The performance of privatized firms in the Czech Republic

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Abstract

With the growing importance of privatizations as a part of government policy, most empirical studies of these privatizations conclude that firm performance immediately improves following privatization. Privatization has been the most important part of the transition from the centrally planned economies of Central and Eastern Europe and has a larger impact on those economies than privatizations in other countries. However, few studies have looked at the performance of firms following mass privatization. This study uses 453 separate firms (101 firms privatized in both waves for a total of 554 observations), in the first and second waves of Czech voucher privatization. Using methodology from previous studies, we find that while the overall effects from privatization are positive, the effects vary by privatization wave, size, and industry. Firms privatized in the first wave performed worse (decline in performance following privatization) than firms privatized in the second wave. We also fail to find ownership concentration or debt as an important factor in restructuring the firm.

I believe that the results are consistent with two hypotheses. First economic and political structure surrounding the privatization waves plays an important part in the success of privatization. Stable environments, both political and economic, help privatized firms restructure and improve operating performance as well as attract foreign investors and capital even in less developed countries, but in transitional economies undergoing mass privatization in rapidly changing and developing economic and

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political environments hinder firms from restructuring and improving performance following privatization. Results are also consistent with the hypothesis that firms with a longer preparation period prior to privatization, an ''implicit seasoning'', improve performance following privatization. © 2002 Elsevier Science B.V. All rights reserved.

1. Introduction

One of the most prominent trends in finance outside the US over the past two decades has been the divestiture of state-owned enterprises (SOEs) by governments through privatization. Estimates of the number of firms privatized over the past 20 years are in the thousands, with many firms privatized through mass privatization in the former communist countries not included in the count. Megginson and Netter (2000) report that 30 of the 34 largest initial share offerings in history have been privatizations. With the increase in privatizations by governments, the academic literature concerning privatizations has also grown. Recent studies have focused on the effect of privatization on the operating efficiency, capital spending and profitability of the firm (Boardman and Vining, 1989; Megginson et al., 1994; Boubakri and Cosset, 1998; D'Souza and Megginson, 1999; Dewenter and Malatesta, 2001), the pricing and issuance of equity of privatized firms (Perotti and Guney, 1993; Perotti, 1995; Jones et al., 1999) and the returns to investors of investing in privatized firms (Megginson et al., 2000a,b; Dewenter and Malatesta, 1997). The purpose of this study is to test the effects of privatization on operating performance and profitability and to determine the source of these effects within the Czech program.

While many of the earlier studies have focused on firms in developed markets, there is an increasing literature on firms in developing markets and experiences in former communist countries. However, relatively little attention has been given to SOEs in former communist countries that have been privatized, even though these privatizations have far reaching effects in these countries and contribute to the large number of firms privatized in recent years. With the evidence from previous research supporting large gains from privatization for most firms, we are likely to expect gains for privatized firms in former communist countries as well (Pohl et al., 1997; Claessens et al., 1997). In addition to the firm becoming more efficient through privatization, the transformation of the environment and the economy in which the firm operates offers additional gains to privatized firms from being in a market economy. However, some previous research, such as Perotti (1995) offers a caveat concerning extending privatization models and theories to mass privatization

programs. In fact, recent news articles suggest that mass privatization has not transformed privatized firms, but caused these companies to "... remain mired with inefficiencies" (Frank, 1997a) and has let large businesses run as they did under communism (Frank, 1997b).

Given the findings of earlier privatization studies and the popular press reports of Czech Republic's transformation, the Czech Republic's privatization program offers a unique opportunity to study the effects of mass privatization (over 1600 firms in large-scale privatization in the short time period 1991–1994) on firm performance. The major benefit to using firms from the Czech Republic (CR) in addition to sample size is that noise from different economic settings, political systems, and methods of privatization of sample firms will be reduced. It also provides an interesting case study that would allow an analysis of the effects of political and economic choices on privatization. However, results from this single country study need to be interpreted carefully and may not be easily extrapolated to general statements concerning the effects of privatization on firms in other countries with differing methods of privatization. Within this context, previous single country studies concerning privatization have contributed to the understanding of how privatizations cause firms to restructure and the pricing of privatization issues within the constraints of a political system. [1] Results from this study are useful in the study of other countries' privatization plans that included vouchers, such as Russia, Poland and Romania. Results are of special interest to countries where voucher privatization will be considered in the future and whether voucher privatization is a reasonable alternative to traditional privatization methods.

The findings of this study are mixed with respect to the previous general findings that privatization leads to increases in operating efficiency, profitability and capital spending that were reported by Megginson et al. (1994) and Boubakri and Cosset (1998) but are more consistent with Dewenter and Malatesta (2001). We find that while the overall effect of privatization has a positive effect on firm performance, the gains from privatization are affected by when the firm was privatized (economic and political setting) and the size and the industry of the firm. We also find that ownership concentration in these Czech firms is not an important factor in restructuring firms following privatization.

The remainder of the paper is organized as follows. Section 2 reviews previous relevant literature on privatizations and the unique aspects of the Czech Republic's privatization program. The following section describes the hypotheses and the methodology used to test the effects of privatization on the

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[1] For other single country studies of privatization, see Barberis et al. (1996), Bishop and Kay (1989), Dyck and Alexander (1997), and La Porta and Lopez-de-Silanes (1997) as examples.

operating performance and profitability of the firms and the driving forces for these changes. Section 4 describes data for the study and the sample of Czech firms used in this study. Section 5 presents the empirical results and discusses the implications of these findings for the CR. The final section contains concluding remarks and directions for future research and applications to other privatization programs, especially Poland.

2. Literature review

Perotti (1995) and Boycko et al. (1996) develop theories of privatization and its ability to improve the efficiency and profitability of the firm. Both theories emphasize the political nature of the privatization process. The empirical results of Jones et al. (1999) and Megginson et al. (2000a,b) are generally consistent with these theories. They find significant underpricing in privatizations that is consistent with meeting political goals of the government. Perotti and Guney (1993) determine that underpricing in privatizations is greater than that of traditional initial public offerings (IPOs). However, Dewenter and Malatesta (1997) find that privatization underpricing is not significantly different from IPOs, but is related to the level of development in the capital markets and the industry of the firm.

The effects of privatization on the operational efficiency, profitability and capital spending by the firm are tested by Megginson et al. (1994), Boubakri and Cosset (1998), D'Souza and Megginson (1999) and Dewenter and Malatesta (2001). Most of these results find that privatization increases profitability, efficiency, output and capital spending.

Dewenter and Malatesta (2001) find that government firms tend to be less profitable and efficient than private firms. Furthermore, they collect a longer time series of data prior to and following privatization to analyze the effect of privatization on the firm. They find that while profitability measures improve following privatization, many of the efficiency gains are achieved in the three years prior to privatization as firms prepare for privatization and there is deterioration in some measures following privatization. They attribute these findings to the restructuring of the firm by the government prior to privatization. They also conclude that privatization perpetuates efficiency gains already achieved.

Many of these studies exclude or have a very small sample of firms from Eastern Europe or the former Soviet Union. In many cases of mass privatization, the government did not attempt to restructure the firm before privatization because of the number of firms involved and time considerations. A study on the restructuring of small Russian shops by Barberis et al. (1996) find that changes in human capital and management of firms increases restructuring beyond that of a simple transfer of ownership.

The empirical privatization literature indicates that most privatizations are underpriced and provide positive returns to initial investors. Most literature also indicates that a firm's performance improves immediately following privatization and indicates post-privatization ownership and management is important in achieving those results. There is additional evidence that privatization plans are politically driven and not necessarily revenue maximizing sales by the government.

Several studies have focused on the Czech Republic's privatization program and those of other Eastern European countries. The CR privatized firms through a variety of methods. Small shops and stores were privatized through small scale privatization and sold directly to buyers. Most of the large firms were privatized, at least in part, through voucher privatization instead of direct asset sales or share issue privatizations (SIPs). [2] This method is unique in that the investors receive ownership shares in exchange for vouchers that were sold for a small amount of wealth. While not common in many other countries where revenue maximization is a goal, voucher privatizations serve political goals of asset distribution to the populace that has little wealth and a large number of firms to be privatized. [3] Voucher privatization also prevents SOEs from being sold at fire sale prices to foreigners. For these reasons, voucher privatization solves many of the problems raised by Lipton and Sachs (1990) that might occur by using a traditional IPO privatization in Eastern Europe. For voucher privatization to be effective, information about the SOEs must be widely distributed so that the public can make rational decisions about the investment of their vouchers. Following the distribution of information on all firms, the Czech voucher privatization program used an auction process to distribute shares. [4] Participants used vouchers to bid for shares of firms in a multiple round auction process.

The voucher privatization took place in a period of political transformation as well as economic change. Table 1 presents a timeline of privatization and political events during the 1990s. During the first voucher privatization, the Czech and Slovak Federal Republics held national elections that led to the dissolution of the federation and the independence of the two republics. Consequently, the Czech Republic had relative political stability until 1997

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[2] The majority of large scale assets were privatized in voucher auctions. The CKP did not provide pre-privatization information on firms sold in direct asset sales. Furthermore, firms that were privatized through direct asset sales are no longer public companies or are consolidated with their acquirer; thus post-privatization information is not available.

[3] Boycko et al. (1994) describe the different variations of mass privatization used by the Czech Republic, Poland and Russia and the potential effects for performance following privatization.

[4] For a more complete description of the Czech privatization program, see Mertlik (1997), Claessens (1997), Hingorani et al. (1997), Kortba (1995) and Aggarwal and Harper (2000).

Table 1
Political events surrounding voucher privatization in the Czech Republic

Date	Event
November 1989	Velvet revolution
October 1990	Act on small scale privatization
February 1991	Act on large scale privatization (including voucher privatization)
October 1991	Preliminary list of firms to be privatized in the first wave
April 1992	Projects approved for first privatization wave
May 1992	First round of voucher privatization
June 1992	Federal elections, Czech and Slovak Republics agree to become independent
December 1992	Fifth round of voucher privatization, first wave completed
May 1993	Shares from first wave distributed to shareholders
June 1993	Prague Stock exchange begins trading
October 1993	Projects approved for second privatization wave
April 1994	First round of voucher privatization
November 1994	Final round of voucher privatization, second wave completed
May 1996	Parliamentary elections, Klaus reelected by narrow margin
November 1997	Klaus resigns as prime minister

with the resignation of prime minister Klaus and the creation of a coalition government headed by the Social Democrats' Zeman.

Economic conditions were also changing early in the privatization program, but later improved to provide a stable economic environment. Price liberalization contributed to the high inflation in 1991 and 1992, but inflation remained below 10% through 1996. Unemployment also remained surprisingly low during this time period. After two years of little or no economic growth, the Czech economy grew at a rate between 3% and 6% for the next four years. There was also a shift in the economic base of the economy. The service sector grew and the industrial sector declined as a percentage of GDP. By the end of the 1990s, the service sector was larger than the industrial sector in the Czech economy.

Early studies of voucher privatization by Hingorani et al. (1997) and Claessens (1997) focused on the investment decision in the first voucher auction. Using data from the first voucher auction in 1992 and price information immediately following privatization, Claessens (1997) finds that the final round voucher price and the market prices following privatization are significantly related to concentrated ownership structures and majority ownership by domestic investors. In addition to the findings by Claessens (1997), Hingorani et al. (1997) use similar information from the first voucher auction and confirm the relationship between ownership concentration and prices and also find that share demand and prices are directly related to past profitability of the firm and inversely related to firm size and financial distress. Even though vouchers were widely distributed, concentrated ownership structures were obtained through

the use of investment privatization funds (IPFs). Investors could exchange their vouchers for shares in an IPF if they so choose or use their vouchers on their own. Seventy percent of vouchers were eventually assigned to the funds in the first wave. IPFs were not sponsored by the government, and there were initially over 400 IPFs registered. However, the largest 15 funds controlled more than half the vouchers. Some of the IPFs were started by Czech banks, but some of the largest funds were associated with foreign banks or were independent of any other enterprise. Mertlik (1997) describes a potential problem of inter-locking ownership and claims as a result of bank-owned IPFs where banks who own IPFs are reluctant to force bankruptcy on firms who have defaulted on loans because the bankruptcy would decrease the value of the IPF's portfolio. Furthermore Pistor and Spicer (1997) find Czech IPFs are not active share-holders and conclude that there is little evidence that IPF ownership and board representation leads to restructuring.

While the previous studies focused attention on the auction process and prices resulting from the auction, neither study addresses the restructuring or changes in the firm following privatization. Claessens et al. (1997) test the relationship between ownership and market value and profitability for Czech firms following privatization. Using yearly observations following privatiza-tion, they find that firm value (Tobin's Q) and profitability (similar to return on assets or basic earning power) are positively related to concentration of own-ership in the firm. They also find that ownership by bank sponsored IPFs in-creases market valuation. However, while the relationship between ownership concentration and profitability is positive, these results do not give any insight into whether the IPFs caused changes through restructuring and using their ownership control or rather they merely bought profitable firms in the voucher auction. Furthermore, their results do not explicitly test for the overall effect of privatization. [5] Pohl et al. (1997) extend this analysis to six other Central and East European countries and find that most countries experienced substantial progress towards profitability regardless of privatization method used. The exceptions to the findings were Bulgaria and Romania.

Harper and Krehbiel (1999) and Harper (2001) also examine the Czech privatization experience. Harper and Krehbiel (1999) use a stepwise regression to estimate the effect of ownership on the newly privatized firms. They find that firms with moderate levels of ownership by the three largest shareholders has a significant positive effect on changes in operations and financial performance, but the lowest and the highest levels of ownership had a significant negative effect on the firm. Harper (2001) finds that the overall performance of firms

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[5] High ownership concentrated firms could have lost less than other firms, but the net effect of privatization is still a loss and a decrease in profitability. Pistor and Spicer (1997) also note that Claessens et al. (1997) did not address restructuring, only profitability.

decreases following the first wave of voucher privatization using similar methodology of Megginson et al. (1994) and also uses a regression analysis to test the effect of ownership, industry and size on the level of performance following privatization. However, it does not address the causes and the source of the changes following privatization.

This paper compares pre- and post-privatization performance in CR firms similar to Megginson et al. (1994), Boubakri and Cosset (1998) and Harper (2001). We will also extend Harper's (2001) analysis to determine the source of changes in performance and the effects of political choices, economic environment and firm specific factors on change in performance. This expands upon the existing research by including both waves of voucher privatization and using both nonparametric and regression methods.

3. Hypotheses and methods

Previous theory (Boycko et al., 1996) supported by empirical evidence (Megginson et al., 1994; Boubakri and Cosset, 1998; Barberis et al., 1996) support privatization as a means to increasing operating efficiency and profitability of firms following privatization. Dewenter and Malatesta (2001) find that restructuring of firms began before privatization and many gains were achieved before privatization, but continued following privatization. Given the theory and evidence for privatization, similar results are expected for the Czech Republic's privatization program. While Megginson et al. (1994) and Boubakri and Cosset (1998) measure several changes in the firm following privatization, including operating efficiency, profitability, output, dividends, capital investment and leverage, the data are not available or not applicable for the Czech sample for all of these measures. This study uses similar measures to proxy operating efficiency and profitability that are similar to the studies by Megginson et al. (1994) and Boubakri and Cosset (1998). We expect that profitability (ROS and ROA), operating efficiency (sales efficiency and net income efficiency) and output (real sales) should be greater following privatization of the firms since restructuring of Czech firms began after 1991 (see Mertlik, 1997). However, in contrast to these studies, we expect that employment should be lower following privatization. SOEs employ more workers than necessary to accomplish the goals of the government, especially in former communist countries. Following privatization, firms are expected to reduce the employment level in order to become more competitive. Table 2 defines the performance measures tested in this study and also explanatory variables used to explain the changes in the performance measures following privatization.

To measure the effects of privatization on the Czech firms, we compare the two-year pre-privatization and post-privatization data using a Wilcoxon sign rank test. We take the averages of the measures two years prior to privatization

Table 2
Performance measure definitions and expected changes and explanatory variable definitions and expected impact

Performance measures	Definition	Expected change
Employment	Number of employees	Decrease
Sales efficiency	Real sales/number of employees	Increase
Net income efficiency	Real net income/number of employees	Increase
Return on assets	Net income/total assets	Increase
Return on sales	Net income/sales	Increase
Real sales	Nominal sales/price index	Increase
Explanatory variables		Expected sign
Size	Log of pre-privatization real sales	Negative
Service and trade	Dummy variable equal to 1 if firm is in the service or trade industries	Positive
Strategic	Dummy variable equal to 1 if firm is in a strategic industry. Strategic industries include chemicals and pharmaceuticals, steel, mining and mechanical and electrical engineering	Positive
Utility	Dummy variable equal to 1 if firm is in the utility industry	Positive
Prague	Dummy variable equal to 1 if firm is located in the Prague district	Positive
First wave	Dummy variable equal to 1 if the firm was initially privatized in the first voucher auction	Negative
Both waves	Dummy variable equal to 1 if the firm sold shares in both voucher auctions	Positive or negative
Debt	Total debt/total assets	Positive or negative
Ownership	Percentage of shares owned by the three largest shareholders as reported by Aspekt	Positive
Percent privatized	The percentage of shares privatized in the voucher auctions, restitution and direct sales	Positive
Foreign influence	Dummy variable equal to 1 if the firm has foreign ownership, capital or joint ventures	Positive

and of the two years following privatization. If the measures of operating efficiency and profitability are larger following privatization, we expect a positive sign rank. This would be consistent with earlier findings and support the claim that privatization alone improves firm performance.

Even with a general improvement in performance as a result of privatization, differences should exist due to industry, size, location and when privatized. Firms that have lower fixed assets and costs should be easier to restructure and adjust than for firms with larger fixed assets and costs. The examples of lower fixed cost firms are service and trade type industries. In comparing service and trade type firms with manufacturing type firms, more positive changes are expected for service and trade industry firms. Firms that are considered important for defense and economic development may also

differ from other firms in post-privatization performance because of an ongoing relationship with the government. These ''strategic'' industries would perform better if they continued to receive subsidies or preferential treatment by the government (Manzetti, 1994). Utilities also are unique in that they generally operate as monopolies and are not exposed to a competitive environment. With this type of market protection, many macroeconomic gains benefit utilities. Growth in demand that the CR experienced will increase sales of utilities because of their monopolistic environment. Therefore, we separate utilities from other industries for analysis and comparison.

In addition to industry differences, there are timing differences. The CR privatization program proceeded in two distinct waves. The first wave and largest wave occurred in 1992 and a second and smaller wave occurred in 1994. The timing of privatization may have an effect on the immediacy and size of restructuring following privatization. Firms in the first wave faced more uncertainty surrounding and following privatization and shorter preparation for privatization than firms in the second wave. Managers of all firms had greater control and ability to restructure beginning in 1991 (Mertlik, 1997). Firms in the first and second wave began their restructuring process at the same time. Firms in the second wave had the advantage of observing the voucher process of privatization and the political process and environment of the country while beginning to improve operating efficiency. Second wave firms should have less hurdles and problems following privatization translating into larger gains in operating efficiency and profitability following privatization than firms in the first wave.

Claessens (1997) and Hingorani et al. (1997) also find differences in valuation of firms in the first auction due to location of the firm within the CR. Firms located in or near Prague, the capital and major population center, commanded a premium over other firms. A dummy variable is included to measure the effect of location on the changes in performance following privatization.

A Mann–Whitney (MW) test is used to directly test the effect of industry and the timing of privatization (first or second wave) on changes in the averaged operating efficiency and profitability of firms. Percentage changes for each firm are ranked from lowest to highest. Ranks for one group are summed and tested. As hypothesized above, we expect changes for service industry, strategic and utility firms to be greater than other industry firms and that second wave firms should have more positive changes than for first wave firms. In addition, we also test for size effects by comparing the ranks for the smallest and largest quartiles of firm size (as proxied by real sales the year prior to privatization) and location of the firm.

To validate the nonparametric tests, a cross-sectional regression is used to determine the sources of performance changes following privatization. Explanatory variables for industry, size and timing of privatization are included in the regression as well as other factors that may influence restructuring and

post-privatization performance. Ownership has been shown to be an important factor in improving firm performance in previous lines of research, such as Demsetz and Lehn (1985), McConnell and Servaes (1990), Morck et al. (1988) and Shleifer and Vishny (1986). Ownership concentration is a potential factor affecting post-privatization performance. Ownership has also been shown to be important in studies by Hingorani et al. (1997) and Claessens (1997) who find that ownership affects the voucher auction and secondary trading value of shares. Claessens et al. (1997) find that higher ownership concentration positively affects post-privatization profitability. We also test for ownership effects in our study. In addition to including ownership concentration, we also test for the effects of foreign influence through capital investment or joint ventures and the percentage of ownership retained by the government.

4. Data and sample selection

Pre-privatization data were collected by the Center for Coupon Privatization (CKP) for general distribution to the public to be used in the voucher auction. The data include information on total sales, profits, employment and bank loans for the three years prior to privatization and book equity, assets, and liabilities at the end of the year prior to privatization. Besides financial information, information regarding other types of share distribution and the percentage distributed, and the ownership percentage retained by the government was also included in the information distributed by the CKP. The government compiled these data for both the first and second voucher privatizations. Dewenter and Malatesta (2001) find that governments in their sample do not misrepresent the firms' information they wish to privatize and the data are reliable (their sample included firms from Hungary and Poland). This is also consistent with Perotti's (1995) theory of credible privatization.

Post-privatization data were obtained through the Aspekt Stock Market Database, which contains financial information on firms following privatization and is consistent with western accounting practices following the passage of the Accounting Act in 1992. [6] In addition to financial information, Aspekt also reports information on firms' ownership, joint ventures and foreign capital, and other firm related information. While the most complete data set for Czech firms, it is by no means exhaustive. Information for some firms is incomplete or missing, thereby limiting the sample used in the study.

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[6] The CKP used somewhat different terminology to record accounts. Sales were referred to as production, net income as profit, etc. Aspekt reports both production and revenue from sales. Production was a more common account for firms following the first wave of privatization and revenue was more common for second wave of privatization. These were the accounts used in this study for post-privatization data.

All financial based data are then adjusted to real terms in order to exclude the effects of the relatively high inflationary environment. An adjustment to post-privatization net income needs to be made to make the accounts more comparable. Pre-privatization profit is measured on a before tax basis (since there was no tax on businesses initially), so taxes paid following privatization are added back to net income so that both measures are on a before tax basis.

There were 988 firms in the first wave (1992) of voucher privatization and 861 firms (with 185 of these firms partially privatized in the first wave and 676 firms offered for the first time) in the second wave (1994) voucher privatization. Pre- and post-privatization information was available for 174 firms in the first wave and 380 firms in the second wave (279 of these were privatized for the first time). The final sample consists of 554 (with 101 firms privatized in both waves) firms privatized in the first and/or second waves of voucher privatization. Table 3 offers a comparison on a pre-privatization basis of sample firms to those firms that were excluded from the sample because of insufficient data (mainly due to the lack of post-privatization data). As is shown in Table 3, the sample firms are larger than the nonsample firms in most measurements of size. While the sample may not be entirely representative of all firms in the Czech mass privatization program, the results should be similar if privatization increases performance overall. The second problem with the sample is that parts of the sampled firms were privatized in each wave. These firms will be included in the full sample, but the behavior of these firms will also be compared to firms that were initially privatized in the second wave. Table 4 describes the breakdown of firms privatized in the first and second waves by size, industry (service or trade, utilities, strategic industries) and location.

5. Empirical results

The empirical results are discussed in the following section in three parts. The first part will discuss the overall effect of privatization on all firms and then on firms by privatization wave. The second part will present and discuss the nonparametric results by size, industry and location. The final part will discuss results of the cross-sectional regression models which are used to validate the nonparametric tests. The regressions incorporate the effect of privatization wave, size, industry and ownership issues on efficiency and profitability measures concurrently.

5.1. Full sample and privatization wave results

The results for Wilcoxon test for the full sample are reported in Table 5. The results are not entirely consistent with that of Megginson et al. (1994) and Boubakri and Cosset (1998). The first major difference is the large decline in

Table 3
Comparison of the sample firms with the nonsample firms based on pre-privatization values

	Mean	Median	S.D.	Mean	Median	S.D.	T-statistic	P-value
Panel A: *First wave*								
	174 Sample firms			814 Nonsample firms				
Net business equity	878,240	221,926	4,365,908	329,381	111,070	1,013,827	1.65	0.099
Liabilities	587,783	120,920	1,751,401	253,733	54,610	754,836	2.47	0.014
Sales	1,032,304	318,235	3,787,923	468,637	149,755	1,783,500	1.92	0.055
Net income	212,694	25,627	1,745,711	57,603	8,890	428,160	1.16	0.246
Employment	1726	835	3296	741	372	1298	3.38	0.001
Panel B: *Second wave*								
	380 Sample firms			481 Nonsample firms				
Net business equity	1,044,230	233,130	4,130,132	319,664	114,140	873,766	3.35	0.001
Liabilities	537,086	100,484	1,817,090	237,019	47,150	771,580	2.96	0.003
Sales	1,168,939	252,203	3,814,400	376,559	114,831	1,103,649	3.91	0.001
Net income	107,941	5631	935,003	7915	750	73,292	2.07	0.038
Employment	1355	469	3651	571	249	1126	4.02	0.001

Table 4
Sample firms by wave and industry, location or size

	1st wave $n = 174$	2nd wave $n = 380$	All firms $n = 554$
Service/trade	28	72	100
	16.1%	18.9%	18.1%
Utilities	8	23	31
	4.6%	6.1%	5.6%
Strategic	67	102	169
	38.5%	26.8%	30.5%
Prague	25	48	73
	14.4%	12.6%	13.2%
Lower quartile	29	110	139
	16.7%	28.9%	25.1%
Upper quartile	54	85	139
	31.0%	22.4%	25.1%

employment following privatization. This result was as predicted and supports the assumption that the former communist countries overemployed SOEs in order to keep unemployment low. With the large decrease in employment by sample firms, we would expect to see the unemployment rate in the CR increase. However, it remained constant at about 4% following privatization. This indicates that either the government or new businesses employed more people during the transition.

The lower employment following privatization also led to improvements in efficiency. Both sales and income efficiency increased following privatization, indicating that privatized firms put remaining human capital to better use and allocated current technological resources to more efficient uses. Improvements were not only significant at the 0.01 level for the output based measure, but also for the profit based measure as well. These findings are consistent with the previous body of empirical research on privatizations.

The change in profitability due to privatization is mixed. The profit margin improved significantly but the return on assets decreased. These combined results indicate the amount of sales (and therefore profits) decreased and caused the return on assets to decline as well. Total assets also increased at the same time, which further contributes to the decrease in return on assets. [7] The decline in real sales is also contrary to previous findings and the overall cause of the decline is unknown although two factors are very likely. First, with the opening of markets and trade, there is more competition and this increased competition cut into the market share of the privatized firms who did not fare

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[7] Information is only available for total assets. Assets are not broken into current and capital assets. Therefore, I am unable to calculate the change in capital spending following privatization.

Table 5
Wilcoxon test of median differences for all firms

	Median		Sign rank	Wilcoxon *T*-statistic	*P*-value
	Pre	Post			
Employment	581.75	454	−119,991	−15.92	0.001
Sales efficiency	211.64	222.98	26,715	3.54	0.001
Net income efficiency	14.67	26.87	42,933	5.70	0.001
Return on assets	7.52%	6.93%	−12089	−1.60	0.110
Return on sales	6.35%	10.18%	34025	4.51	0.001
Real sales	146,224	116,992	−41,999	−5.57	0.001

well initially. Another contributing factor is the loss of the government market for goods following privatization. The decrease of the state sector overall would cause a decline in sales for many firms until new markets are developed.

The results by privatization wave are presented in Table 6. Wilcoxon sign rank test statistics are reported for each wave in panel A as well as the MW rank test of percentage changes in the measures. First wave firm performance decreased following privatization in every respect, which is consistent with Harper (2001). However, second wave performance improved by most measures, except real sales which had no significant change. When directly comparing the first wave firms to the second wave firms on a percentage change basis using the MW test, the results confirm that the two waves did not behave identically following privatization and that firms privatized in the second wave performed significantly better following privatization than first wave firms. The timing of privatization thus had a significant effect on the performance following privatization. While this finding is interesting, it is also somewhat puzzling. Previous privatization literature does not suggest a difference in privatization due to timing. The issue of timing is unique to the mass privatization within the CR.

A potential explanation is that firms included in the second wave of privatization included some firms that were initially privatized in the first wave. These ''seasoned'' privatized firms may be driving the results and causing the differences. However, panel B of Table 6 compares the seasoned privatized firms (firms in both waves) and the initially privatized firms. The pre- vs. postprivatization results demonstrate that both seasoned and initially privatized firms followed the same pattern. When compared directly using the MW test, there is no significant difference between the seasoned and initially privatized firms. The MW test does not support the explanation that seasoned privatized firms were driving the second wave results and the differences in first and second wave performance results.

The remaining potential explanations for the differences in first and second wave results would include a selection bias of which firms to privatize in each wave, a differing structural, political and economic environment at the time of

Table 6
Comparison of firms by when the firms were privatized

Efficiency ratio	Median		Wilcoxon *T*	Median		Wilcoxon *T*	Mann–Whitney *T*
	Pre	Post		Pre	Post		
Panel A: Wilcoxon test of median differences by privatization wave							
	First wave (*N* = 174)			Second wave (*N* = 380)			Rank FW
Employment	891.5	529.5	−11.43***	489	406.5	−11.00***	−10.84***
Sales efficiency	223	209	−2.03**	204.2	231.7	5.73***	−4.99***
Net income efficiency	22.1	7.4	−9.15***	9.3	36.9	11.49***	−13.45***
Return on assets	12.87%	1.33%	−11.47***	5.08%	11.46%	7.64***	−14.51***
Return on sales	9.88%	3.02%	−11.18***	4.27%	14.67%	10.52***	−12.79***
Real sales	217,994	119,170	−8.35***	119,931	116,189	−0.19	−9.49***
Panel B: Wilcoxon test of median difference of second wave firms by seasoning							
	Both waves (*N* = 101)			Second wave only (*N* = 279)			
Employment	948	791	−6.04***	378	331	−8.96***	−1.73*
Sales efficiency	230.7	278.2	3.52***	190.9	223.9	4.54***	0.36
Net income efficiency	12.8	39.9	5.50***	8.6	35.5	10.01***	−0.07
Return on assets	5.65%	11.78%	2.72***	4.82%	11.29%	6.25***	−1.19
Return on sales	4.79%	15.85%	5.43***	4.00%	14.44%	9.04***	−0.35
Real sales	239,228	243,903	−0.23	77,742	79,391	0.24	−0.73

*** Significant at the 0.01 level.
** Significant at the 0.05 level.
* Significant at the 0.10 level.

privatization, the effects of time on preparation before privatization (an "implicit seasoning") or a combination of these factors. Selection bias does not seem to be a plausible explanation. If a government wanted the privatization to succeed and build support for future privatization waves, then it would choose to privatize firms that will perform better following privatization for the first wave. By choosing the firms that would not improve following privatization for the first wave, then public support for future waves would be in jeopardy and subsequent privatizations more difficult to initiate. Table 6, panel A shows that by most measures, first wave firms were more efficient and profitable than second wave firms indicating that the Czech government selected firms that were the strongest to privatize in the first wave.

Surrounding political and economic changes and conditions offer an alternative explanation for the differing results between privatization waves. The first wave of privatization took place during 1992. This was a tumultuous time for the then Czech and Slovak Federal Republic (CSFR), since it split into two separate, independent republics at the end of the year. Following the first wave, the political structure was still somewhat unsettled, although the elected government in the CR was committed to reform. Changes were implemented in economic policy as well. At about the same time as privatization, price and trade liberalization were implemented, resulting in high inflation and more competition. The government instituted policies to combat inflation and establish a more stable economic environment. The second wave of privatization, 1994, did not have the surrounding political or economic uncertainty. This may have a provided a more conducive environment (credible government) for privatization.

Another potential, but not exclusive explanation of the differing results between the privatization waves is "implicit seasoning". According to Mertlik (1997), current managers took greater control of operations of firms before they were privatized with profit earning as a goal. This policy allowed managers the possibility of restructuring the firm prior to privatization while continuing to receive some support or protection from the government. Managers gained experience and time to prepare for privatization, with firms privatized in the second wave receiving an additional two years of preparation and time to begin restructuring prior to privatization, a type of "implicit seasoning" of privatization and restructuring similar to Dewenter and Malatesta (2001). Firms with longer periods before privatization would have the advantage of being exposed to the market, forming a post-privatization strategy, and perform better following privatization. The evidence presented in Table 6 demonstrates that first wave firms did not perform as well as second wave firms and that firms privatized in both waves did not differ from firms privatized only in the second wave. No direct evidence is available to test this hypothesis of implicit seasoning since data for all second wave firms are not available for 1989 and 1990.

5.2. Results by size, industry and location

Mass privatization requires that firms in all industries and of differing sizes be privatized simultaneously. However, the differences in cost structures, markets and scope of the firm will be a major factor in how the firm will change and when the gains from privatization will occur. To test the impact of industry, firms are grouped into industry types, service and trade, strategic, utility industries and then compared to the rest of the sample. [8] Firms are also grouped on the basis of size proxied by pre-privatization real sales and the upper and lower quartile of firms are used. Table 7 presents the industry and size comparisons using Wilcoxon and MW tests.

Panel A presents size quartile results. In general, smaller firms (lower quartile) have greater improvements following privatization. The Wilcoxon tests for the lower quartile firms are similar to the results for second wave firms (improvements in profitability and efficiency, no change in real sales). A further examination of the lower quartile firms reveal that 29 of the 139 firms (21%) are from the first wave as compared to approximately 31% of the firms for the full sample. The larger firms (upper quartile), which include 54 firms from the first wave (39% of the upper quartile sample), resemble the full sample results (decrease of real sales, lower or no change in profitability). However, upper quartile firms in the second wave performed worse than larger firms in the first wave relative to the lower quartile firms in each wave, with larger decreases in profitability, output and net income efficiency. This indicates, second wave smaller firms realized much higher gains than larger firms in the same time period.

Overall, larger firms have a more difficult time improving performance following privatization. The MW tests of upper quartile rankings are all negative and the rankings for profitability measures are significant at the 0.01 level. The significant decline in real sales for larger firms seems to be the driving force behind the differences in these groupings. Large firms experienced a larger percentage decline in sales. As sales decline and profit margins remain stable, the result is lower overall profits and a decline in ROA.

Industry should also be an important factor in determining performance following privatization. Panels B, C and D present results based on industry groups. Service and trade industries, those with lower fixed costs and more flexibility, had larger gains following privatization than other industry groups. Again, the driving force behind the changes in performance is the change in sales. Service and trade firms had small declines in sales, which improved efficiency and profitability when compared to other industries. In conjunction with the comparisons based on size, service and trade firms are smaller than

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[8] Information from the Aspekt database are used to determine industry classifications.

Table 7
Comparison of firm performance following privatization by size and by industry and location

Efficiency ratio	Median		Wilcoxon T	Median		Wilcoxon T	Mann–Whitney T		
	Pre	Post		Pre	Post		Both waves	First wave	Second wave
Panel A: Comparison by size									
	Lower quartile (n = 139)			Upper quartile (n = 139)			Upper quartile rank		
Employment	227	200	−7.97***	2153.5	1700	−9.56***	−1.27	−0.33	−0.57
Sales efficiency	152.7	180.8	3.41***	305.1	359.3	2.50**	−0.73	−0.76	−1.63
Net income efficiency	9.3	23.6	5.28***	24.8	38.6	1.50	−3.22***	−0.93	−2.78***
Return on assets	4.73%	7.09%	2.02**	11.02%	6.31%	−4.48***	−5.11***	−2.61***	−4.46***
Return on sales	5.81%	12.04%	4.55***	8.16%	9.62%	0.45	−3.29***	−0.36	−2.09**
Real sales	40,423	38,099	−0.67	664,139	561,654	−2.68***	−1.71*	−1.20	−2.12**
Panel B: Comparison of service and trade firms to other industries									
	Service/trade firms (n = 100)			Other industry (n = 454)			Service and trade rank		
Employment	231	172.5	−6.59***	782.5	552.5	−14.38***	−0.24	−0.92	−0.68
Sales efficiency	186.3	232.7	4.05***	216.3	219.3	1.72*	3.87***	−0.10	4.42***
Net income efficiency	9.4	40.7	4.49***	14.7	24.1	3.84***	2.25**	1.21	2.43**
Return on assets	3.99%	6.02%	0.74	8.71%	7.70%	−1.97**	1.78*	1.13	1.84*
Return on sales	3.99%	7.83%	2.66***	6.63%	10.38%	3.79***	1.25	1.22	0.81
Real sales	62,526	54,255	1.28	181,345	126,429	−6.37***	3.57***	−0.28	4.27***
Panel C: Comparison of strategic industry performance to other industries									
	Strategic firms (n = 169)			Other industries (n = 385)			Strategic firm rank		
Employment	1228.5	795	−9.62***	411	350	−12.65***	−4.06***	−2.32**	−2.17**
Sales efficiency	226.5	217.9	−2.33**	197.4	227.1	5.48***	−5.06***	−3.05***	−3.47***

(continued on next page)

Table 7 (*continued*)

Efficiency ratio	Median		Wilcoxon T	Median		Wilcoxon T	Mann–Whitney T		
	Pre	Post		Pre	Post		Both waves	First wave	Second wave
Net income efficiency	16.6	23.2	0.06	12.7	28.5	6.90***	−3.23***	−3.44***	−0.66
Return on assets	9.69%	4.69%	−2.79***	6.59%	7.30%	0.16	−3.42***	−4.14***	−0.64
Return on sales	7.39%	8.32%	0.70	5.99%	10.35%	5.15***	−2.43**	−3.14***	0.34
Real sales	304,105	154,796	−7.61***	98,593	84,847	0.87	−6.67***	−3.65***	−4.86***
Panel D: Comparison of utility firms to other industries									
	Utility firms (*n* = 31)			Other industry (*n* = 523)			Utility firm rank		
Employment	1163.5	1096.0	1.02	545	423.5	−16.06***	3.86***	1.24	4.25***
Sales efficiency	890.7	1407.5	3.37***	206.1	217.8	2.44**	3.67***	1.30	3.39***
Net income efficiency	42.6	168.1	3.31***	13.6	24.1	5.00***	1.86*	2.62***	0.32
Return on assets	7.96%	11.28%	0.59	7.49%	6.50%	−1.75*	1.43	2.92***	−0.06
Return on sales	7.90%	11.51%	1.69*	6.17%	9.53%	4.32***	1.07	2.70***	−0.58
Real sales	806,241	1,332,494	3.41***	134,309	105,925	−7.09***	4.69***	1.91*	4.49***
Panel E: Comparison of Prague location to other firms									
	Prague firms (*n* = 73)			Other firms (*n* = 481)			Prague rank		
Employment	1178.5	601	−6.28***	538	417.5	−14.53***	−2.52**	−1.43	−2.16**
Sales efficiency	229.35	318.67	3.64***	206.58	214.77	1.89*	3.00***	1.49	2.69***
Net income efficiency	17.19	34.70	1.52	13.65	25.80	5.69***	−0.34	0.26	−1.70*
Return on assets	6.82%	5.37%	1.94*	7.56%	7.05%	−0.85	−1.48	−0.38	−1.41
Return on sales	6.80%	9.79%	0.67	6.30%	10.21%	4.79***	−1.15	0.40	−1.63
Real sales	239,917	179,136	1.08	136,106	110,191	−6.64***	1.30	1.03	1.08

*** Significant at the 0.01 level.
** Significant at the 0.05 level.
* Significant at the 0.10 level.

firms in other industries. However, most of these gains come as a result of service and trade firms in the second wave rather than the first. First wave service and trade firms did not significantly differ from other industries, but second wave service and trade firms were able to achieve larger privatization gains than other types of firms.

Firms in strategic industries did not perform as well as other industries. All the strategic firms are in heavy industries such as mining, steel, engineering, and chemical production. [9] This result also suggests that strategic industries did not receive additional state support following privatization. These results are consistent with the positive findings of the service and trade industries. The difference between strategic firms and other industries were similar in the two waves. In the second wave, strategic firms continued to decrease real sales, employment and sales efficiency; there was not a statistical difference between strategic and other firms in profitability unlike the first wave. This points to some improvements of firms privatized in the second wave.

Unlike strategic industries, utilities performed better following privatization. Utilities are on average larger than other firms in our sample (*t*-statistic is 1.965) and larger firms were shown to be less efficient following privatization than other firms (Table 7, panel A). However, utilities were still able to make improvements in their efficiencies and sales following privatization. This may be due to utilities being a protected industry with monopolistic structure. If this were the case, then utilities could exploit their position and raise prices in order to improve performance, especially if the regulatory environment is weak. However, the average permanent holding by local and federal government was 17% for utilities and less than 4% for other firms. This indicates that the government still had a strong influence over utilities and reduces the threat of rapid price increases to exploit the monopolistic advantage.

Finally, location seems to have a relatively minor impact on the performance of firms following privatization. This is in contrast to the premiums paid for Czech firms in the voucher auctions (Claessens, 1997; Hingorani et al., 1997). Firms located in Prague would have greater name recognition and may command a higher value, but that valuation is not based on the performance following privatization. Sales efficiency increased but the employee level decreased significantly as well. These results are consistent in each privatization wave. The remainder of the performance measures are not significantly different than firms located outside of Prague.

The interaction of these factors, size, industry and location, along with the ordering of privatization makes direct one-to-one comparisons difficult to interpret. A cross-sectional regression analysis, with dummy variables for the

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[9] The author would like to thank Luigi Manzetti for assisting in the identification of strategic industries.

different divisions is better able to directly test the overall relationships of these factors and their impacts on post-privatization performance.

5.3. Cross-sectional regression results

To test the effects of timing, size and industry together and validate the nonparametric tests, a cross-sectional regression is used. The regression is designed to approximate the previous four MW tests of privatization wave, size, industry and location into one combined analysis and are estimated using White (1980) heteroskedastic correction method. The model used for each performance measure is

$$PM_i = \alpha_0 + \beta_1 \text{Size} + \beta_2 \text{Prague} + \beta_3 \text{Strategic} + \beta_4 \text{Utility} + \beta_5 \text{Service}$$
$$+ \beta_6 \text{First} + \beta_7 \text{Both} + \varepsilon, \tag{1}$$

where PM_i is the percentage change from pre- to post-privatization performance measure, size is the log of pre-privatization real sales, Prague, Strategic, Utility and Service are dummy variables that take the value of 1 if the firm is in those industries or location, 0 otherwise. First is a dummy variable takes the value of 1 if the firm was privatized in the first wave, 0 otherwise and Both is a dummy variable takes the value of 1 for firms privatized in the second wave if they were previously privatized in the first wave, 0 otherwise. If the regressions are consistent and representative of the nonparametric tests, Size and First should have a negative effect, Service and Utility should be positive, Strategic should be negative, and Both and Prague should not be significant. Table 8 presents the cross-sectional results for the percentage change in the six measures of performance.

The most important factor in determining the performance following privatization in the Czech mass privatization program is when the firm was privatized. Consistent with the nonparametric tests, the first wave dummy variable is negative and significant at a 0.10 level or better for all equations except change in employment. The only other explanatory variable that is significant is the industry dummy variable for the changes in sales efficiency and real sales, although it is positive for all equations (except for employment) as predicted. Although not significant at standard levels, the size variable is consistently negative which supports the nonparametric tests. Finally, the both waves variable is not significant which is also consistent with the earlier nonparametric tests.

Overall the regression results support two hypotheses. First, firms and industries that have lower fixed cost structures tend to perform better than other industries following privatization. Second, within the unique Czech system, firms performed worse following the first wave of privatization than after the second wave of privatization. The size and consistency of the First wave

Table 8
Estimates of Eq. (1): Size, industry and timing effects on post-privatization performance, t-statistics are reported in parentheses ($n = 554$)

	ΔEmp	ΔSE	ΔNIE	ΔROS	ΔROA	ΔRS
Intercept	6.123	0.631	16.546	15.576	18.516	1.198
	(1.030)	(0.822)	(1.076)	(0.856)	(1.226)	(2.145)**
Size	−0.511	−0.044	−1.003	−0.857	−1.298	−0.100
	(1.044)	(−0.694)	(−0.761)	(−0.543)	(−1.012)	(−2.121)**
Prague	−0.299	0.321	−2.254	−3.611	−2.345	0.172
	(−1.158)	(1.298)	(−1.285)	(−1.158)	(−1.608)	(0.805)
Strategic	−0.412	0.119	−0.759	4.286	1.118	−0.054
	(−1.099)	(0.996)	(−0.356)	(1.164)	(0.829)	(−0.797)
Utility	0.569	0.921	14.415	14.827	15.146	1.128
	(1.196)	(91.830)	(0.982)	(0.932)	(1.004)	(2.313)**
Service	−0.932	0.659	2.342	6.786	1.478	0.515
	(−1.062)	(2.907)***	(0.599)	(0.900)	(0.486)	(2.355)**
First wave	0.189	−0.199	−6.406	−9.001	−4.369	−0.398
	(0.488)	(−1.888)*	(−3.121)***	(−2.695)***	(−3.671)***	(−5.616)***
Both waves	2.102	0.248	−0.903	−2.563	−1.088	0.202
	(1.023)	(1.207)	(−0.619)	(−0.748)	(−0.974)	(1.186)
Adj R^2	0.007	0.0428	0.023	0.008	0.027	0.112

*** Significant at the 0.01 level.
** Significant at the 0.05 level.
* Significant at the 0.10 level.

dummy variable also indicates that the economic and political uncertainty hurts privatized businesses. Alternatively, the more time given to firms to prepare for and begin restructuring firms prior to privatization, the better they will perform following privatization in the CR.

An expanded regression analysis is also used to test the effects discussed above on privatized firm as well as other factors identified in earlier studies. Ownership and corporate control issues are important in determining the post-privatization performance as well as agency issues related to debt. Corporate control and ownership issues include the percentage of the firm privatized (conversely, the ownership stake retained by the government), ownership concentration following privatization, and if the any of the owners were foreign. Hingorani et al. (1997), Claessens (1997) and Claessens et al. (1997) explore the effect of ownership concentration on voucher auction values and post-privatization equity value as well as post-privatization performance. Several measures of ownership have been used in these studies (as well as other ownership studies), but most measures indicate that a more concentrated ownership structure increases value in the voucher auction and has a direct relationship on profitability following privatization. In the Czech voucher privatization, individuals could give their vouchers to IPFs. These funds served two purposes. First, it served as an investment diversification for

investors. Second, if IPFs gain enough vouchers, they can become large blockholders and can use their ownership position to restructure the firm and improve performance. This study measures ownership concentration as the percentage of shares owned by the three largest shareholders as reported in the Aspekt database. [10] Ownership is not reported for all firms in the database and restricts the sample size to 290, approximately half of the full sample.

In addition to ownership concentration, the type of owner is also important. The continued presence of government ownership sends a positive signal (Perotti, 1995), but government control or influence may prohibit restructuring (Boycko et al., 1996). The greater the percentage of shares privatized the greater the government commitment to privatization, especially when the government gives up majority ownership. The variable PctPrvt is the percentage of the firm privatized. We expect a positive relationship between PctPrvt and efficiency and profitability measures. The presence of foreign owners should help restructure the firm. Foreign owners encourage exposure of newly privatized firms to foreign markets, technology and managerial expertise. Newly privatized firms that have a foreign influence (as reported by Aspekt) should perform better following privatization than other privatized firms. Foreign ownership is a dummy variable equal to one if Aspekt reports a foreign owner, zero otherwise.

The amount of debt should influence changes in privatized firms. Debtholders serve as another monitor of the firm, but in the case of the Czech economy, the effect on firms is uncertain. Most of the debt in the communist system was soft debt, but as firms were privatized, the debt may become a hard constraint. Furthermore, Mertlik (1997) documents banks' ownership of IPFs, which in turn owned the firms who are indebted to the banks. This type of circular, cross-ownership claim distorts expected agency relationships and the effectiveness of ownership. The debt ratio is included as a control variable in the regression.

The last set of variables included in the full regression model are firm-specific performance measures to explain the effect of changes in the efficiency and profitability ratios and the changes in employment and sales. Past profitability, as measured by pre-privatization return on sales, should have a direct effect on employment. The more profitable the firm, the less need for employment cutbacks. It should also affect sales levels. If a firm is profitable, that indicates that its products are competitive and it should be able to expand its market share (growth opportunities). Changes in employment should have a

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[10] Other measures of ownership concentration were also used in the model to test the robustness of the results including the Herfindahl index used by Claessens et al. (1997) and a stepwise regression model used by Morck et al. (1988).

positive effect on efficiency ratios by the indirect construction of the ratio if real sales and income remain constant. A decrease in employment would also reduce production workforce and sales staff, potentially decreasing sales. Finally, it has been hypothesized in this paper that a decrease in sales would decrease the amount of income, which would affect profitability, especially ROA since there is an increase in the level of total assets for the sample. We include the change in real sales as an explanatory variable for changes in profitability measures. The general model for the expanded regressions is

$$PM_i = \alpha_0 + \beta_1 \text{Size} + \beta_2 \text{Debt} + \beta_3 \text{Ownership} + \beta_4 \text{Pct Pr vt}$$
$$+ \beta_5 \text{Foreign} + \beta_6 \text{First} + \beta_7 \text{Pr ague} + \beta_8 \text{Service}$$
$$+ \beta_9 \text{Strategic} + \beta_{10} \text{Utility} + \beta_j PM_j + \varepsilon_i \qquad (2)$$

where size, industry and first variables are defined as above, ownership is the ownership concentration of the three largest owners, PctPrvt is the percentage privatized in the wave, foreign is a dummy variable for foreign influence, and PM_j is the firm-specific performance measure j.

Table 9 reports the results of the regressions for the full model. As in the reduced model, firms privatized in the first wave did not perform as well following privatization as firms privatized in the second wave as can be seen by the significant negative coefficients for the models. This again points to the differences in the structural conditions in the economy and government that existed between the two waves. For changes in employment, size and percentage privatized are negative and significant as expected. Also as expected, pre-privatization profitability has a significant positive effect on employment changes. The more profitable the firm, the less need to reduce workers.

An unexpected finding is revealed in the expanded regression model. The amount of ownership and debt do not significantly affect changes in the firm following privatization. This is not consistent with the findings of earlier Czech studies which find monitoring by the new owners or by creditors has a positive impact on firm value. However, our results are consistent with Pistor and Spicer's (1997) that IPF ownership does not promote restructuring. The cross-ownership and interlocking claims of the new owners causes a significant agency problem. An example of this would be of a firm that is bankrupt or has stopped debt repayments. Banks would have an incentive to force the firm to liquidate and collect proceeds from the sale of assets. However, if a bank does enforce payment or liquidation, the IPFs (which the banks own and control) would lose equity claims and lose value. Therefore, as described by Mertlik (1997), Czech banks have an incentive to keep bankrupt firms alive so that at some point in the future it may collect on its equity claims no matter how remote the possibility may be.

Table 9
Estimates of Eq. (2), sources of changes following privatization for the performance measures, full model, t-statistics are reported in parentheses ($n = 290$)

	ΔEmp	ΔSE	ΔNIE	ΔROS	ΔROA	ΔRS
Intercept	0.271	1.323	2.864	3.954	6.053	1.319
	(2.353)**	(2.089)**	(0.342)	(0.624)	(1.123)	(3.077)***
Size	−0.019	−0.077	0.304	−0.094	−0.114	−0.099
	(−1.998)**	(−1.200)	(0.374)	(−0.168)	(−0.239)	(−2.679)***
Debt	0.033	0.756	−2.814	−2.482	−3.242	0.373
	(0.579)	(1.474)	(−1.077)	(−1.391)	(−1.837)*	(1.624)
Ownership	−0.001	0.001	−0.001	0.001	0.002	−0.001
	(−2.865)***	(0.791)	(−0.610)	(0.404)	(0.220)	(−1.375)
PctPrvt.	−0.002	−0.008	−0.005	0.017	−0.011	−0.002
	(−3.477)***	(−1.119)	(−0.289)	(0.855)	(−0.804)	(−0.992)
Foreign inf.	−0.031	0.484	1.396	−0.680	−0.420	0.298
	(−0.915)	(1.307)	(0.652)	(−0.683)	(−0.645)	(2.509)**
First wave	−0.195	−0.672	−4.467	−4.889	−3.152	−0.256
	(−7.903)***	(−1.943)*	(−3.089)***	(−4.333)***	(−4.157)***	(−2.868)***
Prague	−0.069	−0.208	0.453	−0.418	−0.052	0.016
	(−2.140)**	(−0.784)	(0.377)	(−0.473)	(−0.069)	(0.156)
Service	−0.031	0.094	0.316	0.243	−0.213	0.133
	(−1.102)	(0.415)	(0.323)	(0.309)	(−0.316)	(0.968)
Strategic	−0.055	−0.016	−1.814	2.478	1.032	−0.073
	(−2.045)**	(−0.129)	(−0.527)	(1.177)	(0.733)	(−1.071)
Utility	0.062	0.594	−1.158	1.467	−0.726	0.630
	(0.991)	(1.524)	(−0.492)	(0.923)	(−0.577)	(1.852)*
Pre-ROS	0.254					0.134
	(3.230)***					(0.442)
Emp. chg.		−2.493	7.837			0.619
		(−1.790)*	(1.288)			(3.792)***
RS chg.				0.828	0.973	
				(0.966)	(2.097)**	
Adj R^2	0.297	0.104	0.003	0.036	0.049	0.228

*** Significant at the 0.01 level.
** Significant at the 0.05 level.
* Significant at the 0.10 level.

6. Summary and conclusions

The Czech Republic's privatization program required a large number of firms to be privatized at the same time to a large number of domestic investors. While previous studies of the changes in performance of newly privatized firms overwhelmingly find that performance increases following privatization, these studies did not include mass privatizations in the transitional economies of Eastern Europe. Because of the large number of firms privatized within a short time frame, results from these countries may not be entirely consistent with the previous findings. Using a sample of 554 privatizations of 453 Czech firms

privatized through voucher privatization in the first two waves and nonparametric methodology used in earlier studies, we find that while there is improvement in some areas of performance following privatization, there is an expected significant decrease in employment following privatization as well as a decrease in real sales (output). This is in contrast to the increases in these measures following privatization in the earlier studies.

Furthermore, we find that the most important factor in determining a firm's performance following privatization is in which wave the firm was privatized. First wave firms fared much worse than second wave firms. The surrounding political and economic situation in each wave is a potential explanation for these findings, as well as an "implicit seasoning" of firms involved in the second wave. We also find that industry and size also are important in determining the firm's success following privatization. Cross-sectional regression results confirm the importance of the privatization wave in performance. An expanded model finds little or no support for ownership concentration and debt monitoring as an effective agent for improving performance following privatization. This study reveals the importance of an economic and political infrastructure as a prerequisite for the success of a privatization program. In the transitional setting of the CR, firms experienced less gains in the beginning of the privatization program than firms privatized later. While there are many examples of successful privatizations in developing countries the more stable and developed the financial and economic markets the greater the benefits that will accrue as a result of privatization.

These results have direct application to other countries that have used vouchers in their privatization process. The most interesting comparison would be to the Polish privatization experience. In Poland, vouchers represented ownership in predetermined investment funds that consisted of all the firms in the market. In essence, the vouchers represented the entire market of privatized firms. In addition, each of the funds had significantly more control over a set of firms that were assigned to it. Given the results from this study two areas and questions would be interesting when looking at other voucher privatization programs. First, does investment fund ownership structure help firms restructure and does managerial talent and the investment fund level differ across the funds? Finally, do firms privatized through vouchers in Poland (and other countries) have similar experiences?

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References

Aggarwal, R., Harper, J.T., 2000. Equity valuation in the Czech voucher privatization auction. Financial Management 29, 77–100.

Barberis, N., Boycko, M., Shleifer, A., Tsukanova, N., 1996. How does privatization work? Evidence from the Russian shops. Journal of Political Economy 104, 764–790.

Bishop, M.R., Kay, J.A., 1989. Privatization in the United Kingdom: Lessons from experience. World Development 17, 643–657.

Boubakri, N., Cosset, J.-C., 1998. The financial and operating performance of newly privatized firms: Evidence from developing countries. Journal of Finance 53, 1081–1110.

Boardman, A., Vining, A.R., 1989. Ownership and performance in competitive environments: A comparison of the performance of private, mixed, and state-owned enterprises. Journal of Law and Economics 32, 1–33.

Boycko, M., Shleifer, A., Vishny, R., 1994. Voucher privatization. Journal of Financial Economics 35, 249–266.

Boycko, M., Shleifer, A., Vishny, R., 1996. A theory of privatisation. The Economic Journal 106, 309–319.

Claessens, S., 1997. Corporate governance and equity prices: Evidence from the Czech and Slovak Republics. Journal of Finance 52, 1641–1658.

Claessens, S., Djankov, S., Pohl, G., 1997. Ownership and corporate governance: Evidence from the Czech Republic. Working Paper 1737, World Bank, Washington, DC.

Demsetz, H., Lehn, K., 1985. The structure of corporate ownership: Causes and consequences. Journal of Political Economy 93, 1155–1177.

Dewenter, K.L., Malatesta, P.H., 1997. Public offerings of state-owned and privately-owned enterprises: An international comparison. Journal of Finance 52, 1659–1679.

Dewenter, K.L., Malatesta, P.H., 2001. State-owned and privately-owned firms: An empirical analysis of profitability, leverage, and labor intensity. American Economic Review 91, 320–334.

D'Souza, J., Megginson, W.L., 1999. The financial and operating performance of newly privatized firms in the 1990's. Journal of Finance 54, 1396–1438.

Dyck, I., Alexander, J., 1997. Privatization in eastern Germany: Management selection and economic transition. American Economic Review 87, 565–597.

Frank, R., 1997a. Czech's economic success loses edge. Wall Street Journal May 28, 1997, A12.

Frank, R., 1997b. Invisible hand. Wall Street Journal July 15, 1997 A1.

Harper, J.T., 2001. Short-term effects of privatization on operating performance in the Czech Republic. Journal of Financial Research 24, 119–131.

Harper, J.T., Krehbiel, T., 1999. An empirical investigation of the relationship between ownership structure and operating performance of newly privatized Czech firms. In: Hirschey, M., John, K., Makhija, A. (Eds.), Advances in Financial Economics, vol. 4. JAI Press, Stamford, CT, pp. 79–102.

Hingorani, A., Lehn, K., Makhija, A., 1997. Investor behavior in mass privatization: The case of the Czech voucher scheme. Journal of Financial Economics 44, 349–396.

Jones, S.L., Megginson, W.L., Nash, R.C., Netter, J.M., 1999. Share issue privatizations as financial means to political and economic ends. Journal of Financial Economics 46, 217–253.

Kortba, J., 1995. Privatization process in the Czech Republic: Players and winners. In: Svejnar, J. (Ed.), The Czech Republic and Economic Transition in Eastern Europe. Academic Press, San Diego, CA, pp. 159–198.

La Porta, R., Lopez-de-Silanes, F., 1997. The benefits of privatization: Evidence from Mexico, Private Sector World Bank Note 117.

Lipton, D., Sachs, J., 1990. Privatization in eastern Europe: The case of Poland. Brookings Papers on Economic Activity 2 (1990), 293–341.

Manzetti, L., 1994. The politics of privatization and deregulation in Latin America. Quarterly Review of Economics and Finance 34, 43–76.

McConnell, J.J., Servaes, H., 1990. Equity ownership and corporate value. Journal of Financial Economics 27, 593–613.

Megginson, W.L., Netter, J.M., 2000. From state to market: A survey of empirical studies on privatization. Working Paper, University of Oklahoma.

Megginson, W.L., Nash, R.C., Netter, J.M., Poulsen, A.B., 2000a. The choice of privatization method: An empirical analysis. Working Paper, University of Georgia.

Meggginson, W.L., Nash, R.C., Netter, J.M., Schwartz, A.L., 2000b. The long-run return to investors in share issue privatizations. Financial Management.

Megginson, W.L., Nash, R.C., van Randenborgh, M., 1994. The financial and operating performance of newly privatized firms: An international empirical analysis. Journal of Finance 49, 403–452.

Mertlik, P., 1997. Czech privatization: From public ownership to private ownership in five years. Eastern European Economics 35, 64–83.

Morck, R., Shleifer, A., Vishny, R.W., 1988. Management ownership and market valuation: An empirical analysis. Journal of Financial Economics 20, 293–315.

Perotti, E., 1995. Credible privatization. American Economic Review 85, 847–859.

Perotti, E., Guney, S., 1993. Successful privatization plans. Financial Management 22, 84–98.

Pistor, K., Spicer, A., 1997. Investment funds in mass privatization: Lessons from Russia and the Czech Republic. Private Sector, World Bank Note 110.

Pohl, G., Anderson, R.E., Claessens, S., Djankov, S., 1997. Privatizing and restructuring in Central and Eastern Europe: Evidence and policy options. World Bank Technical Paper, 368.

Shleifer, A., Vishny, R.W., 1986. Large shareholders and corporate control. Journal of Political Economy 94, 461–488.

White, H., 1980. A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. Econometrica 48, 817–838.