

## State ownership and efficiency characteristics

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### Abstract

This study examines the influence of state participation in the ownership structure of companies on their financial efficiency using a sample of 114 largest companies in Russia. As an indirect indicator of efficiency, we used a variety of financial indicators: revenue per employee (gross margin), return on equity, profit margin and debt burden. The effects of direct and indirect state ownership are considered separately. Using econometric analysis, we conclude that the dominance of the block of shares owned by the state has a negative effect on the performance characteristics, and its increase is associated with an increase in the debt burden of the companies. According to our criteria, state-owned enterprises (SOEs) perform worse on average than private companies. The mechanism of how changes in the “real sector” affect profitability is examined particularly closely. The study shows that a change in the profitability of private companies is characterized by a significant dependence on the movement of labor productivity characteristics. At the same time, for SOEs, a similar correlation was not revealed. These companies demonstrated no visible relationship between their profitability and performance characteristics. The study shows that increases in the size of direct government ownership lead to lower labor productivity and profitability; the impact of indirect ownership is, seemingly, more complicated.

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## 1. “Neutral” theory and “pro-privatization” empiricism

Formulating their privatization indifference theorem (neutrality in the form of ownership), Sappington and Stiglitz (1987) built their analysis around the delegation of authority and related aspects of the *principal-agent* problem. Shapiro and Willig (1990) used another method to compare the characteristics of state and private ownership, focusing on comparing information flows during the transition from state to private ownership. In the article dedicated to the 25<sup>th</sup> anniversary of the paper by Grossman and Hart (1986), which emphasized the incompleteness of signed contracts, Aghion and Holden (2011, pp. 188–189) highlighted the connection between said considerations and the choice between private and public entrepreneurship. Papers on the correlation between sociopolitical factors and the functioning of the public sector form a separate field of research in this area (Shleifer and Vishny, 1994; Acemoglu, 2006).

It should be noted that the implications of transitioning to private economic relations, described in Sappington and Stiglitz’s fundamental theorem (and its subsequent interpretations),<sup>1</sup> require a number of usable initial theoretical conditions, which are hardly operational in discussing the applied tasks of the economic policy: a “favorable” state maximizing national well-being; a competitive market environment for producers; no externalities; prompt and full access to information flows (symmetric information); the completeness of all signed contracts; effective institutions; definitive and strong protection of ownership rights by the law and independent courts; no opportunity to derive private profit, etc.

Lower efficiency in the economy may be caused by specific aspects of state ownership, usually perceived as a type of collective (“common”) ownership.<sup>2</sup> The mechanisms for monitoring the performance results of state-owned enterprises cannot require that control be exercised by every citizen. This function is usually performed by executive government agencies, thereby forming a principal-agent relationship, which gives rise to even more questions regarding the mechanisms for monitoring the results of control measures taken by these agencies. “Monitoring the monitors” basically degrades into an inefficient bureaucratic pyramid of multi-level administrative control and perfunctory reports.

Another point seems noteworthy. Most papers comparing state and private entrepreneurship usually present the *state or private entrepreneurs* as the alternatives. However, this wording of the question is at least oversimplified. It is always—and particularly at the current stage of economic development—difficult to imagine models of social structures in which the state would simply be “banished” from the economic domain.

In cases recognizing the expediency of transitioning to a broader use of market regulating mechanisms, the state, first of all, becomes the initiator and organizer of the transition, and second, actually controls compliance with the rules of a competitive market “game.” In other words, with both private and state entre-

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<sup>1</sup> And this is in addition to other judgments related to analyzing Pareto-optimal characteristics of the market economy and, in particular, the general Arrow-Debreu equilibrium.

<sup>2</sup> In his work on the philosophy of law, Hegel (1990, p. 105) noted that certain characteristics of common ownership border on “non-law”.

preneurship, the respective regulatory and supervisory bodies must perform their functions. The difference is, rather, *the optimal choice of forms in which the modern state performs functions vital to the society*.

Comparing the commercial results of state-owned and private companies always entails considerable limitations. Under normal conditions in competitive sectors of the economy, a private entrepreneur (in particular, under conditions of no fixed costs) continues production until the current market price exceeds its current marginal costs. A state institution will provide households with public goods (services) even if the tariffs for those goods do not cover their respective costs. In certain cases, state-owned enterprises may occupy monopolistic positions in the market. In particular, this is clearly reflected in a bilateral monopolistic (essentially non-market) situation where companies owned by the state produce products ordered by government agencies. If the state chooses not to have its own production facilities, then this matter concerns the behavior of government agencies acting as monopolies.

If companies produce more or less homogeneous products, this opens an opportunity for comparative research and comparisons between the performance of state and private companies. Of course, a number of factors complicate the comparative analysis of production efficiency (differences in the product range, specificity of market demand, insufficient comparability of cost calculation methodologies, etc.).<sup>3</sup> Due to limited competition and incomplete contractual relations, as seen from theoretical models of contracts with limited opportunity for prompt renegotiation, the optimal strategy for the management of state-owned firms would more often (as compared with managers in private companies) be related to making uncreative, routine, and/or “approved” decisions. Managers in such firms rely relatively less on innovations to reduce production costs (Estrin et al., 2009; Hoppe and Schmitz, 2010). The monopolistic power and administrative leverage possessed by state-owned companies may strengthen this trend significantly.

Although the theoretical discussion of the advantages and drawbacks of state entrepreneurship, even in the overall context of “government failures” and “market failures” (continuing for over fifty years) are not so straightforward,<sup>4</sup> the vast majority of empirical research conducted during the second half of the 20<sup>th</sup> century provides *indisputable arguments in favor of private companies*.<sup>5</sup> Boardman and Vining (1989, p. 29) investigated over 50 papers on the efficiency of private and state-owned companies and compared them with their own calculations. The authors formulated their main conclusion as follows: “Research findings show that, with a great number of factors [affecting the efficiency of business operations], large industrial firms with mixed owner-

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<sup>3</sup> Moreover, in a number of industries—in financial markets, for example—the operations of private companies are most often subject to government regulation. In this case, the actual reason behind the poor efficiency of such firms may, for example, be the excessively strict requirements of supervisory agencies.

<sup>4</sup> Various ideas on this matter have been cited in the literature on multiple occasions, including those mentioned in the discourse about “government failures” (Radygin and Entov, 2012; Radygin et al., 2015), in theoretical models studying the effectiveness of privatization (Radygin and Entov, 2013), and following numerous empirical studies of the efficiency of private and public goods production between the 1970s and the 1990s (Radygin, 2014).

<sup>5</sup> A summary description of comparative research papers published since the early 1970s is provided in Shirley and Walsh (2000).

ship and similar firms that are fully owned by the state demonstrate considerably lower efficiency than comparable private companies.” Another review by Borcharding et al. (1982) addresses the results of 50 empirical research papers, 40 of which showed private entrepreneurship to be more efficient than state entrepreneurship. It was impossible to clearly identify the advantages of any particular form of ownership in 7 other cases. Mueller (2003) compiled the results of 71 studies, where state-owned companies demonstrated comparatively lower efficiency in 56 cases.<sup>6</sup>

The theoretical findings are apparently in line with one of the most important results of the investigation: *the aggregate costs were lower for private companies in almost all cases under review*. At the same time, those companies produced new products considerably more often (improved product quality). The numerous research papers demonstrate that, unlike private companies, state-owned companies can in many situations maintain (improve) their profitability, first of all by increasing product prices. Combined with other factors, i.e., lower dependency of top managers on the results of market competition (provided the latter exists at all) and their comparatively stronger connection with, for instance, the results of purely administrative “games” and poor initiative, this strongly undermines the incentives to cut costs and/or improve product quality.

Research papers that demonstrate better performance by state-owned companies are not only few in number but—particularly significantly—cover the few industries (energy generation and distribution in 4 of 5 of the cases reviewed) where competitive mechanisms have very low significance due to a number of factors. This mostly coincides with the above considerations on the special role of the “environment” in which private and state-owned companies operate. In most cases reviewed, *it was not so much the advantages of organization and management for private companies, as the market competition mechanisms that realized their potential, which actually formed the basis of efficiency regulation*.

A significant number of empirical papers written during the 1990s were dedicated to the differences between private, privatized, and state-owned companies in various countries. Most works analyzed the influence of the ownership structure on the financial indicators of companies, which were considered as various performance indicators.

For example, regarding the operation of companies in the Czech Republic, Hungary, and Poland from 1990 to 1993, Frydman et al. (1999) demonstrated that the presence of outsiders, non-residents, and local financial organizations in the ownership structure improved company performance. However, the effect of privatization on what they called performance largely depended on the indicators used to describe it. For the labor productivity change indicator, the authors identified a significant effect for various types of owners and an insignificant effect was observed when using cost reduction indicators.

Claessens and Djankov (2002) investigated the effect of privatization on company performance on a sample of more than 6,000 privatized and state-owned

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<sup>6</sup> It should be noted that the theoretical models underlying such comparisons and conclusions about the inefficiency of the public sector represent only a portion of society’s losses reflected in the logic of ordinary market transactions.

industrial companies in 7 Eastern European countries. Historical sales, employment, and labor productivity data were used as its indicators. The authors demonstrated that privatization had a positive impact on revenues and labor productivity, while leading to lower employment.

Research by Brown et al. (2006) analyzed the effect of privatization on multi-factor productivity using long panel data for state-owned production enterprises (SOE) in Russia, Ukraine, Hungary, and Romania. The authors tried to study three problems: the effect of various types of new private ownership structures, changes in productivity before and after privatization, and the differences between countries manifested in its results.

The researchers found that, in most cases, privatization resulted in productivity growth; however, in Russia, on the contrary, it resulted in poorer performance. The authors believe that the most preferential estimates were those indicating positive effects on multi-factor productivity in the amount of 15% in Romania, 8% in Hungary, and 2% in Ukraine. At the same time, for Russia, the authors identified a negative effect of privatization in the amount of 3%. Furthermore, the paper shows that the results of privatization in different countries differed noticeably depending on the degree of involvement of foreign investors in the process. The effect of privatization by external investors is considerably greater, from 18% to 35% in all cases reviewed. The positive effect of privatization by domestic investors was manifested immediately in Hungary and Romania, and continued to further increase in Ukraine, while appearing only five years after privatization in Russia.

In estimating company performance, various financial ratios for productivity and costs are often used. Kočenda and Svejnar (2003), regarding company operations following privatization in the Czech Republic, found the state to be one of the efficient owners. The “golden share” mechanism enabled it to maintain indirect control, encouraging productivity growth and boosting employee wages. Research by Estrin et al. (2009) showed that, in Central Europe, privatization usually had a positive impact on profitability, revenues, and other financial indicators of company positions. In CIS countries, such positive effects were observed only when control was transferred to foreign investors.

Research by Fominykh (2004) used data on Russian companies from 2000 and 2001 to demonstrate that, in private companies, average revenue per employee exceeded the comparable indicator for state-owned (unitary) companies. Moreover, the public sector can achieve higher sales margins and lower returns on equity compared with private companies.

The specific aspects of Eastern European countries determined the significant differences in the content of privatization programs and in the economic policy and business environment, which were potentially capable of changing or distorting the privatization effect. Its mechanisms are evaluated using a wide range of variables that describe various mass-privatization technologies, e.g., sales revenue, the demand of various types of owners for company shares, and the concentration of ownership (Frydman et al., 1993). The political and business environment require an estimate for factors such as competition barriers, access to finance, macroeconomic stability, protection of property rights, and the contract enforcement (EBRD, 1994–2002; Johnson et al., 2000, 2002; Mitra and Selowsky, 2002).

The characteristics of the institutional environment can either enhance or limit the competitive power of companies within an industry (see, e.g., Wei et al., 2005). The performance of companies after privatization may be indirectly dependent on the relevance of the industry to the stability of the country's economic development, and on the privatization method selected (see, e.g., Dewenter and Malatesta, 1997). Company performance may be significantly affected by the ownership and capital concentration (see, e.g., Marcincin and van Wijnbergen, 1995; Pham and Carlin, 2008).

A number of papers studied the effect of the specific nature of legal environment, corporate governance, and investor rights protection on the performance of companies (including state-owned) (see, e.g., La Porta et al., 1998, 1999, 2000). Those papers show that differences in the legal systems and institutions are important factors shaping corporate ownership structures in individual countries.<sup>7</sup>

Including financial leverage in the model provides an indirect assessment of not only management efficiency, but also the degree of risk aversion. Debt contracts act as a mechanism for resolving agency problems and reduce incentives for investing in risky projects (see, e.g., Bolton and Scharfstein, 1990; Harris and Raviv, 1990; Diamond, 1991; Aghion and Bolton, 1992). Ghazouani et al. (2007) researched changes in the financial and operating performance of companies in Egypt, Morocco, Tunisia, and Turkey after privatizing through IPOs. They demonstrated that these companies significantly improved returns and operating performance, while reducing employment and debt burden.

A number of papers researched only the effects that privatization had on public companies, which allowed for using data on market capitalization, share price volatility, etc. for estimating alternative performance indicators. For example, as Chinese companies demonstrated (Wei et al., 2005; Ng et al., 2009), the participation of the state and institutional investors has an adverse effect on Tobin's  $q$  (the ratio of a company's adjusted market value to the recovery value of its assets). At the same time, the presence of foreign investors had a positive impact on the investment attractiveness of companies. Ang and Ding (2006) concluded that state participation had a positive impact on the market value of companies in the Singapore market.

The correlation between market value and government control may depend on specific circumstances (the state's ownership of a blocking, controlling, and/or 100% interest, and the degree of concentration of the equity capital). A linear dependence was found in Minguez-Vera and Martin-Ugedo (2007), Filatochev et al. (1999); Bokov and Vernikov (2008); a nonlinear dependence was found in Barja et al. (2005), Kuznetsov and Muraviev (2000), McConnell and Servacs (1990), Thomsen and Pedersen (2000). Some authors found no dependence (Omran, 2009), while the paper by Teplova (2012) discusses a potential non-linear effect of mixed state ownership on a company's financial position.

Radygin and Entov (2001) surveyed 872 Russian joint-stock companies and found that a lower state capital share led to higher returns on equity. They also

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<sup>7</sup> Empirical research on the evolution of corporate governance models was also conducted by Dolgopyatova et al. (2009). In particular, they identified the closed orientation toward foreign investors and estimated the development prospects for private companies and companies with direct and indirect state control.

showed that the privatization of 1992–1994 resulted in a trend toward a higher concentration of share capital ownership in Russian corporations. As it increased (of course, with certain limitations), indirect performance indicators also rose: the ratio of revenue to the number of employees; the ratio of profits to fixed funds; the ratio of profit to revenue, etc.

In general, the review of academic papers on the impact of state ownership on company performance points to an absence of generally accepted indicators. The indirect indicators widely used before (primarily financial indicators) cannot completely eliminate the distortions caused by the price factor under a limited competitive environment. However, using various financial indicators, most researchers found that the performance of state-owned enterprises is usually poorer than that of private companies in various countries and across various time horizons. The results of more fundamentally focused research, which attempted to evaluate “real” performance, do not contradict these findings. These assumptions served as the starting point for our study.

## 2. Sample and research methodology

Our sample included the most highly capitalized companies (or those with the highest equity, if capitalization data were unavailable) whose shares or bonds were listed.<sup>8</sup> The database included annual reports for 114 private companies and state-owned enterprises for the period from 2006 to 2014.<sup>9</sup> In 2014, the sample represented 63% of stock market capitalization, 5.9% of employment, and 16.2% of total revenues in the Russian economy.<sup>10</sup> Therefore, although the number of sampled companies is considerably less than the samples in existing papers on the subject, the analysis was conducted based on the cluster of companies representing the greater part of Russia’s corporate sector and may be therefore relevant for similar major companies outside the sample.

In analyzing the ownership structure at the SOE level, we attempted to distinguish between the effects caused by direct and indirect state ownership (an innovative feature of our research). Direct ownership means that the shares (stakes) owned by the federal government are disposed of directly by authorized government agencies. Indirect ownership means that the state owns company shares through other organizations or a chain of organizations, whereas the size of the state’s indirect share (stake) is calculated as the multiplication of shares owned by the state in the parent company, shares owned by the parent company

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<sup>8</sup> These companies are required to publish quarterly reports on securities according to Appendix 3 to the Regulation on Disclosure of Information by Issuers of Listed Securities, approved by Bank of Russia Order No. 454-P, dated December 30, 2014. Data on the owners of such companies are contained in Section 6.3 of the quarterly reports published by security issuers.

<sup>9</sup> The sample also includes (based on the above criteria) major subsidiaries of state corporations set up in the Russian Federation in 2007, and afterwards, that are governed by special regulations. It should be noted that the specific status of a “state corporation” (or “state-owned company”) raises a number of theoretical and methodological questions regarding the position of this business form within the Russian regulatory framework and, most importantly, its position on the “state ownership—private ownership” scale.

<sup>10</sup> This article describes only specific features of the sample for purposes of comparative performance analysis. The previous article contains its detailed description, including each company’s industry structure and SOE classification methods based on direct and indirect state ownership: see Abramov et al. (2017), dedicated to an analysis of the ownership structure of major Russian companies and their role in the economy and the financial market.

in the subsidiary, those owned by the subsidiary in its subsidiary, and so on down to the company under review.

Of the overall sample, 40 companies can be considered fully private, and 74 organizations had non-zero stakes directly and/or indirectly owned by the state. 54 of them had shares (stakes) directly owned by the state, regardless of its size. In 33 of the 74 SOEs, the state ownership share (stake) was indirectly held.

A greatest portion of the companies in the sample represented certain industries including utilities (22%), oil and gas (11.4%), and machinery manufacturing and the military-industrial complex (7.89% each). The highest average direct state ownership stakes (exceeding 47%) were found in the nuclear industry, airports, the military-industrial complex, diamond mining, and in certain industries represented by a small number of companies. On average, the greatest indirect share of the state was observed in the nuclear industry, diamond mining, infrastructure construction, and transportation (over 30%). Looking at the sum of direct and indirect state-owned shares, the state's ownership in the nuclear power industry, airports, diamond mining, and the military-industrial complex exceeded 70% without accounting for certain industries represented by a small number of companies in the sample. This suggests a sufficiently broad coverage of companies across different industries and different sizes of state ownership stakes within individual industries.

As a calculation method, the authors chose a quantitative analysis of panel data using regressions with fixed individual and group effects and industry-specific dummy variables. A similar approach to analyzing the impact of privatization was applied, for example, by Frydman et al. (1999), Brown et al. (2006), Claessens and Djankov (2002), and a number of other authors.

The sample contains the findings of observations on 114 companies across 9 years (2006–2014). Unfortunately, the size of the sample and the time horizon are not sufficiently large, making it difficult to consider the trends for each company in the indicators under review (Brown et al., 2006). Curious aspects and issues related to this should be analyzed as part of further research. The calculations assume that fixed individual and/or industry effects are stable over time. To control the significance of fixed effects, *F*-tests were conducted for each model for the general insignificance of all regression coefficients for included dummy variables. For each model, a Hausman specification test was conducted (Hausman, 1978); at 10%, the hypothesis about sampling random effects instead of fixed ones was rejected (the test reports are not included here).

The quantitative analysis of the effect of state ownership on company performance used several types of dummy variables. Since the business of companies and their performance indicators are described with the broadest spectrum of both measurable and immeasurable factors, we were forced to use only a minimal number of explanatory variables in the regression analysis. This, in turn, led to missed information (a number of factors) for each company. The depth of panel data used does not allow for a correct assumption or future evaluation of the assumption regarding the significance of individual trends for each company. Therefore, the individual fixed effects reviewed using proxies<sup>11</sup> of unrecorded

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<sup>11</sup> Hereinafter, the term proxy means a variable that allegedly represents the characteristics of the relevant unobserved variable.

characteristics and features of each company, which do not change over time and are difficult to observe or measure. For each specification of the models presented below, we tested the regression model with individual fixed effects—a number of unknown constants (one for each company) measured during the calculations, which, on the one hand, ruled out the deviation caused by missing variables, and on the other hand, led to an increase in (binary) factors on the right-hand side of the equation. Regrettably, in a large sample of companies with a limited time period, further interpretation of such constants is complicated. Additionally, companies with an almost permanent ownership structure may have faced problems with the statistical estimate of such effects over the period under review. Therefore, where possible, based on the significance criteria of the regression model, we chose a model with industry effects. Individual effects were used in models with large differences between company performance within an industry, for purposes of the most definite identification of state ownership effects.

In addition, the fixed effects on company clusters were used in the analysis. To this end, the companies were divided into groups according to their respective industries. The division is based on the specialization used in the RBC-500 rating.<sup>12</sup> Thus, companies are conventionally divided into 30 industry groups. The test of various approaches to industry classification, e.g., OKVED (Russian Classification of Economic Activities)<sup>13</sup> or the Bloomberg agency,<sup>14</sup> confirmed the relevance and validity of the sample selected in terms of industry composition.

The goal of the research is to study the differences in financial performance for companies with different ownership structures (here, with a different degree of government involvement as a company owner). A comparative analysis of SOEs and private companies is complicated by the absence of a common versatile criterion for all ownership categories. Thus, the analysis of a number of company performance indicators does not fully cover the specific features of state-owned enterprises for a number of reasons. First, some SOEs cannot be privatized as they conduct their business in the country's strategically relevant industries or perform social functions as well as commercial operations. This may lead to certain difficulties in the comparative analysis if such companies are included in the sample together with companies that were privatized or are being prepared for privatization. Second, financial results, profitability optimization, improving efficiency or increasing market value are not the operational goals for certain SOEs. This is the reason why the company performance criteria only partially reflect the differences between SOEs and other companies. Third, some SOEs may be, to a certain degree, monopolies in certain market sectors, and comparisons of financial results will not be fully representative. We realize that financial performance does not always reflect production characteristics accurately; however, due to their broader availability, they are more often used to study company performance. For example, in works by Brown et al. (2006), Frydman et al. (1999) and others, research was consistently conducted for a whole number of financial indicators. Therefore, to verify the stability of the impact of ownership on company performance, we use several different characteristics of a company's operations.

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<sup>12</sup> <http://www.rbc.ru/rbc500/>

<sup>13</sup> [http://www.consultant.ru/document/cons\\_doc\\_LAW\\_163320/](http://www.consultant.ru/document/cons_doc_LAW_163320/)

<sup>14</sup> <http://www.bloomberg.com/>

The main problem appears to be the choice of criteria for comparing and evaluating performance. The sample includes companies with poor comparability in terms of a large number of parameters, which operate in different industries, and produce different products. Using total factor productivity could ensure more acceptable characteristics for evaluating the overall business “effectiveness” (see, e.g., Brown et al., 2006). This requires a production function for each company or industry based on data gathered about the main factors of production, i.e., labor and capital. However, the diversity of forms and methods for evaluating production functions plus the lack of reliable data complicate the application of this approach to our limited sample. This provides opportunity to study this problem in the future on a broader sample of companies.

In this situation, a trade-off would be to use labor productivity, calculated as product cost per employee. However, the diversity of industries and products that companies produce complicates the use of this indicator for comparing operating results between different companies in the sample, and therefore it would be more correct to use it to compare the productivity of an individual company or similar companies producing the same product. In evaluating labor productivity subject to the above methodological difficulties, we use revenue per employee for further analysis of company performance (hereinafter, gross revenue per employee, since the company’s gross income was used as an indicator in calculating the variable). We calculate annual rate of change of gross revenue per employee, which may presumably act as a financial indicator, indirectly related to the level of labor productivity growth achieved. At the same time, gross revenue per employee is of course subject to price factors. We attempt to solve this problem by using a set of product price indices.

We selected return on equity as the financial performance indicator (*ROE*) for the regression analysis. This ratio evaluates financial performance but can also serve as an indirect indicator, or proxy, for certain aspects of the company’s production operations. The analysis evaluated how privatization and the size of the state’s stake in the equity affect the indicator under review. By using *ROE*, we evaluated the changes in the economic results of companies, whether public or not.

The *profit margin* characterizes the ratio between the profit to which the shareholders are entitled and net sales, reflecting the efficiency of various resources, including the company’s ability to control costs. The indicator is widely dispersed across the sample due to differences in technologies, operating structure, etc.

To evaluate the debt burden for companies, we used *Net Debt/EBIT*<sup>15</sup> to verify the credibility of the assumption that SOEs enjoy better access to borrowed resources and, accordingly, feature greater debt burden than private companies. At the same time, the debt burden does not act as a measure of a company’s performance in and of itself, but it can serve as its indirect indicator to complement the analysis.<sup>16</sup>

<sup>15</sup> In our research, we used *EBIT* (in contrast to the traditional *EBITDA*) as the denominator, since some companies lacked data sufficient to calculate *EBITDA*.

<sup>16</sup> All listed data were gathered based on information provided by Bloomberg and SparkInterfax, in addition to the annual statements prepared and disclosed by companies.

Based on our previous findings (see Abramov et al., 2017), the following assumptions (hypotheses) were used as null hypotheses in the econometric analysis. On the whole, state ownership, not unlike direct ownership, has an adverse effect on company performance. This means that increasing shares of private owners in a company's ownership structure increase its gross revenue per employee and return on equity. In this case, private companies are more efficient in terms of the specified criteria than SOEs in the production of private goods. It is assumed that state-owned companies perform a number of social functions and promote the realization of certain aspects of government policy. This is why the null hypothesis is that their efficiency is lower and debt burden is higher due to better access to credit. For various reasons, the most efficient SOEs are transferred to indirect state ownership, leading to the assumption of its positive impact on the selected measure of productivity, return on equity, and profit margin, plus its negative effect on debt burden.

The research difficulties include a great number of factors affecting the financial position and performance of companies. The aggregate impact of these factors is incorporated by including individual, annual, or industry (group) fixed effects in the model, and identifying only available explanatory variables as separate, which characterize each company and is consistent with the field of research. To this end, in addition to ownership structure indicators, we selected certain proxies for a company's size (see, e.g., Boubakri et al., 2013) and its financial stability (Gunasekarage et al., 2007). To characterize the degree of risk and an indirect indicator of financial stability, we selected the ratio between the company's borrowings and equity<sup>17</sup> (hereinafter, the financial leverage ratio), reflecting the company's economic independence and/or dependence on external financing.

Since the sample includes companies from various industries, the analysis should include a number of industry-specific characteristics that change over time and likely reflect the comparative advantages of conducting business in a given industry. However, the correct choice of such factors is impossible in practice due to representative indicators covering the industries under review. This is why the models include, where applicable, fixed industry effects. The research tested models that also take into account GDP growth rates, the utilization of production facilities (production capacity index) and changes in the exchange rate for the national currency. The initial analysis demonstrated that the performance indicators used strongly depend on both current trends and current economic conditions (identified based on the respective paired regression models in different observation periods). To solve this problem, we could exclude the impact of individual trends for each company, which calls for increasing the length of the time series and panel data with a small number of gaps. However, this is a topic for future research.

Part of the sample is represented by companies that export their products. Operations by these companies are more exposed to fluctuations in the foreign exchange rate. This is why, based on the information on the breakdown of Russian exports by main industries (per data from the Federal Customs Service

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<sup>17</sup> Equity means the aggregate value of the company's authorized capital and retained earnings reported on the balance sheet.

and Russian Federal State Statistics Service—Rosstat), we compiled a list of industries where the share of exported products was at least 30%. This classification of companies formed the basis for fixed effects related to export operations.<sup>18</sup>

To identify the impact of the state's ownership share on company performance, we selected an approach that evaluates the following generalized set of models:

$$\begin{aligned} EffRatio_{i,t} = & c + \beta_1 \times government\ share_{i,t} + \sum \beta_j \times size\ factors_{i,t} + \\ & + \sum \beta_s \times fixed\ effects_{i,t} + \sum \beta_k \times macro\ factors_t + \varepsilon_{i,t}, \end{aligned} \quad (1)$$

where  $EffRatio_{i,t}$  is the selected company performance indicator  $i$  in the year  $t$ , which can be represented by the company's return on equity or its other indicators, i.e., profit margin and debt burden. The  $c$  variable is a constant, while  $government\ share_{i,t}$  is the value of the government's direct, indirect, or total share in the company's ownership structure  $i$  in the year  $t$ . The  $size\ factors_{i,t}$  can be included in the model to take into account the size of the company; they are represented by a (base) logarithm of the total assets or average staff headcount of the company  $i$  in the year  $t$  as well as the ratio characterizing the company's financial leverage. The  $macro\ factors_t$  are represented by macroeconomic indicators: GDP growth rates, production capacity index, changes in oil prices and in ruble-to-dollar exchange rate. The  $fixed\ effects_{i,t}$  can also be included in the model, e.g., to take into account fixed effects for each company individually, or differences in their respective industries including the export industry.

Based on a comparison of various specifications by formalized criteria and tests, we selected model specifications that allow for the deepest possible research into the impact of each of the three characteristics of state ownership: direct, indirect, and total government shares.

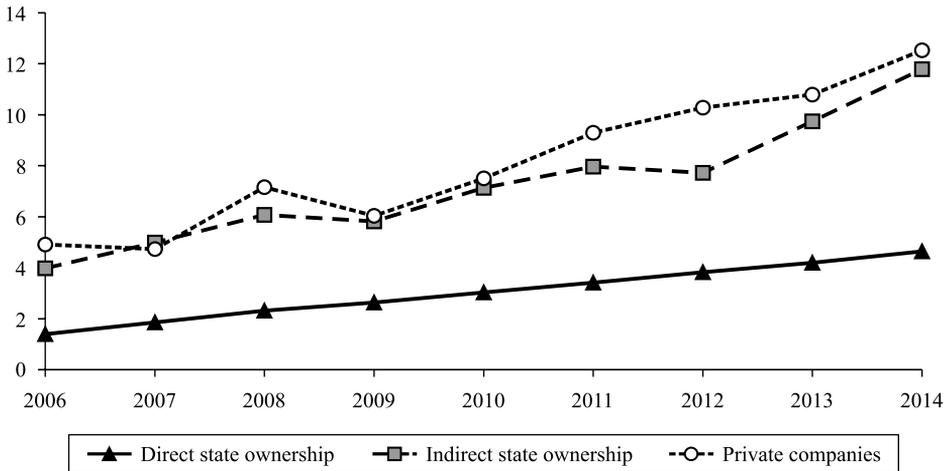
### 3. Impact of state and private ownership on the indicators of individual companies

The effect of total state ownership, including its direct and indirect forms, on company performance turned out to be selective. As shown in Table 1, we identified an inverse relationship between total government share and return on equity, statistically significant at 5%. In contrast, for the debt burden, we observed a positive relationship to state control, statistically significant at 10%, which may be related to the privileges of state-owned companies (including those with indirect state ownership) in terms of lending, state-backed guarantees, etc. The effect of total government share on profit margin was insignificant.

Including fixed effects in the models allowed the impact of state ownership on the main company performance indicators to be identified under significant inter-industry or individual differences. The calculations take possible shifts in the models into consideration related to each company's industry specialization.

<sup>18</sup> In the sample, a large number of oil and gas companies are classified among the exporting industries according to our classification criteria. They account for 55% of the total revenue across the sample and 84% of the revenue in the sample of exporting companies in 2014. This is why the models that categorize companies as part of exporting and non-exporting industries should not include oil and gas and ruble exchange rate indicators.





**Fig. 1.** Average gross revenue per employee in private companies and SOEs, 2006–2014 (RUB million).

Source: Authors' calculations.

Using fixed industry-specific (individual) effects takes into account that various industries (companies) possess a number of characteristics that do not change over time.

The binary variable reflecting the company's attribution to exporting industries is significant at high levels in the models for all indicators. At the same time, we can see an adverse effect on debt burden from exporting (this may indicate a lower relative dependence on borrowed capital in exporting industries on average). For profitability indicators, the coefficient is positive: financial indicators are, on average, higher than for companies that export their products and are probably more resilient to internal price and demand shocks.

Figure 1 compares the average values of the proxy indicator of labor productivity in private companies and SOEs. For almost every year under review except 2007, the average growth of gross revenue per employee at private companies surpassed similar indicators for SOEs. In 2006, gross revenue per employee was RUB 4.91 million on average at private companies, RUB 3.98 million at SOEs with indirect state ownership, and RUB 1.39 million at SOEs with direct state ownership. Over the nine years (in 2014), the average gross revenue per employee of private companies reached RUB 12.53 million, RUB 11.79 million for SOEs with indirect state ownership, and RUB 4.64 million for SOEs with direct state ownership.

On average, private companies surpassed SOEs in terms of return on equity indicators as well (Fig. 2). Following the 2008 crisis, they could better adapt to the new conditions. In 2014, return on equity for private companies was 9%, of companies directly owned by the state—8.77%, and indirectly owned—7.71%.

Thus, according to our tentative results, the government's share in the capital of major companies is characterized by a negative correlation with return on equity, while the average gross revenue per employee is higher for private companies than for state-owned companies. On the whole, this does not contradict the findings by most of the academic papers reviewed in Section 1. Nevertheless,

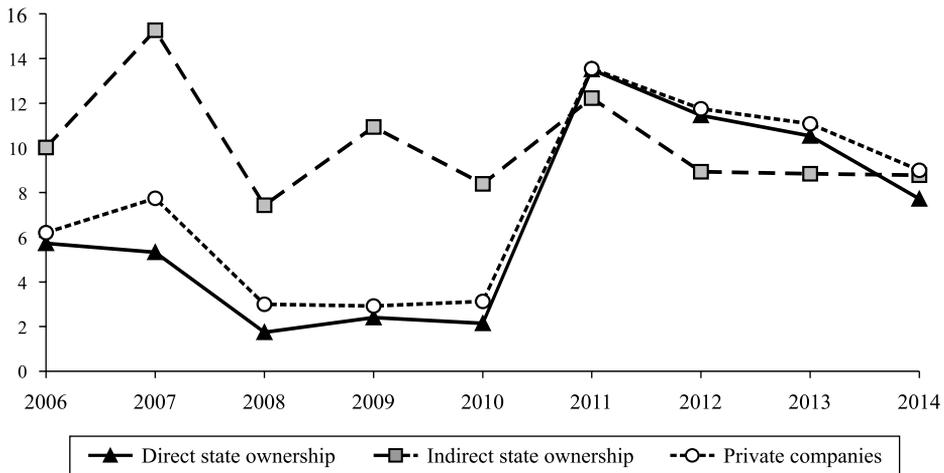


Fig. 2. Return on equity comparison in private companies and SOEs, 2006–2014 (%).

Source: Authors' calculations.

one of the significant innovations of this research is also the separate measurement of the effects from different types of state ownership (direct and indirect), the results of which are detailed in Section 5. An equally relevant issue pertains to the mechanisms for maintaining efficiency at SOEs, considered below, which had no interpretations in the literature to date.

#### 4. Mechanisms of economic performance

The preceding comparisons of financial characteristics essentially assumed that the research subjects (state-owned and private companies) maximize their net profit (company value). In the meantime, the matter of selecting a target function is quite complicated, particularly for state-owned companies. It largely depends on the intensity of influence exerted by competitive forces operating in the business entities under review.<sup>19</sup> Without a more detailed discussion of this multifaceted problem, we highlight a single, quite essential point: in state-owned companies, principal-agent relations are manifested, in particular, in top manager goals to maximize their regular income and various types of “incentive” payments (bonuses, awards, etc.), which is inevitably detrimental to the adjusted profitability for the respective state-owned companies. In most cases, there is no access to the respective information, which is a serious limitation on the possibilities for empirical research in this area.

At the same time, our understanding of the existing corporate mechanisms that regulate operating performance also requires clarification. The traditional description of these correlations presumes that the information signal is the decrease in profitability and deterioration of other financial indicators following a growth period (slower decline) in real costs which, in turn, encourages firm owners and managers to actively resist the new trend. To what extent could we observe these processes in the companies reviewed?

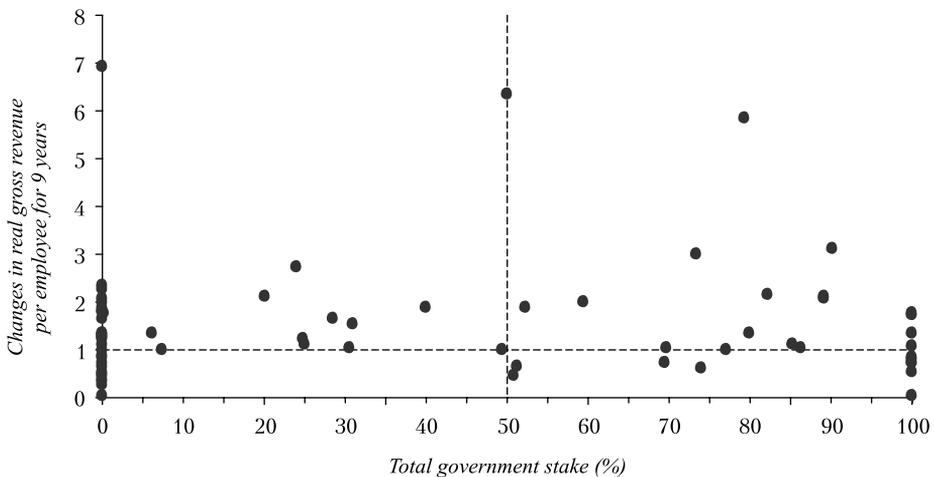
<sup>19</sup> See Ehrlich et al. (1994), Aghion et al. (2015).

To answer this question, we need to switch from nominal indicators to changes in the real characteristics of production and marketing, whereas developing adequate cost and revenue deflators for individual diversified companies is an extremely difficult task that is practically impossible if the required data are lacking. Therefore, in the following approximate calculations of the (gross) real revenue, we used available “proxy” indices.

Using price effects meant deflating the increase in gross revenue relative to the base year.<sup>20</sup> However, based on available statistics, we cannot build a system of deflators for the products of individual producers. Consequently, in the research we included a set of price indices for producers of individual types of goods and services as compiled by Rosstat to reflect aggregate price changes. These price indices seem only to serve as an approximation of the required deflators; however, we also used industry-specific price index data.

Our calculations enabled us to estimate the rate of change in *real* gross revenue per employee for nine years (2006–2014), depending on the amount of state ownership as of 2014<sup>21</sup> for all companies without missing data. The results of our analysis are shown in the scatter plot (Fig. 3). We added a border value of 50% total state ownership for a graphic presentation of the differences between companies with a majority government share (exceeding 50%) and other companies.

We can see that for companies with a non-zero government stake, quite a sizeable portion of observations in the right-hand side of the graph are lower than



**Fig. 3.** Changes in real gross revenue per employee (in 2006 prices) for 9 years and total state ownership in 2014.

Source: Authors' calculations.

<sup>20</sup> Since the research uses non-balanced panel data, there were no gross revenue per employee data for a number of companies for the beginning of the period, i.e., 2006. Therefore, we calculated rate of change in the gross revenue per employee for shorter periods (the base years are 2007, 2008, 2009, 2010).

<sup>21</sup> Hereinafter, we cite state ownership data for 2014, rather than the base year, for greater representation and the completeness of data. This assumption does not distort the research results, since during the period under review there were no material changes in the ownership structure; the government's ownership stake in most major companies was relatively stable.

**Table 2**

Share of companies with a different ownership structure, characterized by a decline in gross revenue per employee during different periods (%).

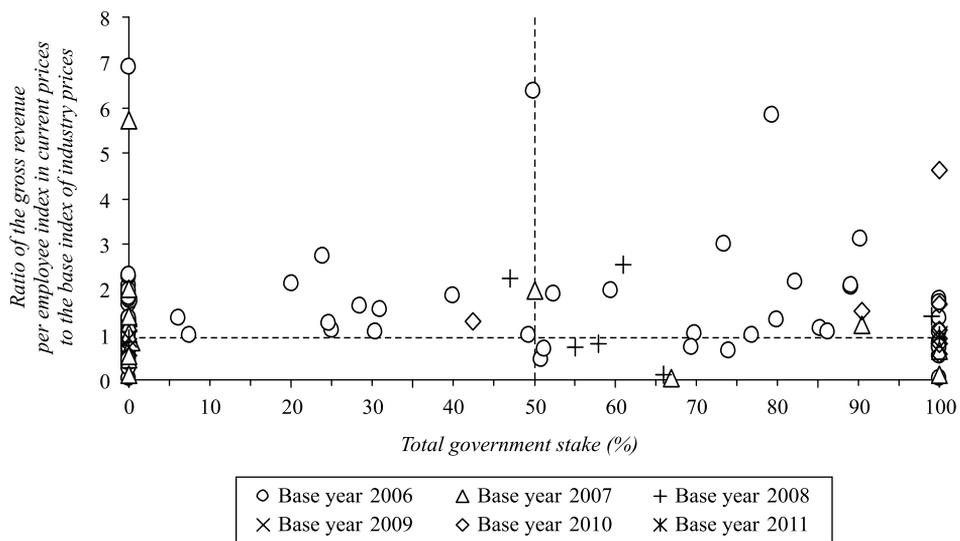
Share of companies with changes in real revenue per employee less than 1	Base year				
	2006	2007	2008	2009	2010
Among companies in which the state held more than a 50% stake	37.04	58.06	44.12	55.88	53.85
Among private companies and companies in which the state held less than a 50% stake	31.71	41.51	46.55	40.68	53.33

Source: Authors’ calculations.

the increase in real gross revenue per employee equal to 1 compared with similar “accumulations” in the left-hand side. A similar analysis was conducted for shorter periods (e.g., from 2007 to 2014 or from 2008 to 2014). The results are shown in Table 2.

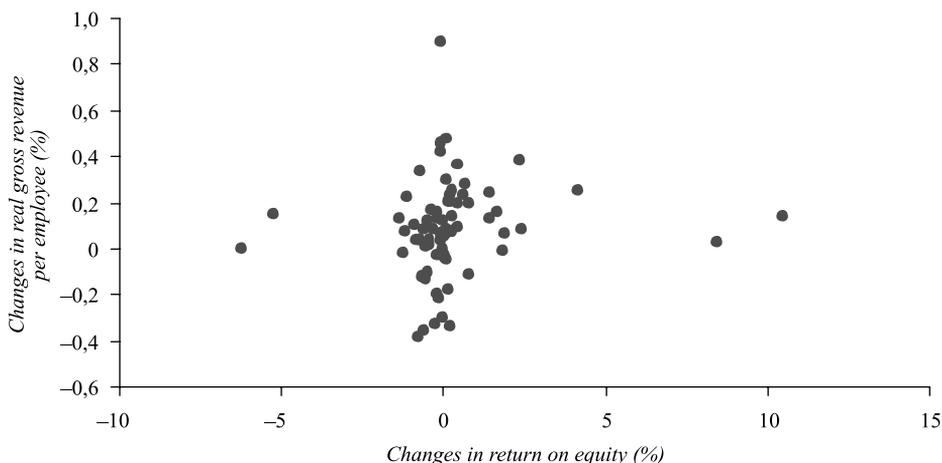
For the majority of the periods, we observe the consistency identified over the nine-year period. For example, when using 2006 as the base year, the real gross revenue per employee over nine years decreased for 37% of the companies with more than 50% of state-owned shares, but for only approximately 32% of the companies with smaller government stakes or fully private companies. A similar result can be seen over eight, six, and five-year periods. It should be noted that this trend was most pronounced after the crisis (2009–2014).

An alternative way to build a similar scatter plot with various base years for companies with shorter time series, is to display in one chart the observations for real gross revenue per employee increases for each company for maximum period available in the utilized database (Fig. 4). For example, if a company’s earliest gross revenue per employee in the database is dated 2008, we will calculate and reflect in the figure four changes in its real gross revenue per employee



**Fig. 4.** Changes in real gross revenue per employee for different base years.

Source: Authors’ calculations.



**Fig. 5.** Changes in real gross revenue per employee and return on equity for SOEs with decreasing real revenue per employee over the 9-year period.

Source: Authors' calculations.

for the seven-year period (2008–2014). It clearly shows that the preceding results remain the same.

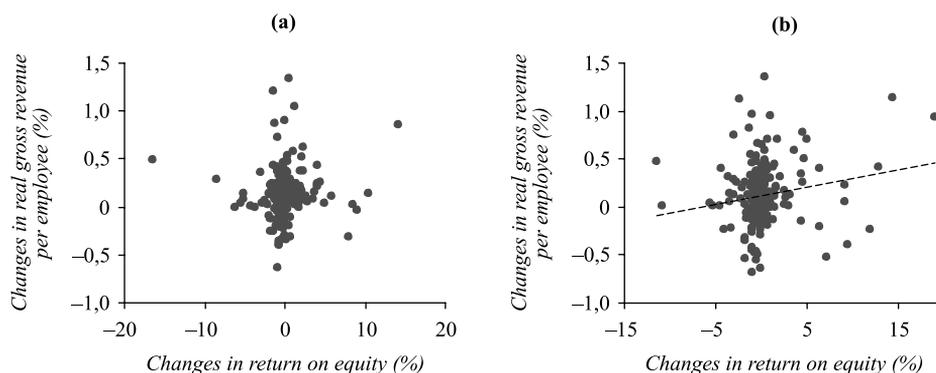
Of special interest in the changes in real gross revenue per employee and return on equity are companies where the state's total share exceeds 50%, for which the calculated proxy of labor productivity decreased over the nine-year period (Fig. 5). As shown in the graph, the decreasing gross revenue per employee adjusted for the price factor hardly affected return on equity for those SOEs.

It should be noted that for state-owned enterprises in which real gross revenue decreased for 9 years, there is no statistically significant relationship between labor productivity and return on equity. This finding is in agreement with the initial assumption that *state-owned companies to all appearance lack generally accepted mechanisms for regulating efficiency*. The companies reviewed seemed to be able to offset the reduction in productivity and respective cost increases by raising prices for their products, which enabled them to at least maintain the current ROE.

The sustainability of our conclusion can be demonstrated by studying the potential statistical relationship between real gross revenue per employee and return on equity separately for the group of companies with a high government share (over 25%) and the group of private companies and companies with minority state ownership (Fig. 6).

To illustrate the availability or lack of a stable statistical relationship between these indicators, we can calculate a paired regression for each sample (Table 3).<sup>22</sup> Figures 6a and 6b and the calculation results demonstrate that for companies with a high government share (over 25%), the corresponding correlation between real gross revenue per employee and return on equity is statistically insignificant; for other participants (sample of private companies and companies with minimal government involvement in the decision-making process, Fig. 6b), we can see a significant (1%) positive correlation: return on equity falls as productivity declines. For SOEs, this correlation is not observable in the sample used.

<sup>22</sup> We would need to use various control variables for a more precise calculation.



**Fig. 6.** Changes in real gross revenue per employee and return on equity for companies (a) with a total government share over 25% and (b) with a minority government share below 25%, including private companies.

Source: Authors' calculations.

The comparison of private companies and SOEs with a total (direct and indirect) government stake (see Table 1) established that *growth in state ownership has a significant adverse effect on return on equity and a positive correlation to increases in the debt burden*. Moreover, as shown in Fig. 1, *the average gross revenue per employee is higher in private companies than in SOEs*. The average gross revenue of SOEs with indirect state ownership exceeded that of directly owned SOEs. However, we could not exclude the impact of the price factor on the results. This is why in our research on gross revenue per employee, we particularly focused on comparing the increase in this indicator for companies with different forms of ownership subject to adjustments for price factors. This suggested the conclusion that for private companies and SOEs in which the total government share was less than 25%, we identified a correlation between changes in real gross revenue per employee and return on equity (see Fig. 6b and Table 3).

In other words, when their productivity fell, those companies received a market signal in the form of a lower return on equity. For SOEs in which the state's total stake exceeded 25%, no correlation of this kind was observed (see Fig. 6a), i.e., *no mechanism was found for the management's response to lower financial*

**Table 3**

Relation between real gross revenue per employee and return on equity for state-owned and private companies.

Indicator	Changes in real revenue per employee for companies with a government share	
	over 25%	under 25%
Constant	0.131*** (0.015)	0.121*** (0.018)
Return on equity	0.006 (0.006)	0.018*** (0.006)
Number of observations	246	257
Coefficient of determination	0.004	0.031
F-statistics	0.990	8.029***

Note: The value in parenthesis is the standard deviation of the estimated ratios; \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Source: Authors' calculations.

*performance*. When gross revenue per employee decreased, those companies could offset the loss in return on equity, for example, by raising prices for their products or services.

## 5. Specifics of the effect of direct and indirect state ownership

Including direct state ownership in the model instead of its total share considerably increases the effect of state ownership on the companies' performance indicators. Almost all null hypotheses were confirmed in the model (Table 4). *For return on equity and profit margin, we identified a significant impact of direct state ownership.* The greater is the size of the share block (stake) directly owned by the state, the worse a company's performance results become, all else being equal. This result may be related to the fact that, in their operations, companies with a high share of direct state ownership are forced to focus not only on market performance indicators, but also on achieving social objectives in the interests of the state, which are not entirely aligned directly with the business. Nevertheless, these considerations do not lead to significant distortions in our results, since the objective of the research is a comparative analysis of corporate financial performance based on a number of identified criteria and indicators, which does not rule out a study of these additional aspects in the future.

The impact of macroeconomic factors did not change compared to the analysis of total state ownership: the signs of the estimated coefficients are consistent with the null hypotheses formulated in most models. The sustainability of our findings with respect to belonging to exporting industries is confirmed by testing the respective alternative fixed effects. For the measure of direct state ownership, all findings were confirmed which were obtained with respect to total state ownership.

*Direct state ownership had significant and positive effect on company debt burden.* SOEs have a higher burden in terms of long-term debt. This may be the result of their preferential access to centralized financing sources in the form of budget funds or credit resources.

The scatter plot of increase in real gross revenue per employee in 2014, relative to the base year of 2006, for companies directly owned by the state is presented in Figure 7. The chart highlights a border value of 50% direct state ownership for a more persuasive presentation of differences between companies with a direct majority government stake (over 50%) and other companies. As we see, the conclusion was maintained and confirmed that, among companies with direct state-owned shares exceeding 50%, a smaller number of companies experienced an increase in real gross revenue per employee for 9 years.

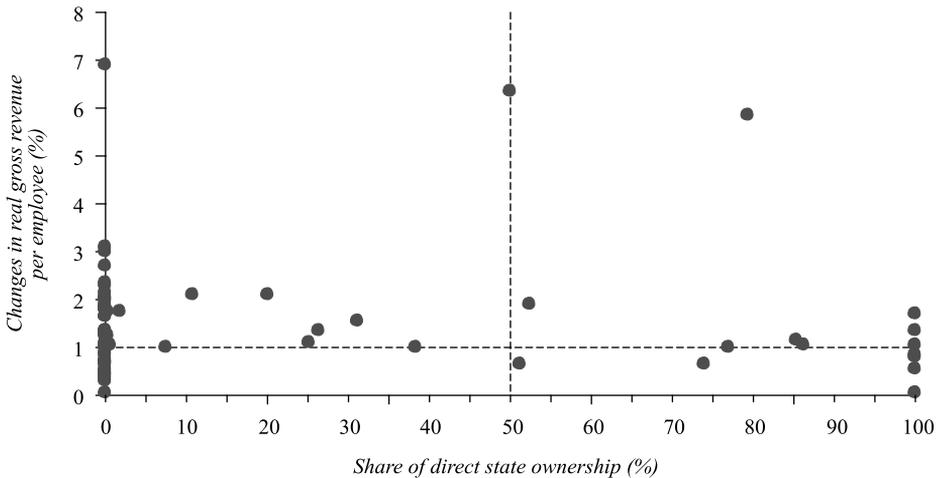
The results of selecting and evaluating models to analyze the effect of indirect government ownership are provided in Table 5. As shown above, a greater share of direct state ownership usually leads to poorer company performance. The calculations in Table 5 suggest that an increase in indirect ownership is, on the contrary, more often accompanied by an improvement in these indicators. At the same time, the statistical significance of the impact of indirect state ownership on performance characteristics is higher than the estimated role of total state ownership (see Table 1). The sustainability of our findings is also confirmed by testing alternative fixed effects for companies belonging to export industries.

**Table 4**  
Evaluations of models of direct state ownership impacts.

Indicator	Dependent variable								
	ROE			Debt burden			Profit margin		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Constant	12.4495 (9.3147)	8.9576* (5.0589)	14.1183* (7.6457)	2.9656 (4.7290)	4.3158*** (1.6049)	6.6504* (3.9874)	18.7747 (19.6067)	-2.8846 (10.5777)	-31.4336* (17.9020)
Total direct government share	-0.0697*** (0.0190)	-0.0689*** (0.0188)	-0.0550*** (0.0136)	0.0155* (0.0088)	0.0154* (0.0088)	0.0091 (0.0074)	-0.0821** (0.0394)	-0.0809** (0.03958)	-0.0724** (0.0322)
Number of employees <sup>a</sup>	-0.4107 (0.3420)	-0.4558 (0.3388)	0.4304 (0.2738)	0.0088 (0.0088)	0.0088 (0.0088)	0.0074 (0.0074)	5.4150*** (0.7152)	5.4299*** (0.7159)	6.2910*** (0.6672)
Assets <sup>a</sup>	0.6877*** (0.1987)	0.7262*** (0.1959)	0.4422*** (0.1807)	0.0088 (0.0088)	0.0088 (0.0088)	0.0074 (0.0074)	-0.2740 (0.4095)	-0.3193 (0.4075)	-0.4317 (0.4175)
Ratio characterizing financial leverage	-1.1704*** (0.2858)	-1.0010*** (0.2819)	-0.4328** (0.1795)	0.0313 (0.0851)	0.0313 (0.0851)	-0.0185 (0.0743)	-0.0024 (0.0172)	-0.0024 (0.0172)	-0.0000 (0.0199)
Utilization of production facilities	-0.0269 (0.1509)	-0.2713** (0.1338)	-0.2713** (0.1338)	0.0313 (0.0851)	0.0313 (0.0851)	-0.0185 (0.0743)	-0.4144 (0.3189)	-0.4144 (0.3189)	-0.2653 (0.3118)
Exchange rate	-13.5649* (7.0893)	-13.5649* (7.0893)	-13.5649* (7.0893)	-3.6141 (3.9774)	-3.6141 (3.9774)	-3.6141 (3.9774)	11.6673 (14.8345)	11.6673 (14.8345)	11.6673 (14.8345)
Changes in GDP		0.4568*** (0.1045)	0.4568*** (0.1045)		0.0608 (0.0575)	0.0608 (0.0575)		0.1001 (0.2244)	0.1001 (0.2244)
Oil price		7.7410** (3.6414)	7.7410** (3.6414)		-0.3655 (2.0125)	-0.3655 (2.0125)		-1.6385 (7.7413)	-1.6385 (7.7413)
Exporting industries (1 means "yes", 0 means "no")			6.4264*** (1.0114)			-2.2599*** (0.5577)			15.0830*** (2.3161)
Fixed effects	Industry 776	Industry 776	Export 776	Industry 807	Industry 807	Export 807	Industry 748	Industry 748	Export 748
Number of observations	776	776	776	807	807	807	748	748	748
Coefficient of determination	0.228	0.243	0.101	0.139	0.139	0.023	0.410	0.409	0.161
Adjusted coefficient of determination	0.191	0.207	0.094	0.121	0.121	0.019	0.384	0.382	0.154
F-statistics	6.236***	6.789***	14.401***	7.502***	7.520***	6.284***	15.523***	15.449***	23.738***
Akaike information criterion	6206.030	6190.520	6265.978	5526.568	5526.568	5600.755	7077.376	7078.843	7288.468
Schwarz information criterion	6378.234	6362.724	6303.211	5615.741	5615.470	5624.222	7234.368	7235.835	7325.407

Note: The value in parenthesis is the standard deviation of the estimated ratios; \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . <sup>a</sup> Value logarithm.

Source: Authors' calculations.



**Fig. 7.** Changes in real gross revenue per employee (in 2006 prices) over 9 years and direct state ownership in 2014.

Source: Authors' calculations.

Concerning the null hypotheses about the impact of indirect state ownership on company performance, the following should be noted: *SOEs indirectly owned by the state are characterized by comparatively higher financial performance than directly owned SOEs*. The impact of macroeconomic factors is, on the whole, consistent with initial hypotheses. The evaluation of the effect of indirect state ownership on basic financial ratios confirms the advantages that are manifested in SOEs as the share of indirect state ownership grows. *Return on equity and profit margin grow together with indirect state involvement*.

The different effects of direct and indirect state ownership on profit margin can be attributed to the different industry structure of the SOE sample. This indicator depends on a number of industry-specific characteristics, such as capital intensity, the ability to generate high value added, and other characteristics of both the industry and the company. This is why profit margin calculations may not include all factors. Nevertheless, it should be noted that SOEs do not operate only in profitable (in accordance with the term's definition) industries, but also in industries with a negative or low average profit margin: electricity generation, postal services, geology, etc.

Regarding SOEs with indirect state ownership, we can see a more favorable company sample and their industry structure. For example, companies with more than a 50% indirect government stake operate in the following industries: chemicals, petrochemicals, diamond mining, mechanical engineering, etc. The calculations based on the sample demonstrate that the profit margins of companies with an indirect state-owned share over 50%, for example, in the military-industrial complex, are five times higher on average than SOEs with direct state ownership exceeding 50% (18.9% and 3.45%, respectively).

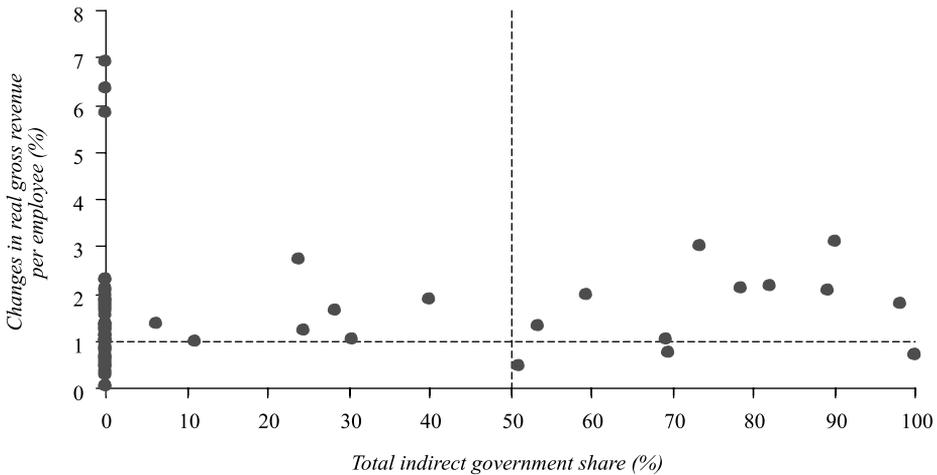
The analysis of total government stakes did not reveal significant correlations, as if in summing up, the differences in the structures of the respective groups are "washed away." On average, companies with a large total government stake differ from private companies only slightly (insignificantly).

**Table 5**  
Evaluations of models of indirect state ownership effects

Indicator	Dependent variable								
	ROE			Debt burden			Profit margin		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Constant	16.1420* (9.4017)	13.7656*** (4.9671)	18.0718** (7.6390)	-0.7207 (4.4056)	0.9813 (1.9555)	6.7246* (3.9846)	17.5151 (19.6809)	-0.9841 (10.5825)	-30.4092* (17.8884)
Total indirect government share	0.0443** (0.0194)	0.0432** (0.0192)	0.0084 (0.0192)	0.0195 (0.0200)	0.0197 (0.0199)	-0.0128 (0.0108)	0.0700* (0.0402)	0.0668* (0.0402)	0.0660 (0.0437)
Number of employees <sup>a</sup>	-0.2258 (0.3342)	-0.2519 (0.3313)	0.4998* (0.2620)				5.5661*** (0.6969)	5.5527*** (0.6972)	6.3752*** (0.6588)
Assets <sup>a</sup>							-0.6903* (0.4155)	-0.7067* (0.4141)	-0.7701* (0.4230)
Ratio characterizing financial leverage	-1.1928*** (0.2819)	-1.1404*** (0.2783)	-0.5234** (0.1801)						
Utilization of production facilities	-0.0086 (0.1523)		-0.2795** (0.1355)	0.0355 (0.0754)		-0.0124 (0.0746)	-0.3468 (0.3209)		-0.2717 (0.3131)
Exchange rate	-15.9759** (7.1405)			-1.8071 (3.4919)			8.1932 (14.9446)		
Changes in GDP		0.4534*** (0.1057)			0.0424 (0.0507)			0.1874 (0.2246)	
Oil price		8.4753** (3.6848)			-0.3604 (1.7735)			-1.6548 (7.7709)	
Exporting industries (1 means "yes", 0 means "no")			6.6535*** (1.0221)			-2.3735*** (0.5586)			15.6494*** (2.3317)
Fixed effects	Industry 776	Industry 776	Export 776	Industry 807	Industry 807	Export 807	Industry 754	Industry 754	Export 754
Number of observations	0.209	0.223	0.078	0.422	0.422	0.023	0.407	0.406	0.162
Coefficient of determination	0.173	0.187	0.072	0.333	0.333	0.019	0.381	0.381	0.156
Adjusted coefficient of determination	5.763***	6.256***	13.006***	4.760***	4.769***	6.243***	15.965***	15.948***	28.879***
F-statistics	6222.537	6208.779	6283.693	5385.762	5385.156	5600.876	7146.240	7146.578	7354.784
Akaike information criterion	6390.087	6376.329	6316.272	5897.334	5896.728	5624.343	7298.878	7299.216	7387.161

Note: The value in parenthesis is the standard deviation of the estimated ratios; \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . <sup>a</sup> Value logarithm.

Source: Authors' calculations.



**Fig. 8.** Changes in real gross revenue per employee (in 2006 prices) over 9 years and indirect government shares in 2014.

Source: Authors' calculations.

The scatter plot of the changes in real gross revenue per employee in 2014, relative to the base year of 2006, for indirect state ownership in a company is presented in Figure 8. We added a border value of 50% direct state ownership for a more persuasive presentation of the differences between companies with a direct majority government share (exceeding 50%) and other companies. It may be concluded that the situation for indirect state ownership is different: only a comparatively small share of companies with a non-zero indirect state-owned share demonstrated the decline in real gross revenue per employee for 9 years.

The higher performance of companies whose shares were indirectly owned by the state in comparison with companies directly owned by the state can be attributed to the fact that, as a rule, more efficient companies are indirectly owned (for example, setting up state corporations and holding companies based on special regulations and acquisition of shares in such companies by state-controlled entities in the public market).

Certain SOEs whose shares were indirectly owned by the state (Degtyarev Works, AvtoVAZ, Oboronprom, Siberian Chemical Plant, Irkut, etc.) are part of state-owned holding companies. They entered the public market independently by placing corporate bonds, for example, which may point to their attractiveness to market investors. Shares of other companies (Rosneft, InterRAO, partially PJSC Gazprom) were transferred to private ownership pursuant to individual decisions that required the functions of the government representative to be performed by entities specially authorized to implement the industry policy, and not by Rosimushchestvo (Russian Federal Agency for State Property Management; the management of Rosneftegaz was shaped in this way). Finally, in many cases, shares were transferred to indirect ownership during open market transactions where the buyer, controlled by the state in some way, had the opportunity to make an informed decision in favor of investing in more efficient companies. Thus, the shares of more efficient companies, characterized by high labor productivity and financial stability, were typically transferred to indirect state ownership.

Nevertheless, for many parameters, these companies are inferior to private entities in terms of performance efficiency (see Figs. 2–3). Moreover, in a number of cases, for the entities through which indirect ownership of their shares is ensured, non-market motives may arise which are not consistent with the interests of the state that prevent the privatization of these stakes: these risks may increase if a chain of indirect owners is formed. To eliminate this conflict of interest, the state may privatize stakes if the functions of Rosimushchestvo are indirectly performed by other entities, or privatize the stakes of parent companies that are directly owned by the state.

## 6. Conclusions

The study of the sample of 114 major Russian companies showed that in terms of the estimated performance characteristics, private companies have an advantage over SOEs. At the same time, we identified a statistically significant inverse relationship between the total government share and return on equity. In contrast, we observed a significant positive correlation between government control and the debt burden. The significance of state ownership on those indicators seems to be often moderate (10% in many cases). Moreover, for profit margin, the effect of the total government share was insignificant in most cases.

The differences between mechanisms for regulating efficiency, identified in the calculations, deserve special mention. Unlike SOEs controlled by the state, the financial performance of private companies is more exposed to unfavorable signals (e.g., falling real revenue per employee). For example, higher costs entail lower returns on equity for private companies, which encourages their managements to use production factors more efficiently. However, we could not identify the effect of these mechanisms in SOEs. Conversely, profitability for these companies does not decrease with the growth (insufficiently fast decrease) in real costs. These companies may be able to offset growing real costs by raising prices on their products, particularly in the case of monopolies.

At the same time, as shown convincingly by Stigler (1971), regulated companies are having an increasingly greater effect on the government's economic policy. Through regulation, the government essentially "protects" them from the effects of market competition and patronizes quicker enrichment of top managers and private owners (a number of authors, following Stigler, write about the actual "capture" of the state by regulated companies). In this situation, the inevitable consequence is a reduction in the efficiency of the regulated industry.

Although traditional mechanisms for maintaining efficiency (preventing a reduction in company value in the event of acquisition) were found to work inadequately for SOEs, identifying alternative regulatory mechanisms requires additional research. It is obvious, however, that an entire spectrum of applied solutions in the area of economic policy remains quite relevant: improving the transparency (publicity) of SOE operations, economically well-grounded long-term development programs (LDPs) and their open public examination, and the approval of short and medium-term SOE programs within Russia's long-term socioeconomic development programs.

The study shows that the explanatory power increased substantially when the ownership structure was broken down into direct and indirect state owner-

ship. As it turned out, direct state ownership has a negative effect on return on equity at a high level (1%) of statistical significance, and on profit margin at 5% significance. As the share of direct state ownership increased, debt burden also increased for the companies.

The poorer performance of SOEs compared to privately owned companies is often explained by the fact that state-owned enterprises act as a tool for social and industrial policy (see, e.g., Polterovich, 2012, p. 35) or that they, according to Lin (2011, p. 200), incur “the social and strategic burden.” These considerations are, of course, grounded per se. Still, as Lin (2011, pp. 200–201, 203) noted after studying the experience of reforms in state-owned companies in China, due to information asymmetry, the government often fails to obtain precise data on the real costs of companies that are presumably engaged in implementing the official economic course. This often *enables state-owned companies to report higher operating costs not as a result of efficiency but as losses due to the course of general economic policy.*

Unlike direct state ownership, the state’s indirect control may have a positive impact on performance. In the calculations above, the state’s indirect ownership had a positive effect on return on equity (5% significance) and on profit margin (10% significance).

The higher performance efficiency of SOEs indirectly owned by the state may be attributed to a more liberal (as compared with “direct” management of state-owned companies) regulatory regime, generally accepted for all economic entities with private or mixed ownership. Nevertheless, this type of assumption requires further thorough and unbiased research.

We can also assume that, in many cases, indirect state ownership acts as a certain legal alternative to privatizing shares in most efficient SOEs, where instead of selling shares on the market, their ownership is transferred to state-controlled entities by setting up state corporations or state-owned holding companies specially authorized to implement industry policy. In other cases, state-controlled organizations may acquire interest (stakes) in efficient SOEs from their private owners in the open market, which, in fact, means de-privatization of the interest (stakes), while at the same time creating artificial chains of owners among the shareholders (members) of public SOEs.

In terms of applied tasks for economic policy, this indicates, in particular, the need to thoroughly evaluate the expediency of a gratuitous transfer of interest (stakes) in SOEs to indirect state ownership so that this process does not become a legal means for evading privatization. In a number of cases, privatization of parent companies directly owned by the state, controlling other companies through a chain of owners with indirect state ownership, could largely reduce the share of indirect state ownership and, respectively, agency risks within such chains. For better management of these risks, we need to develop independent expertise in forming new integrated government entities and limit the expansion of SOE assets at the expense of privatized property.

In a study of the Chinese economy, Coase and Wang (2012) ascertain the failure of multiple attempts to revitalize state-owned enterprises. Evaluating the contribution of the state to the growth of the Chinese economy, they state that the success of market transformations was attributed primarily to the staged restriction of direct methods of economic regulation: “The strong presence of state

enterprises would be less troubling if the state subjects itself to the rule of law, as recommended by Lord Shan” (Coase and Wang, 2012, pp. 174–175, 183). We can treat the specifics of China’s economic reform experience differently; however, this thesis should hardly be rejected categorically.

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