups of shareholders decreases the value of companies and this relationship has some upward curvature. As in the profitability regression, this result may be interpreted as evidence of high risk of small shareholder expropriation. The fact that there is no clear U-shaped relationship similar to the one observed for profitability may stem from the costs of lower liquidity of shares under more concentrated ownership. When liquidity falls, shares are traded with a discount resulting in lower values of Tobin's Q. We also find a negative relationship between concentration of ownership in the hands of private owners and Tobin's Q. However, when the state has the majority of votes in a company, the negative effect of ownership concentration vanishes. This is in line with the earlier conclusion for profitability that substantial state ownership prevents large owners from extracting private benefits of control.

Analysis of different ownership types shows that larger ownership by Russian shareholders which are not related to the state leads to lower Tobin's Q. This may be interpreted as evidence of inclination of this group of shareholders to the extraction of private benefits of control which is reflected in lower prices of company stock. In the OLS estimation we have also found that ownership by both insiders and foreigners is connected with higher profitability, but this result does not survive in the IV estimation. Therefore, it should not be interpreted in the sense that larger ownership by these groups of shareholders improves company performance.

An interesting by-product of this study is evidence of a significant impact of size and industry affiliation of companies on their performance. This is consistent with the findings of Buck *et al*. (1999) who suggest that non-governance variables like the extent of crisis at the industry-level may affect the choice of enterprise strategy much stronger than ownership variables. The relationship between the size of companies and their performance is somewhat puzzling as it exhibits a U-shaped pattern with the turning point at employment of about 20 thousand people. This indicates that firms of relatively small size (*i.e.*, with several thousand employees) and gigantic companies are better performers than their "medium-sized" counterparts. We believe that better performance of large firms may be

attributed to their both economic and political power. In particular, these firms can effectively influence the government, asking for tax privileges, state order, changes in price regulations, customs fees, and other forms of support. This is in line with McKinsey Global Institute report (1999) indicating that unequal treatment of firms by the state in taxation, energy prices, *etc*. may be of greater importance than the issues of corporate governance. The fact that smaller firms perform better may stem from their greater flexibility as well as inability to engage in rent seeking what makes efficiency improvement the only source of success. In this way of reasoning, the "medium-sized" firms perform poorly as they do not have enough opportunities to lobby their interests and lack necessary flexibility to raise efficiency shortly after privatization.

APPENDICES

A1. Descriptive statistics for financial and employment data*

		1995	1996	1997
Labor	Mean	22431.1	21200.7	20352.5
	St. dev.	27329.9	25861.2	24887.0
	Min	680.0	728.0	723.0
	Max	160000.0	152000.0	134148.0
	Median	14300.0	13364.0	12913.0
Capitalization	Mean	566.5	1481.9	3478.9
	St. dev.	1533.6	4708.2	10733.2
	Min	15.8	7.2	45.4
	Max	14209.1	42683.9	92370.0
	Median	168.0	333.0	873.4
Sales	Mean	3240.3	4327.0	4682.2
	St. dev.	4465.7	6482.4	7494.9
	Min	69.5	119.3	149.6
	Max	23421.0	44015.0	53639.0
	Median	1682.9	2037.2	2013.0
Gross profit	Mean	598.5	403.5	377.4
	St. dev.	1023.0	961.5	893.7
	Min	−445.8	−1163.5	−881.9
	Max	5645.0	6228.9	4697.2
	Median	235.9	178.3	155.0
Net profit	Mean	420.9	291.7	251.4
	St. dev.	782.2	773.1	668.5
	Min	−476.3	−1163.5	−937.4
	Max	4040.0	4991.4	3855.6
	Median	165.6	126.7	107.4

		1995	1996	1997
Assets	Mean	9631.5	10457.8	11080.7
	St. dev.	14493.0	15992.9	17245.6
	Min	115.5	171.7	212.1
	Max	97412.0	102580.0	99487.0
	Median	5168.9	5404.5	5814.5
Equity	Mean	7830.3	7779.8	7543.8
	St. dev.	11585.3	11739.3	11800.6
	Min	84.1	90.0	59.8
	Max	86053.0	80746.0	73802.0
	Median	4330.2	3894.5	3795.2
Long-term debt	Mean	140.8	200.3	540.5
	St. dev.	481.8	598.0	1624.8
	Min	0.0	0.0	0.0
	Max	3976.0	4016.8	9799.0
	Median	2.1	8.9	13.9
Short-term debt	Mean	1660.4	2477.9	2996.6
	St. dev.	3503.4	4335.9	5126.2
	Min	19.9	23.1	22.7
	Max	27338.2	31731.6	34397.0
	Median	447.6	886.8	1255.7

* Financial data are reported in millions of denominated rubles (unadjusted for inflation).

A2. Adjustments in financial data

At the stage of data collection several procedures were employed to minimize the effect of inflation and inconsistent reporting standards in Russia.

Firstly, there is undesirable effect of mandatory revaluations of fixed assets which all Russian firms had to follow between 1992 and 1996. It is important to have fixed assets measured with the lowest possible distortions since the value of assets at the end of each year is used for calculation of profitability and proxy for Tobin's Q.

Between 1995 and 1997, there was one mandatory revaluation that increased the value of fixed assets 2.63 times on average (*Voprosy Statistiki*, No 9, 1996, p. 72). It was implemented at the end of 1995. Since the suppression of inflation in 1996, revaluations were no more mandatory and did not affect the value of fixed assets significantly. To exclude the effect of the 1995 revaluation, book value of assets at the end of 1995 is substituted with book value of assets on January 1, 1996. Differences in these values are primarily attributed to revaluation of fixed assets.

Secondly, the Russian accounting standards allow inclusion of losses into company balance sheets. These losses can constitute a large share of company assets; therefore they were subtracted from both the book value of assets and the book value of equity.

Thirdly, in order to adjust financial data to inflation we have experimented with several methods. The investigated alternatives are: to use consumer price index or producer price index as deflator, to recalculate ruble values into U.S. dollars and to employ an "implicit deflator", which is constructed from the Goskomstat nominal industrial output series and the Goskomstat real industrial output index. Given that the sample embraces large companies, which make a large contribution to the country's GDP, these alternatives are judged depending on how well the dynamics of aggregate sales of the firms corresponds to the dynamics of Russia's GDP and industrial production. On the basis of this criterion the last-mentioned method is chosen.

Table A2. Coefficients-"inflators" used to recalculate financial data into December 1997 prices.

	1995	1996	1997
Sales and profit	1.576	1.118	1.028
Assets (year-end values)	1.196	1.058	1.000

A3. Descriptive statistics for performance indicators

		1995	1996	1997
Labor productivity*	Mean	0.2272	0.2119	0.2209
	St. dev.	0.1677	0.1482	0.1491
	Min	0.0149	0.0145	0.0261
	Max	0.9099	0.8100	0.8589
	Median	0.1993	0.1831	0.1881
Profitability*	Mean	0.1436	0.0870	0.0710
	St. dev.	0.1636	0.1511	0.1334
	Min	−0.0779	−0.2478	−0.2608
	Max	0.9676	0.8635	0.7060
	Median	0.1042	0.0582	0.0668
Proxy for Q**	Mean	0.0856	0.2314	0.5025
	St. dev.	0.1274	0.4105	0.5810
	Min	0.0026	0.0062	0.0289
	Max	0.8348	2.4947	3.6769
	Median	0.0446	0.0889	0.2459

* Financial data of companies are adjusted for inflation.

** Calculated using unadjusted values of market value of equity and book value of equity.

A4. Correlation coefficients between different performance indicators

	Labor productivity	Profitability	Proxy for Q
1995			
Labor productivity	1.0		
Profitability	0.2987	1.0	
Proxy for Q	0.0787	0.7132	1.0
1996			
Labor productivity	1.0		
Profitability	0.2278	1.0	
Proxy for Q	0.0661	0.6463	1.0
1997			
Labor productivity	1.0		
Profitability	0.3443	1.0	
Proxy for Q	0.2212	0.6946	1.0

A5. Descriptive statistics for ownership variables*

		1995	1996	1997
State	Mean	12.8	6.9	6.6
	St. dev.	18.6	12.6	13.0
	Min	0.0	0.0	0.0
	Max	80.0	50.6	65.0
	Median	0.0	0.0	0.0
State-controlled holdings	Mean	22.6	20.3	20.7
	St. dev.	26.6	26.4	26.4
	Min	0.0	0.0	0.0
	Max	80.0	80.0	80.0
	Median	0.0	0.0	0.0
Insiders	Mean	27.7	20.5	14.1
	St. dev.	16.1	13.6	12.1
	Min	4.0	2.0	1.0
	Max	71.0	60.0	52.0
	Median	22.0	17.0	10.0
Russian shareholders	Mean	31.3	40.4	38.3
	St. dev.	17.5	24.8	25.9
	Min	1.0	1.0	2.0
	Max	84.0	98.0	99.0
	Median	29.3	33.4	31.0
Foreign shareholders	Mean	5.5	11.9	20.3
	St. dev.	9.2	13.6	16.0
	Min	0.0	0.0	0.0
	Max	53.0	72.0	75.0
	Median	0.0	9.0	17.0
Top three shareholders (including the state and state holdings)	Mean	53.3	56.7	60.9
	St. dev.	18.2	17.4	16.8
	Min	11.3	15.0	22.0
	Max	87.9	92.0	92.0
	Median	58.0	60.3	64.9
Top three shareholders (state-unrelated)	Mean	20.1	31.5	36.1
	St. dev.	15.1	22.3	23.1
	Min	2.0	2.0	3.0
	Max	76.0	92.0	92.0
	Median	15.0	27.0	33.5

* All figures are reported in percentages.

A6. Definition of instrumental variables

Instrumental variables reflecting privatization characteristics:

var2 — dummy for privatization under option 2. Equals one if a firm was privatized under option 2 (majority employee ownership), and zero otherwise. This is a time-invariant variable, which apparently influences performance only via ownership structure. It can be argued that performance of enterprises hardly had any strong influence on the probability that they would choose option 2. During mass privatization insiders in most cases were eager to invest in enterprises they were working for since they could obtain shares on preferential terms (compared to other citizens), hence they preferred option 2 privatization. Option 1 was typically chosen by large and capital-intensive firms, whose employees did not have enough funds to buy out 51 per cent of equity. The variable is time-invariant.

lfsh — dummy for privatization through loan-for-shares scheme (totally six enterprises). Equals one if an enterprise has gone through loan-for-shares privatization by the time the ownership data are recorded, and zero otherwise. Politically determined method of privatization, hence, it was hardly influenced by firm performance.

holdpriv — dummy for holding privatization; equals one if a block of shares of a company was transferred to some holding. This method of privatization was predetermined by political rather than by economic considerations. The variable is time-invariant.

tpriv — time passed since corporatization of enterprises, in months. This variable is assumed to capture differences in time the enterprises were privatized at (ownership structure may undergo larger changes at firms that were privatized earlier) as well as trends in the evolution of ownership structure, in particular, redistribution of equity from insiders to outsiders and growing ownership concentration.

Variables reflecting regional differences:

These variables, except for the first two, vary over 1995 – 1997 and contain lagged values with respect to ownership data. Thus, their values for 1994, *e.g.*, are used to instrument for ownership in 1995.

inst — institutional rating of regions according to Expert journal. The rating is said to reflect "degree to which major institutions of market economy are developed in regions" (*Expert*, No 47, 1996, p. 31). Lower values of the variable mean higher institutional rating. Included due to the assumption that changes in ownership structure proceed faster in regions with higher institutional rating. Time-invariant, year 1996 values.

risk — regional investment risk according to Expert journal. Lower values mean lower investment risk. The variable is time-invariant and contains 1996 values.

reg_inv — indicates relative position of regions with respect to investments in fixed assets. The variable is defined as:

$$\text{reg\_inv} = \frac{\dfrac{\textit{investment in fixed assets in the region}}{\textit{investment in fixed assets in Russia}}}{\dfrac{\textit{gross regional product}}{\textit{GDP of Russia}}}.$$

Included owing to the assumption that it can reflect "attractiveness" of regions with respect to investments. Changes in ownership structure are likely to proceed faster in regions with higher values of this variable.[8]

reg_rec — relative position of regions with respect to overdue receivables of firms (arrears). The variable is defined as:

$$\text{reg\_rec} = \frac{\dfrac{\textit{overdue receivables of firms in the region}}{\textit{overdue receivables in Russia}}}{\dfrac{\textit{gross regional product}}{\textit{GDP of Russia}}}.$$

The reason to include this variable is that regions that are subject to a greater incidence of arrears may be particularly unattractive to some groups of investors.

reg_loss — relative position of regions with respect to the share of loss-making enterprises. The variable is defined as:

$$\text{reg\_loss} = \frac{\textit{percentage of loss - making firms in the region}}{\textit{percentage of loss - making firms in Russia}}.$$

The variable is intended to indicate general economic conditions in regions.

reg_smbs — relative position of regions with respect to the development of small business. The variable is defined the following way:

$$\text{reg\_smbs} = \frac{\textit{number of small firms per capita in the region}}{\textit{number of small firms per capita in Russia}}.$$

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[8] Here and later on we use relative values of regional and industrial instrumental variables in order to prevent spurious time-series correlation between them and ownership variables. For example, ownership concentration and regional investments may show similar trends and, hence, substantial correlation while being loosely related in reality.

The variable is intended to indicate general economic conditions in regions. Also, it can characterize attitudes of regional authorities with respect to business, *e.g.*, the degree of bureaucratization and corruption.

reg_crime — relative position of regions with respect to criminalization. The variable is defined as the number of murders and attempted murders per capita in the region divided by the same indicator for Russia.

$$\text{reg\_crime} = \frac{\text{\textit{number of murders and attempted murders per capita in the region}}}{\text{\textit{number of murders and attempted murders per capita in Russia}}}.$$

Variables characterizing industrial differences:

These variables vary over 1995 – 1997 and contain lagged values with respect to ownership data.

ind_rec — relative position of industries with respect to overdue receivables. The variable is calculated as:

$$\text{ind\_rec} = \frac{\dfrac{\text{\textit{overdue receivables in the industry}}}{\text{\textit{overdue receivables in Russia}}}}{\dfrac{\text{\textit{value added produced in the industry}}}{\text{\textit{GDP of Russia}}}}.$$

If an industry is characterized by a high spread of overdue receivables, the cash flows within that industry are likely to be thin, hence it may be of small interest to investors. The variable can be especially powerful in explaining the dynamics of ownership concentration, since one of the main benefits for concentrated owners is extraction of private benefits of control, which are tied to cash flows of firms.

ind_ch — change in output in a particular industry one year before ownership data are recorded. Included due to the assumption that some type of investors may be reluctant to invest in industries experiencing decline.

Besides the mentioned instrumental variables, first-stage regressions include all control variables that are used in the second stage. Among them are five industrial dummies, year dummies, two measures of size, and variables reflecting ownership stakes of the state and state holdings. Exogeneity of the latter has already been discussed.

A7. Concentration of ownership and firm performance. OLS estimation

	log(lprod)		profitab		log(q)	
	Coef.	z	Coef.	z	Coef.	z
sum3	−0.0072912	−0.80	−0.0081068**	−2.40	−0.0364799**	−2.25
sum3_squared	0.000083	1.02	0.0000703**	2.47	0.0002274*	1.68
metl	0.2239741	1.48	−0.0413811	−0.92	−0.8033664***	−2.68
mach	−0.9063632***	−4.49	−0.0883254*	−1.89	−1.433813***	−3.94
oilg	0.535353***	3.11	−0.0451448	−0.98	−0.2277241	−0.70
enrg	0.771668***	4.84	−0.0290223	−0.61	−0.5686859*	−1.76
telc	−0.5195799***	−2.93	0.0482318	0.89	0.9236569***	2.93
size	−2.314757***	−3.51	−0.2815132	−1.55	−2.128578*	−1.94
size_squared	0.1193738***	3.39	0.0138157	1.51	0.1080253*	1.88
y96	−0.0150123	−0.45	0.0790061	1.17	−0.7952727***	−5.58
y97	0.0010466	0.03	0.0776594	1.19	−0.7281168***	−5.07
inflation			0.0011168*	1.88		
log(rtsindex)					1.634848***	14.13
_cons	9.38308***	3.08	1.619398*	1.80	1.76121	0.34
Wald chi2	151.22		78.98		532.07	
Prob>chi2	0.0000		0.0000		0.0000	
Test for RE: chi2 (1)	194.73		132.47		95.00	
Test for RE: Prob>chi2	0.0000		0.0000		0.0000	

* — significant at 10%;

** — significant at 5%;

*** — significant at 1%.

**A8. Concentration of private ownership
and firm performance. OLS estimation**

	log(lprod)		profitab		log(q)	
	Coef.	z	Coef.	z	Coef.	z
top3	0.0056634	1.11	−0.0017106	−0.90	−0.0129806**	−2.43
top3_squared	−0.0000423	−0.76	0.0000146	0.70		
state	0.0003436	0.15	−0.0012931	−1.50	−0.0086353	−1.34
sthld	0.0021453	0.92	−0.0007528	−0.99	−0.0098183*	−1.69
metl	0.1985806	1.28	−0.0514941	−1.11	−0.7758237**	−2.43
mach	−0.9175645***	−4.49	−0.0903877**	−1.99	−1.419947***	−3.68
oilg	0.5181137***	2.84	−0.0582163	−1.19	−0.270562	−0.79
enrg	0.7767579***	4.44	−0.0366709	−0.71	−0.6978815*	−1.94
telc	−0.5360582***	−2.83	0.0472459	0.86	0.8189867**	2.32
size	−2.407014***	−3.62	−0.303274*	−1.72	−2.207368*	−1.92
size_squared	0.1241683***	3.48	0.0148044*	1.66	0.1109702*	1.85
y96	−0.0370666	−1.01	0.0535684	0.83	−0.7889415***	−5.21
y97	−0.014912	−0.38	0.0555488	0.90	−0.7106476***	−4.64
inflation			0.000949*	1.65		
log(rtsindex)					1.656049***	14.35
_cons	9.567261***	3.10	1.613615*	1.81	1.55617	0.29
Wald chi2	148.76		71.26		546.32	
Prob>chi2	0.0000		0.0000		0.0000	
Test for RE: chi2 (1)	196.45		125.76		102.89	
Test for RE: Prob>chi2	0.0000		0.0000		0.0000	

* — significant at 10%;

** — significant at 5%;

*** — significant at 1%.

A9. Various groups of owners and firm performance. OLS estimation

	log(lprod)		profitab		log(q)	
	Coef.	z	Coef.	z	Coef.	z
insid	−0.0026897	−0.81	0.0023809***	2.96	0.0093533	1.32
russian	0.0015412	1.02	0.0007639	1.55	−0.0031033	−0.60
foreign	0.003791	1.44	0.0017368*	1.69	0.0080996	1.26
sthld	0.0019723	1.21	0.0005251	1.33	−0.0002707	−0.07
metl	0.2323718	1.56	−0.0460213	−0.94	−0.7860337**	−2.33
mach	−0.8715448***	−4.03	−0.0739267	−1.53	−1.306594***	−3.19
oilg	0.5100365***	2.74	−0.0283455	−0.59	−0.2748008	−0.77
enrg	0.7699834***	4.58	−0.0082845	−0.16	−0.7668783**	−2.03
telc	−0.5507876***	−2.90	0.0775047	1.42	0.7813431**	2.15
size	−2.340887***	−3.62	−0.3160892*	−1.81	−1.920157**	−1.98
size_squared	0.1205002***	3.47	0.015647*	1.77	0.0971884*	1.92
y96	−0.0878943*	−1.91	0.0618132	0.73	−0.7251498***	−4.81
y97	−0.0614389	−1.36	0.0646737	0.78	−0.648285***	−4.15
inflation			0.001003	1.29		
log(rtsindex)					1.548253***	12.22
_cons	9.367876***	3.17	1.4617*	1.82	−0.2265921	−0.05
Wald chi2	159.84		80.44		546.29	
Prob>chi2	0.0000		0.0000		0.0000	
Test for RE: chi2 (1)	193.01		123.67		92.32	
Test for RE: Prob>chi2	0.0000		0.0000		0.0000	

* — significant at 10%;

** — significant at 5%;

*** — significant at 1%.

**A10. Concentration of ownership
and firm performance. IV estimation**

	log(lprod)		profitab		log(q)	
	Coef.	z	Coef.	z	Coef.	z
sum3	0.0098235**	2.14	−0.0207848**	−2.55	−0.1516202**	−1.97
sum3_squared			0.0001855***	2.60	0.001224*	1.82
metl	0.1452791	0.74	−0.0373763	−0.76	−0.7173452*	−1.67
mach	−0.978368***	−4.82	−0.0878735*	−1.73	−1.381342***	−3.13
oilg	0.3102374	1.37	−0.0326654	−0.52	0.0267061	0.05
enrg	0.5193694**	2.14	−0.0156326	−0.23	−0.288405	−0.48
telc	−0.7863507***	−3.41	0.0651104	0.98	1.242237**	2.10
size	−2.116004***	−3.53	−0.250663*	−1.66	−2.011259	−1.53
size_squared	0.1084279***	3.43	0.0127297	1.61	0.1065716	1.55
y96	−0.0573525	−1.51	0.0962745	0.93	−0.7457243***	−4.37
y97	−0.0471946	−1.13	0.089011	0.87	−0.7239872***	−4.31
inflation			0.001221	1.32		
log(rtsindex)					1.653209***	11.59
_cons	8.003193***	2.83	1.714483**	2.27	3.503849	0.57
Wald chi2	147.37		97.53		511.36	
Prob>chi2	0.0000		0.0000		0.0000	

* — significant at 10%;

** — significant at 5%;

*** — significant at 1%.

Instrumented: *sum3*, *sum3_squared*.

Instruments: *metl*, *mach*, *oilg*, *enrg*, *telc*, *size*, *size squared*, *y96*, *y97*, *var2*, *lfsh*, *tpriv*, *holdpriv*, *inst*, *risk*, *reg_inv*, *reg_rec*, *reg_loss*, *reg_smbs*, *reg_crime*, *ind_rec*, *ind_ch*.

Note: The variable *sum3_squared* is dropped when the coefficients on it and the variable sum3 are both insignificant while their joint significance is not rejected at $p = 0.05$.

A11. Concentration of private ownership and firm performance. IV estimation

	log(lprod)		profitab		log(q)	
	Coef.	z	Coef.	z	Coef.	z
top3	0.0085571**	1.98	0.0008675	0.25	−0.0245862**	−2.22
top3_squared			-8.87×10^{-7}	−0.03		
sthld	0.0082888*	1.93	0.000347	0.33	−0.0198469*	−1.90
state	0.0059313	1.45	−0.0002857	−0.28	−0.0179279*	−1.82
metl	0.1417044	0.73	−0.0651324**	−1.97	−0.6623159*	−1.93
mach	−0.9716353***	−4.86	−0.1022345***	−3.06	−1.318757***	−3.77
oilg	0.3373346	1.55	−0.0826957**	−2.01	0.0060217	0.01
enrg	0.5649199**	2.36	−0.0545669	−1.11	−0.4241694	−0.91
telc	−0.7483578***	−3.28	0.0175141	0.40	1.133473**	2.46
size	−2.196841***	−3.72	−0.2837913***	−2.85	−2.517542**	−2.43
size_squared	0.1129603***	3.63	0.0137582***	2.61	0.1275072**	2.33
y96	−0.0685764*	−1.65	0.1115944	0.99	−0.8080776***	−4.92
y97	−0.0562402	−1.25	0.1130422	1.00	−0.7185684***	−4.32
inflation			0.0015441	1.51		
log(rtsindex)					1.73398***	12.61
_cons	8.425751***	3.03	1.38296***	2.74	3.035768	0.62
Wald chi2	151.76		119.64		558.23	
Prob>chi2	0.0000		0.0000		0.0000	

* — significant at 10%;

** — significant at 5%;

*** — significant at 1%.

Instrumented: *top3*, *top3_squared*.

Instruments: *state*, *sthld*, *metl*, *mach*, *oilg*, *enrg*, *telc*, *size*, *size squared*, *y96*, *y97*, *var2*, *lfsh*, *tpriv*, *holdpriv*, *inst*, *risk*, *reg_inv*, *reg_rec*, *reg_loss*, *reg_smbs*, *reg_crime*, *ind_rec*, *ind_ch*.

Note: The variable *top3_squared* is dropped when the coefficients on it and the variable *top3* are both insignificant while their joint significance is not rejected at $p = 0.05$.

A12. Various groups of owners and firm performance. IV estimation

	log(lprod)		profitab		log(q)	
	Coef.	z	Coef.	z	Coef.	z
insid	−0.0034006	−0.58	0.000608	0.43	−0.0066512	−0.57
russian	−0.0038331	−1.27	−0.0005664	−0.70	−0.0146656*	−1.88
foreign	0.0041865	0.82	0.0007519	0.43	0.0184934	1.11
sthld	−0.0008659	−0.40	−0.0002224	−0.40	−0.0059116	−1.09
metl	0.3412965*	1.69	−0.0295003	−0.71	−0.4931171	−1.46
mach	−0.7423987***	−3.33	−0.064545	−1.28	−0.9058135**	−2.13
oilg	0.6461126***	2.79	−0.0311704	−0.65	−0.0970652	−0.25
enrg	0.8084792***	3.35	−0.030195	−0.61	−0.7387046*	−1.80
telc	−0.4891692**	−2.05	0.0510506	1.05	0.732749*	1.82
size	−2.275998***	−3.81	−0.2872228**	−2.46	−1.462361	−1.60
size_squared	0.1168752***	3.70	0.0138686**	2.25	0.0718119	1.48
y96	−0.0643218	−1.22	0.1211734	0.69	−0.5616515***	−2.75
y97	−0.0336487	−0.65	0.1243701	0.70	−0.4507715*	−2.07
inflation			0.0015093	0.90		
log(rtsindex)					1.240829***	4.96
_cons	9.249298***	3.33	1.400586**	2.25	−0.1658956	−0.04
Wald chi2	145.88		106.48		475.27	
Prob>chi2	0.0000		0.0000		0.0000	

* — significant at 10%;

** — significant at 5%;

*** — significant at 1%.

Instrumented: *insid*, *russian*, *foreign*.

Instruments: *sthld*, *metl*, *mach*, *oilg*, *enrg*, *telc*, *size*, *size squared*, *y96*, *y97*, *var2*, *lfsh*, *tpriv*, *holdpriv*, *inst*, *risk*, *reg_inv*, *reg_rec*, *reg_loss*, *reg_smbs*, *reg_crime*, *ind_rec*, *ind_ch*.

A13. Concentration of private ownership and firm performance under majority ownership by the state. OLS estimation

	log(lprod)		profitab		log(q)	
	Coef.	z	Coef.	z	Coef.	z
top3	0.0071712*	1.71	0.0013847	1.42	−0.0006496	−0.08
top3wsc	−0.005918	−1.33	−0.0020932**	−2.02	−0.0139561*	−1.92
state	−0.0008944	−0.39	−0.0016727*	−1.83	−0.0111817*	−1.66
sthld	$8.52{\times}10^{-7}$	0.00	−0.0015097	−1.55	−0.014522**	−2.25
metl	0.1997949	1.30	−0.0535646	−1.15	−0.7823477**	−2.46
mach	−0.9154749***	−4.53	−0.0913983**	−2.01	−1.42234***	−3.73
oilg	0.4994127***	2.82	−0.0534273	−1.16	−0.2847853	−0.84
enrg	0.7880896***	4.42	−0.0080188	−0.16	−0.6027091*	−1.69
telc	−0.5695402***	−2.98	0.0453344	0.85	0.7595216**	2.15
size	−2.395532***	−3.59	−0.323448*	−1.70	−2.261658*	−1.93
size_squared	0.123823***	3.46	0.0159487*	1.66	0.1144162*	1.88
y96	−0.0337427	−0.89	0.0683065	1.04	−0.7845733***	−5.15
y97	−0.0174677	−0.45	0.0694991	1.10	−0.7159598***	−4.65
inflation			0.0011094*	1.89		
log(rtsindex)					1.64529***	14.03
_cons	9.592094***	3.10	1.674682*	1.79	1.901668	0.34
Wald chi2	150.42		71.71		611.92	
Prob>chi2	0.0000		0.0000		0.0000	
Test for RE: chi2 (1)	195.15		126.42		100.00	
Prob>chi2	0.0000		0.0000		0.0000	

* — significant at 10%;

** — significant at 5%;

*** — significant at 1%.

A14. Main results: summary table

	Labor productivity	Profitability	Tobin's Q
OLS estimation			
Concentration of ownership among all categories of shareholders	No relationship	U-shaped relationship, turning point at 57.7%, 5% significance level	U-shaped relationship, turning point at 80.2%, 5% significance level (the upper part is marginally significant at 10%)
Concentration of ownership among private shareholders	No relationship	No relationship	Inverse relationship, 5% significance level
Different groups of owners	No relationship	Insiders — positive relationship, 1% significance level; Foreigners — positive relationship, 10% significance level	No relationship
IV estimation			
Concentration of ownership among all categories of shareholders	Positive relationship, 5% significance level	U-shaped relationship, turning point at 56.0%, 1 − 5% significance level	U-shaped relationship, turning point at 61.9%, 5% significance level (the upper part is marginally significant at 10%)
Concentration of ownership among private shareholders	Positive relationship, 5% significance level	No relationship	Inverse relationship, 5% significance level
Different groups of owners	No relationship	No relationship	Ownership by Russian shareholders negatively affects firm value, 10% significance level
OLS estimation, ownership concentration under majority ownership by the state			
Concentration of ownership among private shareholders	Positive when the state has control, 10% significance level	Negative when the state does not have control, 5% significance level	Negative when the state does not have control, 10% significance level

A15. Complete list of variables

Dependent variables:

lprod — labor productivity; sales to employment ratio;

profitab — profitability; gross profit divided by book value of equity;

q — proxy for Tobin's Q; market value of equity divided by book value of equity.

Independent variables:

state — state ownership on 1 January of the respective year (percentage of voting shares);

sthld — ownership by state holdings on 1 January of the respective year (voting shares);

insid — ownership by insiders on 1 January of the respective year (voting shares);

russian — ownership by domestic investors on 1 January (voting shares);

foreign — ownership by foreign persons on 1 January of the respective year (voting shares);

sum3 — concentration measure; defined as stake of top three shareholders regardless of their type on 1 January of the respective year (voting shares);

top3 — concentration measure; defined as stake of top three state-unrelated shareholders (excluding the state and state-controlled holdings) on 1 January of the respective year (voting shares);

top3wsc — auxiliary variable, which is used to take into account the distribution of control within the firm; equals the variable top3 if the state and state-controlled holdings together do not have a controlling block of shares, and zero otherwise;

size — logarithm of employment in 1994;

metl — dummy for metallurgy;

mach — dummy for engineering industry;

oilg — dummy for oil, gas, and chemical industry;

enrg — dummy for power utilities;

telc — dummy for telecommunication industry;

inflation — inflation rate in the respective year;

rtsindex — Russian Trading System index at the end of respective year;

y96 — dummy for 1996;

y97 — dummy for 1997.

Instrumental variables:

var2 — dummy for the second variant of privatization;

lfsh — dummy for privatization through loan-for-shares scheme (totally six enterprises);

tpriv — time passed since corporatization of an enterprise;

holdpriv — dummy for holding privatization;

inst — institutional rating, 1 means the highest rating;

risk — investment risk, 1 means the lowest risk;

reg_inv — relative position of regions with respect to investments;

reg_rec — relative position of regions with respect to overdue receivables;

reg_loss — relative position of regions with respect to the share of loss making firms;

reg_smbs — relative position of regions with respect to the development of small business;

reg_crime — relative position of regions with respect to criminalization;

ind_rec — relative position of industries with respect to overdue receivables;

ind_ch — change in output in a particular industry one year before ownership data are recorded.

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