

# Origin and concentration

## *Corporate ownership, control and performance in firms after privatization*

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### Abstract

We analyse the effects of different types and concentration of ownership on performance using a large population of firms in the Czech Republic after mass privatization. Specifications based on first-differences combined with instrumental variables show that the performance effects of different types and concentration of ownership are limited when compared to earlier studies. Often, concentrated ownership has a positive effect, a finding that supports the agency theory. The positive effect of foreign ownership is detected primarily for majority ownership and for ownership by foreign industrial firms. The state as a holder of the golden share has a positive effect on employment and sometimes, also on output and profitability. Overall, our results highlight the benefits of strategic restructuring accompanied by an inflow of new capital and managerial culture.

**JEL classifications:** C33, D20, G32, G34, L20.

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## 1. Introduction

We analyse the effects of different types of ownership, changes in ownership and concentration of ownership on corporate performance using a population of firms in the Czech Republic after mass privatization. In particular, we address the question of whether private firms perform better than state-owned enterprises (SOE), and whether post-privatization ownership structures lead to improvements in corporate performance over time. In doing so, we control for the effects of privatization and strive to minimize the key analytical problems that plague much of the large literature on privatization. In particular, since privatization schemes do not assign ownership to firms at random, many studies suffer from an inadequate treatment of the selection (endogeneity) of ownership. Unlike other studies, we use an instrumental variables technique in a two-stage framework to tackle this issue.<sup>1</sup>

Careful micro-econometric studies of ownership effects on performance date back to Caves and Christensen's (1980) classic study that found private and state-owned Canadian railways performing equally efficiently in a head-on competition. Since the 1990s studies have focused primarily on privatization, and recent surveys came up with assessments that range from finding a large variation of outcomes but no systematically significant effect of privatization on performance (Bevan, Estrin and Schaffer, 1999), through cautiously concluding that privatization around the world tends to improve firm performance (Megginson and Netter, 2001), to being fairly confident that privatization improves performance (Djankov and Murrell, 2002; Shirley and Walsh, 2000).<sup>2</sup>

Apart from being diverse, the estimated performance effects found in much of the literature on transition economies are not firmly established. The credibility issue arises from three interrelated analytical problems that may be expected in earlier studies. First, the studies have relied on data covering short time periods immediately before and after privatization. Hence, they at best capture the short-term effects of privatization rather than the medium-term and long-term effects of a switch from state to private or mixed ownership. Second, the studies (a) often use small and sometimes unrepresentative samples of firms, (b) are frequently unable to identify ownership accurately because privatization is still ongoing or because the frequent post-privatization changes of ownership are hard to detect, and (c) often combine panel data from different accounting systems.<sup>3</sup> Third, many of the studies

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<sup>1</sup> As Angrist and Krueger (2001) point out, in a setting such as ours this procedure is desirable because 'two-stage least squares takes the information in a set of instruments and neatly boils it down to a single instrument'.

<sup>2</sup> See Roland (2000) for a theoretical analysis and overview of privatization in transition.

<sup>3</sup> The key studies are indeed based on small samples related to short periods around privatization. These include Frydman *et al.* (1999), D'Souza and Megginson (1999), Boubakri and Cosset (1998), Barberis *et al.* (1996), Bilsen and Konings (1998), Grosfeld and Nivet (1997), and Claessens and Djankov (1999). See also Claessens (1997) and Filer and Hanousek (2002) for a discussion of these issues.

have not been able to control adequately for endogeneity of ownership and their estimated effects of privatization may be biased (see Gupta, Ham and Svejnar, 2000).<sup>4</sup>

Moreover, many of the earlier studies had access to limited data on firm ownership.<sup>5</sup> As a result, they often treat ownership as a relatively simple categorical concept and are unable to distinguish the exact extent of ownership by individual owners or even by relatively homogeneous groups of owners. As we discuss below, this has also prevented many of these studies from providing evidence for a lively debate about the desirability of concentrated versus dispersed ownership on corporate performance. The second generation of studies, to which this paper belongs, strives to avoid these issues.<sup>6</sup>

In this paper, we address systematically the three types of above-mentioned problems. In particular, in analysing the performance effects of ownership, we (a) use panel data on a majority of the medium and large firms that went through mass privatization in the Czech Republic and which constituted the bulk of the country's economic activity, (b) cover a 4-year period after privatization when accounting rules conforming to the international accounting standards (IAP) were already in place, and (c) control for endogeneity of ownership using a first-difference specification together with instrumental variables from rich data on pre-market (initial) conditions of these firms. Compared to earlier studies, we also develop a more systematic analytical framework for evaluating the performance effect of post-privatization ownership, distinguish between instantaneous and permanent effects of ownership changes, and use more detailed data on the extent of ownership by specific types of owners.

By carrying out a detailed study of one model economy, we obviously raise the issue of the general validity of our results. However, we are able to take into account specific legal and institutional features and we avoid the problem of not

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<sup>4</sup> Gupta *et al.*'s (2000) econometric evidence indicates that better-performing firms tend to be privatized first. Moreover, as we indicate below, Djankov and Murrell's (2002) survey of studies dealing with the impact of privatization on performance indicates that one-half of the studies do not treat this issue at all. Our examination of the other half suggests that many treat the issue in a relatively haphazard way.

<sup>5</sup> See, for example, Pohl *et al.* (1997), Smith, Cin and Vodopivec (1997), Claessens and Djankov (1999), and Frydman, Hessel and Rapaczynski (2000).

<sup>6</sup> In particular, note studies such as Grosfeld and Tressel (2001) and Cull, Matesova and Shirley (2002). Furthermore, Joh (2003) finds that firms with low ownership concentration show low profitability, controlling for firm and industry characteristics. Careful assessment of banks' performance is carried out by Bonin, Hasan and Wachtel (2005a) who find that foreign-owned banks are more cost-efficient than other banks and that they also provide better service, especially if they have a strategic foreign owner. The remaining government-owned banks are less efficient in providing services, which is consistent with the hypothesis that the better banks were privatized first in transition countries. Furthermore, Bonin, Hasan and Wachtel (2005b) demonstrate that foreign-owned banks are most efficient and government-owned banks are least efficient. In addition Fries and Taci (2005) show that private banks are more efficient than state-owned banks and privatized banks with majority foreign ownership are the most efficient and those with domestic ownership are the least.

being able to control adequately for cross-country differences in the institutional and legal frameworks that confront comparative studies with a limited number of country-specific observations.<sup>7</sup>

We find, contrary to expectations and results of many earlier studies, that the effects of different types and concentrations of ownership on firm performance are limited and that many types of private owners do not bring about performance that is different from that of firms with substantial state ownership. We do detect, however, significant effects of specific types of private ownership. In particular, a positive effect of concentrated ownership is discernible, but only in some instances and for selected performance indicators, and a positive effect of foreign ownership is found primarily in the case of majority ownership and appears to be driven by the behaviour of foreign industrial (non-financial) firms. Concentrated foreign owners (foreign industrial companies as owners) generate superior performance compared to all other types of owners in terms of growth of sales, and in some specifications also profitability, and concentrated domestic owners (domestic industrial companies and investment funds as owners) reduce employment relative to others. Overall, our results highlight the benefits of concentrated ownership and inflow of new capital and managerial culture.<sup>8</sup> Our firm-level findings complement the macro results of Zinnes, Eilat and Sachs (2001) and Barrell and Pain (1997) that real, as opposed to just *de jure*, privatization matters.

The structure of the paper is as follows. In Section 2, we provide information on the privatization process that generated our data, while in Section 3 we discuss the relevant features of the legal system and the hypothesized implications of different types of ownership on firm performance. In Section 4, we describe the data and basic statistics and in Section 5 we outline our empirical strategy. We present our empirical estimates in Section 6 and draw conclusions in Section 7.

## 2. Privatization in the Czech Republic

We analyse the 1996–99 performance effects of the main patterns of ownership and their changes after large-scale privatization and early post-privatization ownership

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<sup>7</sup> The leading studies in this area (e.g., Boubakri and Cosset, 1998; Frydman *et al.*, 1999; D'Souza and Megginson, 1999) are forced by the paucity of data to use pooled cross-country estimations. On the other hand, using cross-country data Boubakri, Cosset and Guedhami (2005) show that the positive effect of ownership concentration on firm performance is stronger in countries with weak investor protection. They also find that private ownership tends to concentrate over time and that the level of institutional development and investor protection explains cross-firm differences in ownership concentration.

<sup>8</sup> Cull, Matesova, and Shirley (2002) show that among the firms privatized in the Czech Republic from 1993 to 1996, voucher-privatized joint stock companies perform worse than firms with concentrated shareholdings that had to be purchased for cash (i.e., limited liability companies and foreign joint stock companies). They control for size and structure but they do not address in detail the issue of endogeneity of ownership.

swaps occurred. We start by briefly outlining the privatization programme that was carried out in the Czech Republic in the first half of the 1990s under three different schemes: restitution, small-scale privatization and large-scale privatization. The first two schemes started in 1990 and were most important during the early years of the transition. Large-scale privatization, by far the most important scheme, began in 1991 and was completed in early 1995.<sup>9</sup> The privatization programme permitted the use of various privatization techniques. Small firms were usually auctioned off or sold in tenders. Many medium businesses were sold in tenders or to pre-determined buyers in direct sales. Most large and many medium firms were transformed into joint stock companies and their shares were distributed through voucher privatization, or sold in public auctions or to strategic partners, or transferred to municipalities.

The voucher scheme was part of the large-scale privatization process, with two waves of voucher privatization taking place in 1992–93 and 1993–94, respectively.<sup>10</sup> The early post-privatization ownership structure emerged as shares from the second wave were distributed in early 1995 and rapid reallocation of shares across new owners took place in 1995–96 during the so-called ‘third wave’ of privatization as new owners, including the investment privatization funds (IPF), reshaped their initial post-privatization portfolios of acquired companies. Depending on the investor, the swapping of shares in 1995–96 was aimed at (a) portfolio diversification, (b) obtaining concentrated ownership in specific firms and industries, and (c) achieving conformity with legal requirements aimed at preventing excessive stakes being held by privatization funds.<sup>11</sup> The 1995–96 ownership changes were massive, unregulated and frequently unobservable to outsiders, including researchers. Investors, especially the IPFs, engaged in direct swaps of large blocks of shares, and off-market share trading was common. More stable and, from the standpoint of firm performance, more meaningful, patterns of ownership emerged in 1996. We analyse the effects of ownership and ownership changes from 1996 to 1999.

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<sup>9</sup> The privatization process has been extensively described and analysed. See, for example, Coffee (1996), Kočenda (1999), Kotrba (1995), Svejnar and Singer (1994). For development of ownership structures in voucher-privatized firms, see Kočenda and Valachy (2002).

<sup>10</sup> The voucher scheme is sometimes erroneously referred to as the large-scale privatization program itself.

<sup>11</sup> The regulation of IPFs evolved gradually through Decree no. 383/1991, its Amendment no. 62/1992, and Act no. 248/1992. The most important clauses restricted each privatization fund from investing more than 10 percent of points acquired in the voucher scheme in a single company and obtaining in exchange more than 20 percent of shares in any company. Privatization funds established by a single founder were allowed to accumulate up to 40 percent of shares in a given company, but this cap was later reduced to 20 percent. Many privatization funds circumvented the cap through mergers. The Act also prohibited IPFs founded by financial institutions from purchasing shares of other financial institutions to prevent excessive concentration of financial capital (for details, see Kotrba and Svejnar, 1994).

### 3. Forms of ownership and hypothesized effects on performance

#### 3.1 Concentrated or dispersed ownership?

A major issue that has received renewed attention is whether concentrated or dispersed ownership is more conducive to good corporate performance. Since we can identify all owners with ownership stakes of 10 percent or more, we are able to test the validity of the key competing hypotheses in this area.<sup>12</sup> In view of the diversity of predictions, we take as our null hypothesis the proposition that ownership concentration has no effect on firm performance.

Depending on their stakes, different blockholders have under the Czech law different opportunities to influence corporate governance. In particular, the law provides important rights of ownership and control to owners with majority ownership (more than 50 percent of shares), blocking minority ownership (more than 33 percent but not more than 50 percent of shares) and what we define as legal minority ownership (at least 10 but not more than 33 percent of shares). Majority ownership grants the owner the right to staff management and supervisory boards, alter and transfer firms' assets and make crucial strategic decisions at general shareholders' meetings. Through management and supervisory boards, majority ownership also facilitates more direct executive control of the company. The blocking minority ownership gives the right to block a number of decisions, such as those related to increasing or reducing assets and implementing major changes in business activities that the majority shareholder may strive to implement at the general shareholders' meeting. Finally, legal minority ownership is potentially important because the law entitles the holder of this stake to call the general shareholders' meeting and obstruct its decisions by delaying their implementation through lengthy court proceedings. Effective legal minority shareholders (including the state) may thus use their ownership position to delay or completely block the implementation of decisions by stronger shareholder(s).<sup>13</sup>

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<sup>12</sup> A survey by Shleifer and Vishny (1997) summarizes the agency problem arising from the separation of ownership and control and argues for the desirability of concentrated ownership. On the other hand, models of asymmetric information and optimal delegation of authority (e.g., Aghion and Tirole, 1997) point to the importance of managerial initiative and incentives to acquire information, highlighting the fact that concentrated ownership with little delegation of formal authority to managers may be deleterious to firm performance. An aspect of agency theory takes into account an opportunity for a change in ownership, such as an active secondary market or takeover possibilities. For more discussion of ownership concentration see also Bolton and von Thadden (1998), and Burkart, Gromb and Panunzi (2000), Holmström and Tirole (1983), among others.

<sup>13</sup> An interesting phenomenon is observed in the case of portfolio companies that are primarily interested in capital gains. These companies have been observed to buy 10 percent positions in firms where they can sell the stake at a premium to the dominant shareholder whose business strategy is to avoid excessive scrutiny by an institutionally strong minority shareholder.

Overall, the majority and blocking minority represent different degrees of concentrated ownership, while the legal minority may be viewed as a form of moderately dispersed ownership. Highly dispersed ownership arises when the stake of the largest holder held does not reach legal (10 percent) minority. We also know whether the government keeps a golden share in a given firm that gives it the right to veto certain managerial decisions, such as the subject of business activities and sales of assets, and indirectly influence all managerial decisions. Institutional evidence suggests that the golden share may be an important mechanism enabling the state to exert a degree of influence over firms in which it no longer holds a sufficient ownership stake.<sup>14</sup>

### 3.2 *Types of ownership*

Most empirical work has focused on relatively broad categories of ownership. In this paper, we cover broad categories but also assess whether finer ownership distinctions that reflect different business activities of the owners provide a meaningful understanding of the effects of ownership on corporate performance. In particular, we examine the effects of six types of domestic and two types of foreign ownership that may have differing implications for corporate objectives, constraints and governance. The six types of domestic owners are the state, industrial (i.e., non-financial) company, bank, investment fund, portfolio company and individual, while the two types of foreign owners are an industrial (non-financial) company and all other foreign owners.<sup>15</sup> Since the literature does not provide clear-cut predictions about the relative performance effects of these types of owners, we formulate our null hypothesis as stating that different owners do not have different effects on performance.

Using information from analytical and institutional literatures, we next briefly outline plausible hypotheses about the behaviour of different owners. The state as an owner may pursue various goals, including economic efficiency, tax revenues, or social goals such as employment. The results of Gupta, Ham and Svejnar's (2000) analysis suggest that in the Czech case revenue maximization was important in the privatization phase but other goals, such as employment generation, were also

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<sup>14</sup> The golden share was introduced by Act no. 210/1993, modifying Act no. 92/1991. The act set the conditions for property transfer from the state to others with the aim of protecting special interests of the state in firms privatized in large-scale privatization. The veto rights associated with the golden share usually relate to the scope and line of business activity and depend on each company's charter. When the state sells its golden share, it gives up its rights in the company and the golden share ceases to exist. The instrument of the golden share in the Czech Republic does not conform fully to that found in other countries since it is limited to being solely an instrument of state control and does not serve as a means of attracting free or less expensive credit.

<sup>15</sup> Since insiders have not been important in the Czech Republic, we do not analyse this type of ownership. We also do not examine whether a given owner belongs to a larger ownership group. With considerable additional data collection, this could be an interesting topic for future research.



important in the post-privatization phase when unemployment was on the rise. The ownership of a firm by an industrial company may be expected to increase profitability through cost-cutting, integration of activities and expansion aimed at exploiting economies of scale. Bank ownership is expected to impose pressure on the firm's management to improve profitability (Cornelli, Portes and Schaffer, 1996),<sup>16</sup> while investment (mutual) funds are expected to pursue profitable opportunities and, when desirable, take significant equity positions. Funds may hence place emphasis on sound corporate governance and restructuring of firms.<sup>17</sup> Portfolio companies in the Czech Republic are diversified investment vehicles that engage in business with both corporate and private customers. Their ownership positions in large firms are more limited than those of the funds, but the experience in advanced market economies indicates that portfolio companies often force management to become more profitable. Individual ownership is widely perceived to give the single residual claimant strong incentives to monitor the management and achieve superior firm performance. Finally, in a country with low labour cost and favourable profit repatriation rules, foreign owners are expected to aim at generating profits and, if the local products can be sold through their global distribution network, also on increasing output and hence employment. The issue that arises is whether profits generated by firms with foreign owners are declared or hidden through transfer pricing. Naturally, in an underdeveloped legal and institutional setting, any one type of ownership could be associated with managers or key shareholders appropriating private benefits at the expense of others, directly or through transfer pricing.

## 4. The data and basic statistics

### 4.1 Performance data

We start our analysis by providing an understanding of whether corporate restructuring associated with different types of ownership occurs more in terms of revenue

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<sup>16</sup> Ownership involvement of Czech banks in other companies resembles the situation in Germany. Allen and Gale (1995), with reference to the German financial market, argue that the fact that the market for corporate control collapses when stock markets are thin could be made up for by the role of banks as delegated monitors holding equity and exercising their voting rights. Czech banks, with their numerous holdings, were given the above option. However, as shown by Lízal and Kočenda (2001), the newly created banks also had a number of serious structural weaknesses.

<sup>17</sup> Makhija and Patton (2004) find that the extent of disclosure is positively related to (Czech) investment fund ownership at low levels of fund ownership but is negatively related to investment fund ownership at high levels of fund ownership. One may also expect the effect of investment fund and bank ownership on performance to be weaker in our data than in general because a number of funds were sponsored by banks that held debt of the same firms of which they became large blockholders. This resulted in a conflict of interest and inertia in implementing radical restructuring.



or cost (the two main components of profit). The variables that we use are sales revenue and labour cost.<sup>18</sup> Profitability is widely viewed as the best ultimate measure of corporate performance and we therefore also use operating profit on sales (profit/sales or return on sales) and the return on assets (ROA) as two measures of profitability. As we discuss below, we carry out our estimation in first differences and we therefore define these two dependent variables as the annual rate of change of operating profit on sales and the annual change in ROA, with the latter measured as the ratio of the change in operating profit between periods  $t - 1$  and  $t$  to total assets in period  $t - 1$ . By using the profit/sales ratio, we take advantage of the fact that this indicator is based on two flow measures that are less sensitive to inflation and accounting conventions than many other indicators. By using assets in period  $t - 1$  in calculating the change in ROA, our measure is not affected by the possible phenomenon of privatized companies writing off unproductive assets.<sup>19</sup>

The four indicators of performance permit us to draw inferences about the extent to which firms with different ownership engage in the two types of restructuring that have been viewed as key during the transition – defensive (reactive) and strategic restructuring.<sup>20</sup> Defensive restructuring is primarily related to short-term measures, such as layoffs and reductions in wages, while strategic restructuring refers to deliberate investments in the development of firms' advantages, such as introducing new products and finding new markets, and it results in increased sales revenues and profits. Furthermore, by examining the simultaneous effects of different types of ownership on the change of sales, labour cost and profitability, we are able to draw tentative conclusions about the presence of phenomena such as inefficiencies, possible appropriation of profits by managers or key shareholders, non-labour costs, and non-sale income.

Our working dataset contains 2,529–2,949 observations on an unbalanced panel of 1,371–1,540 medium and large firms from all economic sectors during the period 1996–1999. As we indicate in Table 1, the exact number of observations and firms varies slightly across the four performance indicators. The observations represent a cleaned dataset from the entire population of firms that were listed on the Prague Stock Exchange (PSE) in 1996. Since virtually all large and medium-sized firms privatized in large-scale privatization were listed on PSE, the dataset contains most of these firms. In addition to performance variables, our dataset contains detailed measures of ownership structure, the sector in which the firm operates and the

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<sup>18</sup> We do not use other measures of performance, such as material costs, because the sample size would be substantially reduced due to limited information on other variables in the data.

<sup>19</sup> Our measure would provide a biased indicator of a change in ROA, however, if productive assets were sold and, as a result, both assets and profit (rather than just assets) diminished. However, only about 5 percent of the firms in our sample actually reduced their assets and, as we discuss below, firms that substantially reduced assets were removed from our sample when we eliminated outliers.

<sup>20</sup> See Aghion and Carlin (1996), Aghion, Blanchard and Carlin (1997), and Grosfeld and Roland (1997) for a discussion of these concepts.

**Table 1. Summary statistics of the rate of change of performance indicators: 1996–99**

Annual rate of change of	Mean	SD	Minimum	Maximum	No. of firms	No. of observations
ROA*	0.001	0.098	-0.393	0.387	1,540	2,905
Profit/sales	-0.267	0.982	-2.995	2.985	1,289	2,164
Sales	0.009	0.426	-1.000	2.820	1,371	2,592
Labour costs	0.010	0.364	-1.000	2.842	1,539	2,949

*Notes:* The ratio of the number of observations to number of firms varies due to the unbalanced nature of the panel.

\* ROA is defined as a ratio of change in profits between two consecutive periods to total assets at the beginning period. Formally:  $[(\text{Profit}(t) - \text{Profit}(t - 1))/\text{Total assets}(t - 1)]$ . SD, standard deviation.

firm's privatization history (including performance and institutional data from the pre-privatization period). The data sample was compiled by the authors from information provided by Aspekt, a commercial database, the PSE, the National Property Fund (the privatization agency) of the Czech Republic, and the Business Register of the Czech Republic.

Firm-level data from the transition and emerging market economies often suffer from accounting deficiencies and usually contain missing values and outlier observations that may bias the estimated coefficients (Filer and Hanousek, 2002). Firms operating in the Czech Republic started adopting international accounting standards in 1992, and our discussions with international accounting firms located in the country indicate that this process was by and large completed in 1995. Our 1996–99 data are hence from a period in which IAS already dominated local accounting standards. Moreover, the data are reported by firms that had to conform to the standards demanded since the mid-1990s by the main regulatory institutions, namely the PSE, the National Property Fund and the Czech National Bank. The data are therefore relatively reliable and free of the accounting deficiencies that plague the early studies.

We have eliminated a few observations that were based on inconsistent values in the levels of variables, such as negative values of sales or labour cost or some observations with extreme values. We have used Heckman's (1979) procedure to correct for the possible sample selection bias brought about by the two-step data-cleaning procedure.<sup>21</sup> On average, within the 4-year (1996–99) period we have data for three consecutive years to compute annual rates of change of the performance variables

<sup>21</sup> In particular, using the original set of observations we first ran a Heckman-type probit equation, predicting the probability that a given observation is included in the subsample on the basis of the following variables: the initial values of the performance indicators and their squares and products, as well as dummy variables capturing the presence of a given firm in a particular privatization wave.

(Table 1).<sup>22</sup> We have also carried out a number of checks against official and private records to verify that our ownership information is reliable and that we hence meet the criticism of earlier privatization studies raised by Filer and Hanousek (2002).

## 4.2 Ownership data

An important feature of our dataset is that it permits us to analyse the effect of ownership on performance using two detailed sets of ownership measures. First, as in most studies, we evaluate the performance effects associated with different types of a single largest owner (SLO): six domestic and two foreign types. Second, we assign all owners into three categories that have figured prominently in the debates on ownership and are widely believed to have different effects on corporate governance and performance – state, domestic private and foreign ownership. Having included all owners in one of these three categories, we examine whether majority, blocking minority and legal minority ownership by each of these three groups of owners affects the firm's performance.<sup>23</sup> With both specifications of ownership, we also assess if the state affects corporate performance by retaining a golden share that gives it the right to block certain managerial decisions.

As may be seen in Table 2, domestic industrial companies are the most frequent SLOs with 1,244 observations, followed by domestic investment funds (423 observations), domestic individuals (335) and the Czech state (174). Foreign industrial companies are by far the most frequent SLOs among the foreign investors (236 observations). Ownership concentration, measured by the average stake held by a SLO, is between 38 and 59 percent, which is rather high in comparison to ownership concentration in developed countries (Demsetz and Lehn, 1985) and it resembles more the continental European than Anglo-American ownership concentration patterns.

Foreign owners as a group tend to hold majority ownership stakes in the acquired firms (panel B of Table 2). The situation is just the opposite for domestic private owners and the state, both of whom have average stakes of around 43–45 percent and display absolutely and relatively more cases of blocking and legal minority ownership than majority ownership. Moreover, the state retains a golden share primarily in firms in which it or domestic private owners are the SLO. Finally, there are 33 observations with highly dispersed ownership in the sense that no type of owner has even a legal (10 percent) minority ownership.<sup>24</sup>

<sup>22</sup> There are 34 sales and 28 labour cost observations for which the rate of growth is missing.

<sup>23</sup> In this analysis, we focus on the effects of majority and blocking or legal minority ownership irrespective of how many different owners of the same type compose the majority or minority groups.

<sup>24</sup> These observations come from 25 firms that are larger than average in terms of total assets, but otherwise tend to have quite diverse characteristics. The firms belong to various sectors, with seven being in trade and four in construction and building materials sectors. In five firms foreign owners have the largest, albeit relatively small, stakes. The state holds the golden share in two of these firms, both of which are water supply utilities.

**Table 2. Ownership extent and categories: Summary statistics**  
**Panel A: Type of ownership by single largest owner (SLO)**

Type of single largest owner (SLO)	Number of observations						
	Number of observations	Mean size of stake (%)	Majority held by SLO	Blocking minority held by SLO	Legal minority (moderately dispersed ownership)	Other (highly dispersed ownership)	Golden share held by state
Domestic ownership							
Industrial Co.	1,244	48.83	547	412	272	13	42
Bank	33	46.42	11	14	7	1	1
Invest. fund	423	37.61	96	119	205	3	19
Individual	335	38.92	82	99	150	4	13
Portfolio Co.	80	45.06	22	35	22	1	5
State	174	43.18	49	63	58	4	66
Foreign ownership							
Industrial Co.	236	58.81	139	60	30	7	6
Others	67	51.23	26	26	15	0	3
Total	2,592	46.16	972	828	759	33	155

**Panel B: Ownership extent**

Type of aggregate ownership	Number of observations						
	Num. of observations	Mean size of stake (%)	Majority	Blocking minority	Legal minority (moderately dispersed ownership)	Other (highly dispersed ownership)	Golden share held by state
Domestic	2,115	44.84	758	679	656	22	80
Foreign	303	57.14	165	86	45	7	9
State	174	43.18	49	63	58	4	66
Total	2,592	46.16	972	828	759	33	155

*Note:* This table contains basic ownership statistics associated with the performance variable of sales. Statistics for other performance indicators are similar. Ownership concentration categories include majority (more than 50 percent of shares), blocking minority (from more than 33 to 50 percent of shares), legal minority (at least 10 percent but not more than 33 percent of shares), and other (less than 10 percent of shares). All ownership categories are mutually exclusive. The golden share is an additional measure that is not associated with any particular extent of ownership.

In terms of the dynamics of ownership structure, we observe substantial ownership changes during the post-privatization period under study. In particular, 7 to 48 percent of our sample changed category by the type of SLO, with the greatest (smallest) shift being toward an industrial company (bank) as the SLO. Furthermore, 15 to 31 percent of our sample changed category by extent of ownership. Ownership changes were relatively evenly distributed over 1996–99.

## 5. The econometric model

### 5.1 Model specification

Our main goal is to analyse the performance effects of the principal types of ownership that we observe after the large-scale privatization in 1996, and the effects of the changes in ownership that took place in the 1996–99 post-privatization period. In the spirit of Ashenfelter and Card (1985) and Heckman and Hotz (1989), we specify a panel-data treatment evaluation procedure that fits our context, and we supplement it with a rich set of instrumental variables.

Let  $X_{ijt}$  be a given performance indicator, with subscripts denoting firm  $i$  with ownership type  $j$ , in year  $t$ . Moreover, let  $P_{ijt}$  denote ownership type  $j$  of firm  $i$  in year  $t$ . A logarithmic model of the level of performance may be specified as.

$$\ln X_{ijt} = \alpha_i + \alpha t + (P_{ij1t})\beta_j + (X_{ij1t})\gamma_j + P_{ij\tau}\delta_j + [P_{ij\tau}(t - \tau)]\theta_j + (Dt)\phi + v_{ijt} \quad (1)$$

where  $t$  is a linear time trend, vector  $\alpha_i$  controls for firm-specific (fixed effect) differences in the level of performance across firms, constant  $\alpha$  captures the linearly time-varying performance effect of state SLO or state majority ownership (depending on ownership categorization) in 1996–99, and all dummy variables in Equation (1) are coded relative to  $\alpha$ .<sup>25</sup> Column vector  $\beta_j$  thus reflects the (linearly) time-varying effects on performance of all the other types of 1996 (initial post-privatization) ownership  $P_{ij1}$  relative to state SLO or state majority ownership.<sup>26</sup> Vector  $\gamma_j$  in turn captures the time-varying effect of the 1996 level of performance  $X_{ij1}$  on subsequent (1996–99) performance. Similarly, vector  $\delta_j$  captures the time invariant (instantaneous) effect on the level of performance of a firm changing its 1996 ownership to a new ownership category  $P_{ij\tau}$  in a given year  $\tau$  after 1996. Complementing  $\delta_j$ , vector  $\theta_j$  reflects the time-varying effect on performance brought about by the new type of ownership  $P_{ij\tau}$  established in the firm at time  $\tau$ . Finally, vector

<sup>25</sup> The results on relative effects are unaffected by which ownership category we select as the base.

<sup>26</sup> Coding the ownership dummy variables so that the effects of non-state ownership forms is measured relative to the effect of state ownership is useful because firms in which the state retains ownership are the ones that are least privatized and under the null hypothesis also least restructured. More importantly, the approach also reflects the change in performance as firms switch from state to private ownership.

$\varphi$  represents the time-varying effects of  $D$  – industry and annual dummy variables as well as dummy variables reflecting the form of privatization of the firm (first or second wave, both waves, or outside of the voucher scheme), and  $v_{ijt}$  is the error term.

Conceptually, we control for innate differences in the level of firm performance through the firm-specific fixed effects  $\alpha_i$  and we also allow each firm's 1996–99 performance to be affected linearly through time by the initial performance level  $X_{ij1}$  that the firm achieved in 1996. Controlling for these factors, which capture the short-term effects of pre-1996 privatization and restructuring, we estimate the time-varying performance effects  $\beta_j$  of the initial (1996) post-privatization ownership  $P_{ij1}$ , the time-invariant effect on performance  $\delta_j$  of switching to a new type of ownership  $P_{ijt}$  during the 1996–99 period, and the time-varying effect  $\theta_j$  of this new ownership.

Our specification thus controls for fixed performance differences among firms that were or were not part of the voucher scheme, inter-firm differences in the initial post-privatization performance, annual economy-wide shifts (such as macro shocks or degree of openness to trade) and industry-specific fixed effects (proxying for factors such as the degree of competition or differences in technology that do not change in the short run). In the context of the debate about the performance effects of ownership versus competition, we focus on estimating the effects of ownership, while controlling for competition by the firm-specific fixed effects, the effect of initial performance interacted with the time trend, and the industry-specific and annual time dummy variables interacted with time.

For estimating purposes, it is useful to express Equation (1) in the form of the annual rate of change specification. In particular, letting  $y_{ijt}$  be the percentage change of  $X_{ijt}$  from  $t-1$  to  $t$ , Equation (1) may be expressed in a first-difference specification as an estimating equation

$$y_{ijt} = \alpha + P_{ij1}\beta_j + X_{ij1}\gamma_j + \Delta P_{ijt}\delta_j + P_{ijt}\theta_j + D\varphi + \varepsilon_{ijt} \quad (2)$$

where  $\varepsilon_{ijt} = v_{ijt} - v_{ijt-1}$  is the error term. Equation (2) is more parsimonious than (1), but it permits us to estimate all the parameters of interest. Equations (1) and (2) also make it clear that the linearly time-varying effects on the level of performance in Equation (1) are equivalent to the time-invariant effects on the rate of change of performance in Equation (2).

The three key econometric issues that we have to account for are omitted variables bias, measurement error, and endogeneity of ownership. We address omitted variables bias by including a number of control variables discussed above. In dealing with measurement error in ownership, performance and other variables, we note that the error can induce standard attenuation as well as more complicated biases in estimated coefficients. As mentioned above, the earlier studies often suffer from mis-measurement of the ownership variables and performance indicators, including outliers that may seriously affect the estimated coefficients. In collecting the present dataset, we have placed particular emphasis on identifying precisely

individual owners and changes in ownership, as well as collecting several indicators of performance from a period when the IAS was in place. We have also tested for and eliminated outliers that affect the estimates.

We address the problem of endogeneity of ownership as follows. First, we use the first-difference specification in Equation (2) with the aforementioned covariates as a panel data treatment evaluation procedure to control for the possibility that firms are not assigned to different ownership categories at random and that certain types of owners (e.g., foreigners) may acquire firms that are inherently superior or inferior performers.<sup>27</sup> Second, since first-differencing does not fully address all types of endogeneity, especially those where the effect is time-varying, we also employ an instrumental variable strategy.

## 5.2 Instrumental variables

We start by carrying out the Hausman (1978) specification test for assessing the potential endogeneity of the initial post-privatization ownership. We employ the first-difference IV method in which we treat ownership as potentially endogenous and instrument it by IVs that we describe presently. The test is carried out by differencing the two sets of parameter estimates and standardizing the vector of differences by the difference in the covariance matrices of the two sets of estimates. The resulting quadratic form is asymptotically chi-squared with degrees of freedom equal to the number of parameters being tested.<sup>28</sup> Results of the Hausman test confirm that 1996 ownership should be treated as endogenous.

We proceed by using a unique set of firm-specific instrumental variables that we have created from data related to the pre-privatization (pre-1992) period. The instrumental variables reflect economic, institutional, industry and geographic characteristics of the SOEs in the pre-market period, and we use them to instrument the initial post-privatization ownership that we observe in the market economy in 1996. We find that all the IVs described below pass the formal Sargan–Wu, Hansen’s J and Bassman tests of overidentifying restrictions at the 1 percent test level, and in this sense they qualify as valid instruments.

For each firm we have collected detailed information from all the proposed privatization projects that were submitted to the government before privatization.<sup>29</sup> We use the number of privatization projects as an IV because many SOEs attracted

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<sup>27</sup> This approach is used in some studies, such as Frydman *et al.* (1999).

<sup>28</sup> In practice, some diagonal elements of the covariance matrix are negative. As usual, we carry out the test only for parameters corresponding to the positive diagonal elements, with a corresponding correction to the degrees of freedom, using the generalized inverse matrix (procedure YINVO in TSP 4.5).

<sup>29</sup> Privatization of each enterprise was based on an officially accepted privatization project. Each project had to contain recent economic and financial information about the enterprise and describe the proposed method of privatization, as well as the proposed organization of the privatized enterprise. See Kotrba and Svejnar (1994) for details.



several privatization project proposals, reflecting the degree of investor interest and expected future performance of the firm. Moreover, for each privatized firm we use as IVs the pre-privatization data on registered (share) capital, net asset value, total number of shares, number of shares entering voucher privatization, number of shares allocated through voucher privatization, value of shares allocated through voucher privatization in voucher points, geographic and industry location of the firm and the structure of share ownership among various domestic and foreign parties as proposed in the winning privatization project. The share ownership variables include the share that the government intended to keep for the short or long term.<sup>30</sup> Finally, our set of IVs contains annual observations on the SOE's sales, profit, debt and employment during the three consecutive years preceding privatization. The summary statistics related to the instrumental variables are reported in Tables A1–A3 (Appendix), while the first stage IV regressions are reported in Tables A4–A5. The three-year panel permits us to capture the evolution of enterprise performance before privatization. For the sake of comparability across firms, we scale these indicators by the total number of shares. As may be seen from Tables A4 and A5 (Appendix), the first stage regressions have relatively good fit and intuitively acceptable coefficients.

In addition to controlling for endogeneity of the ownership structure resulting from privatization, we control for possible endogeneity problems associated with changes in ownership in the 1996–99 period by including in Equation (1) ownership group fixed effects  $\delta_j$  for firms undergoing ownership changes. These  $\delta_j$  effects may be interpreted as proxying unobserved performance characteristics of the acquired firms (i.e., new owners cherry-picking winners or taking over losers) or reflecting the time invariant effects of new ownership on the level of performance. In order to check the robustness of our results, we have also estimated models that, analogously to including  $X_{ijt}$  as a regressor, include  $X_{ijt}$  – the performance achieved by the previous owner at the time  $\tau$  when there is a change of ownership in 1996–99. This specification does not produce materially different results from those of Equation (2).

## 6. Empirical results of the effects of ownership on performance

Our estimates are generated by the Huber–White procedure yielding heteroskedasticity-adjusted residuals in the presence of instrumental variables (see Huber, 1967; White, 1982). We have also checked that the residuals are free from serial correlation. We

<sup>30</sup> Short-term government ownership reflects the expectation of the government of being able to sell appreciated shares shortly after privatization, while long-term government ownership indicates an expectation of slower appreciation of the value of the privatized firm and/or its strategic character in the economy. Parts of the shares retained by the government were also classified as intended for restitution or future sale through an intermediary.

employ a two-stage least squares procedure in which we instrument all variables related to ownership. The approach provides consistent estimates that are not affected by potential model misspecification.<sup>31</sup>

In Tables 3 and 4, we present the estimated coefficients of the instrumented Equation (2) for the SLO and extent of ownership, respectively.<sup>32</sup> The top panel of each table contains estimates of the linearly time-varying effect  $\beta_j$  of the initial (1996) post-privatization ownership  $P_{ij1}$ , the second panel gives the estimates of the time-varying effect  $\theta_j$  of the subsequent ownership  $P_{ij\tau}$  established after 1996, and the third panel presents the time-invariant effect  $\delta_j$  of the post-1996 change in ownership  $\Delta P_{ij\tau}$ .

In examining the results, we note the extent to which different types of ownership result in defensive restructuring (reducing labour cost and possibly also sales) versus strategic restructuring (increasing sales revenues, labour productivity and/or profits). Since the latter outcomes are inferred from the relative effects on sales, labour cost and profitability (e.g., increased sale and/or reduced labour costs not being accompanied by higher profits), these findings are also consistent with other phenomena such as changes in non-labour costs and non-sales income.

The estimated coefficients in Tables 3 and 4 make it clear that in the first 4 years after privatization the performance effects of different types of ownership are surprisingly limited and that many types of private ownership do not generate effects that are different from those of majority or SLO state ownership. Moreover, the overall fit of these regressions suggests that ownership explains a small part of total variation in the rate of change of corporate performance after privatization.<sup>33</sup>

## 6.1 The single largest owner

As may be seen from the first panel of Table 3, the only initial post-privatization SLO that has a positive, time-varying effect on sales is foreign industrial (that is, non-financial) company. All five types of domestic non-state SLOs, as well as the foreign non-industrial SLO, register effects that are not statistically different from

<sup>31</sup> As Angrist and Krueger (2001) point out, 'Researchers are sometimes tempted to use probit or logit to generate first-stage predicted values in applications with a dummy endogenous regressor. But this is not necessary and may even do some harm. In two-stage least squares, consistency of the second-stage estimates does not turn on getting the first-stage functional form right (Kelejian, 1971). Moreover, using a non-linear first stage to generate fitted values that are plugged directly into the second-stage equation does not generate consistent estimates unless the non-linear model happens to be *exactly right*, a result which makes the dangers of misspecification high'.

<sup>32</sup> In Tables 3 and 4, the constant reflects the 1996–97 rate of change in performance of firms that have state as a SLO and majority owner, respectively, were partially privatized outside of the voucher scheme, and operate in the miscellaneous ('other') category of the nineteen industries for which we control. The estimated coefficients on the various forms of ownership represent the average annual ownership effects relative to the effect of state SLO or majority ownership.

<sup>33</sup> This is, of course, consistent with high correlation coefficients in the specification in levels.

**Table 3. Effect of the single largest owner (SLO) type on performance**  
**Instrumented estimates (Standard errors in parentheses)**

	Sales	Labour cost	Profit/Sales	ROA
State (Constant)	-0.141* (0.076)	0.034 (0.053)	-0.197 (0.141)	0.004 (0.012)
<i>Initial ownership (<math>P_{ij1}</math>) – Time-varying effect (<math>\beta_j</math>)</i>				
<i>Domestic ownership</i>				
Industrial Co.	-0.027 (0.029)	-0.063*** (0.023)	0.015 (0.078)	-0.002 (0.006)
Bank	0.025 (0.065)	0.043 (0.055)	0.005 (0.154)	0.015 (0.014)
Invest. fund	0.015 (0.033)	-0.071*** (0.026)	-0.080 (0.088)	-0.006 (0.007)
Individual	0.022 (0.037)	-0.027 (0.031)	-0.081 (0.095)	0.001 (0.008)
Portfolio Co.	0.042 (0.068)	-0.012 (0.051)	-0.098 (0.134)	-0.005 (0.012)
<i>Foreign ownership</i>				
Industrial Co.	0.107*** (0.042)	0.026 (0.031)	0.180* (0.111)	0.013 (0.009)
Others	0.003 (0.097)	-0.055 (0.073)	-0.221 (0.192)	-0.006 (0.015)
<i>Subsequent ownership (<math>P_{ijt}</math>) – Time-varying effect (<math>\theta_j</math>)</i>				
<i>Domestic ownership</i>				
Industrial Co.	-0.026 (0.027)	-0.041* (0.025)	0.011 (0.093)	0.004 (0.008)
Bank	-0.167 (0.150)	-0.094 (0.091)	0.338* (0.212)	0.118** (0.052)
Invest. fund	-0.096* (0.051)	-0.104*** (0.034)	0.062 (0.124)	0.004 (0.014)
Individual	0.050 (0.086)	-0.054 (0.053)	0.025 (0.153)	0.004 (0.014)
Portfolio Co.	-0.116** (0.058)	0.089 (0.097)	-0.091 (0.217)	0.021 (0.020)
<i>Foreign ownership</i>				
Industrial Co.	0.061* (0.036)	0.087*** (0.026)	0.094 (0.152)	0.007 (0.010)
Others	-0.072 (0.098)	-0.015 (0.076)	-0.391*** (0.134)	0.009 (0.017)
<i>Ownership change (<math>\Delta P_{ijt}</math>) – Time-invariant effect (<math>\delta_j</math>)</i>				
<i>Domestic ownership</i>				
Industrial Co.	0.047 (0.034)	-0.015 (0.029)	0.043 (0.107)	-0.002 (0.009)
Bank	0.072 (0.182)	-0.037 (0.122)	-0.099 (0.384)	-0.152*** (0.061)
Invest. fund	0.106 (0.068)	0.154*** (0.051)	0.087 (0.154)	-0.012 (0.016)
Individual	-0.062 (0.102)	-0.087 (0.062)	0.133 (0.180)	-0.013 (0.017)
Portfolio Co.	-0.057 (0.075)	-0.166 (0.107)	0.235 (0.274)	-0.044** (0.023)
<i>Foreign ownership</i>				
Industrial Co.	0.066 (0.070)	-0.032 (0.052)	0.112 (0.191)	-0.021 (0.016)
Others	0.030 (0.111)	-0.009 (0.087)	0.223 (0.209)	-0.013 (0.022)
Golden share	0.014 (0.025)	0.062*** (0.019)	-0.017 (0.090)	0.009 (0.006)
Initial value ( $X_{ij1}$ )	0.000 (0.000)	0.000 (0.000)	0.000* (0.000)	-0.315*** (0.043)
<i>Voucher-privatization dummies</i>				
First wave	0.036 (0.067)	-0.093* (0.052)	0.024 (0.125)	0.000 (0.010)

**Table 3. (cont) Effect of the single largest owner (SLO) type on performance**  
Instrumented estimates (Standard errors in parentheses)

	Sales	Labour cost	Profit/Sales	ROA
Second wave	0.057 (0.067)	-0.117** (0.051)	0.040 (0.130)	-0.009 (0.010)
Both waves	0.064 (0.069)	-0.097* (0.054)	-0.022 (0.136)	0.004 (0.011)
Adjusted $R^2$	0.017	0.044	0.008	0.110
Number of observations	2,592	2,949	2,168	2,905

*Note:* The dependent variables are the rate of change of sales revenue, labour cost, and profit/sales, and the change in ROA, respectively. Numbers in parentheses are standard errors. \*\*\*, \*\* and \* denote significance at the 1, 5 and 10 percent level, two-tail test, respectively. Industry, privatization, and year dummies are included.

**Table 4. Effect of ownership extent on performance**  
Instrumented estimates (standard errors in parentheses)

	Sales	Labour cost	Profit/sales	ROA
Majority state (Constant)	-0.175* (0.103)	0.026 (0.054)	-0.192 (0.178)	0.005 (0.015)
<i>Initial ownership size (<math>P_{ij1}</math>) – Time-varying effect (<math>\beta_j</math>)</i>				
Majority domestic	-0.067 (0.113)	-0.077** (0.036)	-0.001 (0.137)	0.001 (0.011)
Majority foreign	0.299*** (0.117)	0.015 (0.046)	-0.044 (0.169)	0.015 (0.012)
Blocking minority state	0.083 (0.107)	-0.017 (0.033)	-0.145 (0.168)	0.001 (0.012)
Blocking minority domestic	0.014 (0.108)	-0.065** (0.034)	-0.069 (0.141)	-0.009 (0.011)
Blocking minority foreign	-0.098 (0.268)	-0.063 (0.047)	0.063 (0.213)	-0.013 (0.018)
Legal minority state	-0.091 (0.137)	-0.030 (0.046)	-0.051 (0.157)	-0.012 (0.014)
Legal minority domestic	0.058 (0.102)	-0.049 (0.032)	-0.153 (0.136)	-0.010 (0.011)
Legal minority foreign	-0.075 (0.196)	0.015 (0.089)	0.222 (0.199)	0.003 (0.018)
Other than majority or minority	0.358* (0.212)	0.068 (0.059)	0.141 (0.195)	-0.020 (0.018)
<i>Subsequent ownership size (<math>P_{ijt}</math>) – time-varying effect (<math>\theta_j</math>)</i>				
Majority domestic	-0.030 (0.038)	-0.017 (0.036)	0.164* (0.096)	0.015* (0.009)
Majority foreign	0.086* (0.049)	0.037 (0.029)	-0.145 (0.163)	0.009 (0.019)
Blocking minority state	-0.171** (0.086)	-0.136 (0.096)	0.552 (1.085)	-0.054 (0.062)
Blocking minority domestic	-0.056* (0.032)	-0.045* (0.027)	0.008 (0.093)	0.006 (0.008)
Blocking minority foreign	0.067 (0.086)	0.052 (0.040)	0.079 (0.154)	0.015* (0.009)
Legal minority state	-0.106 (0.078)	0.353 (0.280)	0.568** (0.248)	-0.025 (0.031)
Legal minority domestic	0.006 (0.044)	-0.018 (0.025)	0.045 (0.123)	0.017** (0.009)
Legal minority foreign	-0.120 (0.080)	-0.007 (0.034)	-0.049 (0.168)	-0.003 (0.021)

**Table 4. (cont) Effect of ownership extent on performance**  
**Instrumented estimates (standard errors in parentheses)**

	Sales	Labour cost	Profit/sales	ROA
Other than majority or minority	-0.387* (0.218)	0.440* (0.240)	0.445 (0.434)	0.073 (0.060)
<i>Ownership change (<math>\Delta P_{ijt}</math>) – time-invariant effect (<math>\delta_i</math>)</i>				
Majority domestic	0.059 (0.048)	0.004 (0.042)	-0.066 (0.117)	-0.016 (0.010)
Majority foreign	-0.052 (0.071)	-0.060 (0.048)	0.088 (0.231)	-0.012 (0.024)
Blocking minority state	0.073 (0.097)	-0.029 (0.162)	-1.385 (1.167)	0.037 (0.066)
Blocking minority domestic	0.069* (0.040)	0.033 (0.033)	0.140 (0.112)	-0.015 (0.001)
Blocking minority foreign	0.019 (0.115)	0.069 (0.069)	-0.101 (0.200)	-0.019 (0.013)
Legal minority state	-0.024 (0.126)	-0.398 (0.294)	-0.609 (0.411)	0.023 (0.037)
Legal minority domestic	-0.027 (0.063)	-0.042 (0.036)	-0.110 (0.156)	-0.017 (0.011)
Legal minority foreign	0.344*** (0.124)	0.012 (0.052)	0.078 (0.279)	-0.034 (0.031)
Other than majority or minority	0.263 (0.229)	-0.171 (0.293)	0.145 (0.474)	-0.072 (0.063)
Golden share	0.036* (0.022)	0.058*** (0.019)	-0.002 (0.093)	0.012** (0.006)
Initial value ( $X_{ijt}$ )	0.000 (0.000)	0.000 (0.000)	0.000* (0.000)	-0.322*** (0.042)
<i>Voucher-privatization dummies</i>				
First wave	0.053 (0.074)	-0.089* (0.052)	0.053 (0.125)	0.001 (0.010)
Second wave	0.077 (0.073)	-0.115** (0.052)	0.051 (0.130)	-0.008 (0.010)
Both waves	0.062 (0.077)	-0.096* (0.055)	0.001 (0.135)	0.006 (0.011)
Adjusted $R^2$	0.019	0.038	0.008	0.108
Number of observations	2,592	2,949	2,168	2,905

*Note:* The dependent variables are the rate of change of sales revenue, labour cost, and profit/sales, and the change in ROA, respectively. Numbers in parentheses are standard errors. \*\*\*, \*\* and \* denote significance at 1, 5 and 10 percent level, two-tail test, respectively. Industry, privatization, and year dummies are included.

each other or from the effect of the state SLO. In terms of labour costs (employment), only firms with domestic industrial companies and investment funds as SLOs show a negative effect relative to the state. Finally, only firms with foreign industrial companies as SLOs have a positive effect on profit/sales and no SLO type generates a significant effect on ROA. The post-privatization foreign industrial owners thus increase profitability by enhancing the rate of growth of sales, without having a differential effect from the state firms on the rate of growth of labour cost (employment). Their domestic counterparts and investment fund SLOs reduce the rate of growth of labour cost, but do not display a corresponding positive effect on profit. The restructuring carried out by foreign industrial firms is of

a strategic nature, while that performed by the domestic industrial company and investment fund SLOs is of a defensive type.

The time-varying performance effects of the SLOs that come into existence after 1996 display a number of similarities to, but also more statistical significance than, the effects of the immediate post-privatization SLOs. The basic pattern persists in that (a) most types of private owners do not show significant deviations from the sales, labour cost and profitability effects given by the base category of state SLOs, (b) foreign industrial firms raise sales and (c) domestic industrial and investment fund owners reduce labour cost. The new patterns are that firms acquired after 1996 by investment funds and portfolio companies experience a reduction in sales; foreign industrial SLOs increase not only sales but also labour costs and they no longer have a positive effect on profitability; bank SLOs have a positive effect on profit/sales and ROA; and non-industrial foreign SLOs have a negative effect on profit/sales. These results suggest that the more recent foreign industrial owners acquire firms to expand production but they no longer hold back the rate of growth of labour cost (employment); investment funds reduce the scale of operations; bank and portfolio company SLOs increase efficiency by reducing non-labour costs and/or increasing non-sales income; and domestic industrial and foreign non-industrial SLOs may deploy transfer pricing.<sup>34</sup>

Interestingly, there are only three time-invariant (instantaneous) effects associated with the changes in ownership after 1996. Moreover, two of them (higher labour cost for firms acquired by investment funds and negative effect on ROA for firms acquired by banks) may represent a short-term effect that is subsequently offset by an opposite time-varying effect (second panel in the Table 3).

The effect of government control through the institution of a golden share is to increase labour costs with no corresponding effect on the rate of change of sales or profitability. With the SLO specification of ownership, the government therefore appears to pursue a socially oriented goal of increasing employment and/or wages without a corresponding positive effect on sales or negative effect on profitability.

## 6.2 *Extent of ownership*

The estimated effects of the extent of ownership by the three key ownership groups reported in Table 4, complement the results with respect to the SLOs. Majority and minority post-privatization ownerships by most types of private owners do not generate effects that are statistically different from each other and from the base effect of majority state ownership. The notable exception is majority ownership by

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<sup>34</sup> In the case of banks, the permanent ROA effect in part offsets a negative instantaneous effect observed at the time of the shift to bank ownership (third panel in Table 3). The fact that the instantaneous effect is negative for ROA and not for profit/sales suggests that the banks acquire firms with (a) normal performance in terms of profit/sales and increase this measure of profitability over time and (b) relatively large and unproductive assets, as measured by below average ROA, and raise the value of this indicator over time.

foreign companies which has a positive time-varying effect on sales, thus paralleling the effect of foreign industrial SLOs.<sup>35</sup> The difference is that majority foreign-owned firms, unlike foreign industrial SLOs, do not produce a positive effect on profitability. This difference may be brought about by the different composition of the majority and SLO foreign groups, rising non-labour costs or falling non-sales income in the majority foreign owned firms, or dissipation of profit by majority foreign owners through transfer pricing. Firms with majority and blocking minority domestic private ownership, like firms with domestic industrial company and investment fund SLOs in Table 3, are the only ones that significantly reduce labour costs (employment). Because no type of post-privatization ownership registers significant effects with respect to either indicator of profitability, the reduction in labour cost by concentrated domestic owners may be accompanied by increased non-labour cost or falling non-sales income, or appropriation of resources by managers or key shareholders.

Overall, the effects of initial post privatization ownership indicate that concentrated foreign ownership raises the rate of increase in sales revenue, while highly, as well as moderately concentrated domestic owners reduce the rate of increase in labour cost (employment) relative to others. These asymmetric findings with respect to the sales and labour cost effects of concentrated domestic and foreign owners are provocative because it has been widely presumed that both domestic and foreign private ownership, especially in highly concentrated forms, would lead to substantial strategic restructuring and increases in sales – domestically and/or on the world markets.

The time-varying effects of ownership changes that took place after 1996 show some similarities but also significant differences from the effects of initial post-privatization ownership. A post-1996 shift to majority foreign ownership has a positive effect on the rate of increase in sales revenue that is not accompanied by an increase in the rate of change in labour cost or profitability. This suggests that foreign owners that acquire majority stakes in firms after privatization engage in productivity-enhancing strategic restructuring and either incur increasing non-labour costs and/or falling non-sales revenue, or they siphon off profits. In contrast, shifts to blocking minority state and domestic ownership bring about negative effects on both sales and labour cost, indicating that these somewhat less concentrated owners react defensively by downsizing the newly acquired companies.

A switch to majority domestic ownership results in a positive time-varying effect on both measures of profitability. Interestingly, positive time-varying effects on ROA are also observed with shifts to blocking minority foreign and legal minority domestic ownerships. Moreover, the relatively rare shifts to legal minority state ownership also generate sizable positive effects on the increase in profit/sales.

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<sup>35</sup> There is also a positive effect of highly dispersed ownership. This group is composed of a small number of firms, however, and there is an offsetting effect associated with subsequent ownership by this group.



As may be seen from Table 4, firms in which the state retains a golden share register positive time-varying effects on sales, labour cost and ROA. These effects complement the estimates from the SLO specification and suggest that the state pursues an objective of increasing employment and output (revenue), while also inducing profit-oriented restructuring relative to assets. Since the state retains golden shares primarily in state-owned and domestic private firms (Table 2), the effect of a golden share moderates the tendency in some of these firms to reduce output (sales) and/or employment.

## 7. Concluding observations

With the former Soviet bloc and other developing countries having privatized state-owned enterprises, and the economies of China, India and Vietnam being in the process of privatization, it is important to have an understanding of the post-privatization effects of different forms of ownership on firm performance. While theory generates conflicting predictions, most surveys of the early empirical literature suggest that a shift from state to private ownership tends to improve economic performance. However, much of the early literature suffers from serious data problems and inadequate treatment of endogeneity of ownership, thus leaving many results in doubt. In this paper, we analyse the effect of ownership on performance using rich panel data covering a virtually entire population of firms that went through mass privatization in the Czech Republic. In doing so, we address carefully the principal data issues, including omitted variables bias, measurement error and endogeneity of ownership.

Overall, our econometric estimates present a much less sanguine picture than that presented by many of the earlier studies, suggesting that the expectations and early findings of positive effects of immediate post-privatization ownership structures on corporate performance were premature. Our results indicate that the performance effects of privatization and different types of ownership are on the whole surprisingly limited and that many types of private owners do not generate performance that is different from that of firms with state ownership. There are two key exceptions to this overall result. First, concentrated foreign owners (foreign industrial, that is, non-financial, companies) yield superior performance in terms of growth of sales and in some specifications also profit – thus, reflecting the presence of strategic restructuring. Second, concentrated domestic owners (industrial companies and investment funds) reduce employment – thus, engaging in defensive restructuring. These findings are consistent with the agency theory prediction that concentrated ownership results in superior corporate performance and they go against theories stressing the positive effects of managerial autonomy. Overall, our results highlight the benefits of strategic restructuring accompanied by an inflow of new capital and managerial culture.

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## Statistical Appendix

Table A1. Pre-privatization characteristics of firms

	Mean	SD	Minimum	Maximum
<b>Panel A</b>				
Variable				
Registered capital (in thousands of korunas)	419,607	1,877,644	3,141	49,200,000
Net asset value (in thousands of korunas)	489,480	2,178,180	3,490	56,000,000
Total number of shares	412,827	1,870,709	3,141	49,200,000
Number of shares entering voucher privatization	220,490	656,943	2,202	14,800,000
Number of shares allocated through voucher privatization	204,935	629,464	1,537	13,800,000
Value of shares in terms of voucher points	6,903,206	24,200,000	67,300	611,000,000
<b>Panel B</b>				
Regions				
Prague	15.83%	0.3651	0	1
Central Bohemia	8.14%	0.2735	0	1
Southern Bohemia	7.77%	0.2677	0	1
Western Bohemia	10.28%	0.3038	0	1
Northern Bohemia	11.32%	0.3169	0	1
Eastern Bohemia	12.72%	0.3333	0	1
Southern Moravia	18.71%	0.3902	0	1
Northern Moravia	15.24%	0.3595	0	1
<b>Panel C</b>				
Industrial sectors				
Agriculture	18.20%	0.3859	0	1
Heavy machinery	29.88%	0.4579	0	1
Light machinery	17.46%	0.3797	0	1
Constructions	13.02%	0.3366	0	1
Transportation	4.07%	0.1976	0	1
Trade	9.10%	0.2877	0	1
R&D	1.48%	0.1208	0	1
Services	4.29%	0.2027	0	1
Financial	0.96%	0.0976	0	1
Other	1.55%	0.1237	0	1

*Note:* The number of observations is 1,352 for each variable.  
SD, standard deviation.

**Table A2. Proposed allocation of shares among parties (in %)**

Variable	Mean	SD	Minimum	Maximum
Foreign owner	1.3225	7.6277	0	75
Domestic owner	3.7663	12.8294	0	74
Restitution	0.5222	3.0640	0	58
Fund of national property (temporary)	8.4615	16.6760	0	84
Fund of national property (permanent)	0.1709	2.3046	0	51
Sale through intermediary	2.0666	8.5860	0	75
Municipality transfer	3.4379	13.3587	0	94
Other	3.0377	8.0087	0	81
Total number of privatization projects	3.0178	7.0905	1	77

*Note:* The number of observations is 1,352 for each variable. SD, standard deviation.

**Table A3. Performance indicators prior to privatization**

Variable per share	No. of observations	Mean	SD	Minimum	Maximum
<b>Sales</b>					
3 years to privatization	1,210	3.6350	40.3716	0.001050	1,297.0630
2 years to privatization	1,210	3.5091	46.8384	0.000000	1,614.1270
1 year to privatization	1,346	2.3407	7.0245	0.001787	200.0090
<b>Profit</b>					
3 years to privatization	1,196	0.2650	1.8867	-1.587883	43.7188
2 years to privatization	1,269	0.3058	3.5251	-2.234356	117.8678
1 year to privatization	1,338	0.1919	1.3306	-10.135990	38.4093
<b>Debt</b>					
3 years to privatization	916	0.6610	2.0698	0.000249	31.8724
2 years to privatization	1,021	0.6183	1.8527	0.000121	38.1252
1 year to privatization	1,155	0.6284	2.1576	0.000092	32.1283
<b>Employment</b>					
3 years to privatization	1,221	0.0061	0.0150	0.000002	0.4177
2 years to privatization	1,281	0.0057	0.0142	0.000002	0.3998
1 year to privatization	1,348	0.0050	0.0132	0.000002	0.3812

Table A4. First stage logit regressions: Marginal effects of the ownership type [ $dP(x = 1)/dx$ ]

Variable	Domestic industrial Company	Domestic bank	Domestic investment fund	Domestic individual owner	Domestic portfolio company	Foreign industrial company	Foreign other owners
<i>Regional dummies</i>							
Prague	0.022	-0.001	-0.049	-0.063*	-0.068**	0.219***	0.000
Central Bohemia	0.141**	0.023	-0.124*	-0.005	-0.046	0.182***	0.039**
Southern Bohemia	0.127**	0.000	-0.030	-0.164**	-0.039	0.121**	0.036*
Western Bohemia	0.050	0.000	-0.026	-0.071*	0.002	0.149**	0.017
Northern Bohemia	0.020	0.000	-0.079	-0.004	-0.029	0.183***	0.038*
Eastern Bohemia	0.084	0.003	-0.091*	-0.026	-0.020	0.082	0.028
Southern Moravia	0.130**	0.015	-0.076*	-0.026	-0.016	0.113*	-0.007
<i>Intended ownership (percent)</i>							
Foreign owner	-0.011***	0.000	-0.005	0.000	0.000	0.000	0.000
Domestic owner	0.004***	0.002***	-0.004*	0.000	0.001	-0.004***	0.000
Restitution	0.014	0.004	-0.002	-0.009	-0.014	0.004	0.000
Fund of national property (temporary)	-0.002	0.001**	-0.003*	-0.001	0.001*	-0.002**	0.001**
Fund of national property (permanent)	0.002	0.000	-0.008	-0.005	0.004	0.000	0.000
Sale through intermediary	0.002	0.000	0.003*	0.000	0.000	-0.003***	0.001
Municipality transfer	-0.025***	0.000	-0.002	-0.005	0.000	-0.002**	0.001**
Other	0.008***	0.000	-0.007	-0.011**	0.001	-0.004***	-0.003
<i>Quantitative privatization characteristics</i>							
Privatized in voucher scheme	0.000	0.001***	0.004**	0.001	0.001	-0.005***	0.002***
Total number of privatization projects	0.005***	0.001***	0.002*	-0.001	-0.003	-0.001	-0.021
Total number of shares (mil.)	0.088	0.053**	0.166	0.365	-0.142	-0.214**	0.140**
Total number of shares (mil.) (squared)	-0.003	-0.005	-0.084***	-0.125	-0.033	-0.042	-0.014*
Total number of shares in the voucher scheme (mil.)	-0.048	-0.168	-0.001	0.109	-0.448	0.050	-0.512*



Table A4. (cont) First stage logit regressions: Marginal effects of the ownership type [ $dP(x = 1)/dx$ ]

Variable	Domestic industrial Company	Domestic bank	Domestic investment fund	Domestic individual owner	Domestic portfolio company	Foreign industrial company	Foreign other owners
Sold shares (mil.)	-0.025	0.135	0.197	-0.653	0.730	0.312	0.402*
Sold points (mil.)	-0.002	0.583	-0.005**	-0.302	-0.004*	0.003**	0.216
Share average price in voucher scheme	0.000	0.000	0.002**	-0.001	0.001*	0.000	0.000
Share average price in voucher scheme [squared]	0.000	0.000	0.000	0.000	0.000*	0.000	0.000
Constant	-0.433	-0.206**	-0.432	-0.131	-0.164	0.175	-0.289***
Pre-privatization characteristics	yes	yes	yes	yes	yes	yes	yes
R <sup>2</sup>	0.175	0.464	0.219	0.157	0.142	0.386	0.325

Note: \*\*\*, \*\* and \* denote significance at 1, 5 and 10 percent level, two-tail test, respectively.

Table A5. First stage logit regressions: Marginal effects of the ownership size [ $dP(x = 1)/dx$ ]

Variable	Majority domestic	Majority foreign	Blocking minority state	Blocking minority domestic	Blocking minority foreign	Legal minority state	Legal minority domestic	Legal minority foreign	Other than majority or minority
<i>Regional dummies</i>									
Prague	-0.138***	0.147***	-0.033	0.089*	0.054**	0.045*	-0.084	-0.054	0.000
Central Bohemia	-0.092*	0.118***	-0.006	0.063	0.082***	0.000	-0.019	0.000	-0.01
Southern Bohemia	-0.042	0.038	0.000	-0.006	0.080***	0.06**	-0.043	0.000	0.000
Western Bohemia	-0.186***	0.075**	0.051**	0.141**	0.081***	0.047	-0.031	-0.002	0.000
Northern Bohemia	-0.096*	0.096***	0.05**	0.040	0.058**	0.04	-0.005	0.037***	0.000
Eastern Bohemia	-0.046	0.073*	0.049**	0.069	0.021	0.063**	-0.079	0.000	0.01
Southern Moravia	-0.101**	0.000	0.034	0.180***	0.000	0.052**	-0.111**	0.01	0.005

Table A5. (cont) First stage logit regressions: Marginal effects of the ownership size [ $dP(x = 1)/dx$ ]

Variable	Majority domestic	Majority foreign	Blocking minority state	Blocking minority domestic	Blocking minority foreign	Legal minority state	Legal minority domestic	Legal minority foreign	Other than majority or minority
<i>Intended ownership (percent)</i>									
Foreign owner	-0.001	0.003***	0.000	0.000	0.002***	0.000	-0.008**	0.000	0.000
Domestic owner	0.003**	-0.002***	0.001**	0.002	-0.001	-0.001	0.000	-0.001	0.001
Restitution	0.013*	0.000	0.000	-0.007	0.001	0.002	-0.003	0.004**	0.000
Fund of national property (temporary)	0.000	-0.001*	0.002***	0.004**	0.001*	-0.001	-0.007***	0.002***	0.000
Fund of national property (permanent)	-0.022	-0.001	0.001	0.019*	0.000	0.000	-0.009	0.000	0.000
Sale through intermediary	0.004**	0.000	0.000	0.004**	0.000	-0.004	-0.003	0.001*	0.000
Municipality transfer	-0.013*	-0.001	0.001*	-0.003	0.000	0.001	-0.007**	0.001	-0.002
Other	0.006***	-0.013***	0.001	0.001	0.000	-0.001	-0.005*	0.001	-0.008**
<i>Quantitative privatization characteristics</i>									
Privatized in voucher scheme	0.002	-0.001*	0.000	0.004***	0.000	-0.002**	0.002	0.001	-0.001**
Total number of privatization projects	0.004**	-0.001	0.000	-0.005*	0.001*	-0.003*	0.006***	-0.024	0.000
Total number of shares (mil.)	0.407***	0.146	0.005	-0.079	-0.007	-0.122*	0.039	-0.066	0.017
Total number of shares (mil.) [squared]	-0.050***	-0.061	0.060	0.002	-0.375	-0.021*	-0.009	-0.025	-0.002
Total number of shares in the voucher scheme (mil.)	-1.388**	-0.148	-0.064	0.022	-0.647*	0.813***	0.205	-0.954	0.067
Sold shares (mil.)	0.715	0.017	0.064	-0.011	0.673*	-0.656***	0.050	0.937	-0.100
Sold points (mil.)	-0.386	-0.001	-0.149	0.566	0.581	0.004**	-0.006**	0.002*	0.002**
Share average price in voucher scheme	-0.001	0.001**	0.000	-0.001	0.001	0.005***	0.002**	0.000	0.000
Share average price in voucher scheme [squared]	0.000	0.000**	0.000	0.000*	0.000*	0.000***	0.000**	0.000**	0.000
Constant	-0.264	-0.042	-0.224*	-0.680***	-0.078	-0.108	-0.224	-0.107**	0.011
Pre-privatization characteristics	yes	yes	yes	yes	yes	yes	yes	yes	yes
R <sup>2</sup>	0.245	0.321	0.12	0.11	0.2	0.317	0.179	0.523	0.513

Note: \*\*\*, \*\* and \* denote significance at 1, 5 and 10 percent level, two-tail test, respectively.