Priorities and Sequencing in Privatization: Theory and Evidence from the Czech Republic

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Theory and Evidence from the Czech Republic

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While privatization of state-owned enterprises has been one of the most important aspects of economic transition from a centrally planned to a market system, no transition economy has privatized all its firms simultaneously. This raises the issue of whether governments strategically privatize firms. In this paper we examine theoretically and empirically the determinants of the sequencing of privatization. First, we develop new and adapt existing theoretical models in order to obtain testable predictions about factors that may affect the sequencing of privatization. In doing so, we characterize potentially competing government objectives as (i) maximizing sales revenue from privatization or public goodwill from transferring shares of firms to voters, (ii) increasing economic efficiency, and (iii) reducing political costs due to layoffs. Next, we use an enterprise-level data set from the Czech Republic to test the competing theoretical predictions about which firm characteristics affect the sequencing of privatization. We find strong evidence that more profitable firms were sold first. This suggests that the government sequenced the sale of firms in a way that is consistent with our theories of sale revenue maximization and/or maximizing public goodwill from subsidized share transfers to citizens. Our results are also consistent with Shleifer and Vishny's (1994) prescription for increasing efficiency when there are political costs to employment losses caused by privatization. We also find that the Glaeser-Scheinkman (1996) recommendations for increasing efficiency by privatizing first firms subject to large informational shocks are consistent with our results. Finally, our findings are inconsistent with the government pursuing a static Pareto efficiency objective. In addition to enhancing the general understanding of privatization, our evidence suggests that many empirical studies of the effects of privatization on firm performance may suffer from selection bias since privatized firms are likely to have observable and unobservable characteristics that make them more profitable than firms that remain under state ownership.

Keywords: Privatization, government priorities, auctions, revenue maximization, probit analysis, selection bias.

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1. Introduction

While privatization of state-owned enterprises (SOEs) has been one of the most important aspects of economic transition from a centrally planned to a market system, no transition economy has privatized all of its SOEs simultaneously. Even in countries such as the Czech Republic, Estonia, Russia, and the Ukraine that strove to privatize their SOEs rapidly, the privatization process consisted of a sequence of moves, with some firms being privatized earlier than others. The lack of simultaneous privatization of all SOEs raises the issue of whether governments strategically sequence privatization. An answer to this question is important for understanding the behavior of governments and firms in the transition economies and for establishing whether empirical studies of the effects of privatization need to take into account the potential selection bias brought about by strategic sequencing. This question is also relevant for countries such as India, China, and Mexico that have large state sectors and are currently pursuing privatization.

This is the first study in the literature that examines both theoretically and empirically how competing government objectives may give rise to different privatization strategies.[1] To obtain testable predictions about which factors affect the sequencing of privatization, we develop new, and adapt existing, theoretical models of sequencing strategies for the following government objectives: (i) maximizing sales revenue from privatization and/or public goodwill from transferring shares of firms to voters, (ii) increasing economic efficiency, and (iii) reducing political costs due to layoffs. Regarding the maximization of privatization revenues,[2] we show that it is a reasonable strategy for a government pursuing this objective to

[1] For a recent comprehensive survey of the entire transition literature, see Roland (2000).
[2] This was, for instance, an important objective in heavily indebted Hungary. It also appears to have been an

privatize more profitable firms first. The same outcome will arise if the government's objective is to generate public goodwill from free or subsidized transfers of shares of firms to citizens.[3] Regarding efficiency, one strategy is to privatize inefficient firms first so as to induce major restructuring and improvement in enterprise performance.[4] Assuming that private firms are more efficient in responding to information, the government may also want to privatize firms in industries that face the greatest uncertainty in terms of demand and cost shocks (Glaeser and Scheinkman, 1996). Finally, the government may be concerned about losing voter support due to layoffs brought about by restructuring of privatized firms. In this context Shleifer and Vishny (1994) argue that the interaction between efficiency and political concerns may lead the government to privatize more profitable firms first. We in turn develop a political cost model in which profitable firms are likely to have fewer layoffs, implying that a government concerned with unemployment will prefer to privatize these firms first.

Using firm-level data from the Czech Republic to test which of these above objectives were pursued by a government that carried out one of the most extensive mass privatization programs, we find strong evidence that the Czech government privatized more profitable firms first. This outcome is consistent with the government placing priority on maximizing privatization revenues and public goodwill, as well as on minimizing political costs of unemployment. Testing between these theories, we find that labor market conditions were not an important determinant of privatization, allowing us to rule out the hypothesis that political costs of unemployment were an important priority for the Czech government. This last result

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important factor in determining privatization outcomes in India.

[3] Transfers of shares were, for instance, undertaken in voucher programs in the Czech Republic, Estonia, Kazakhstan, Russia, Slovakia, Slovenia, and Ukraine.

[4] The strategy of privatizing the inefficient firms first may also lead to a reduction of the subsidy burden and hence have a positive effect on the budget.

is not altogether surprising in view of the strikingly low unemployment rate in this economy.[5] We also find that the privatization process was consistent with the Glaeser and Scheinkman (1996) definition of efficiency -- firms likely to be more responsive to changes in demand conditions were privatized first. Our empirical results are also consistent with Shleifer and Vishny's (1994) argument that groups within and outside the government favoring efficiency will advocate privatization of profitable firms first because this will enable the government to stop the flow of subsidies to these firms. These conclusions provide insight into privatization strategies that may be adopted when different, sometimes competing, objectives are pursued by the government.

Our results have important implications for studies evaluating the effect of privatization on firm performance. A number of such studies measure gains from privatization by comparing the performance of privatized firms to those firms still in the public sector.[6] However, such comparisons are only valid if firms are randomly chosen for privatization. For example, if the government selectively privatizes better firms (as our results suggest), it would not be surprising to see these privatized firms perform better than firms that remain public, even if privatization has no effect on firm performance. Thus our results suggest that it is necessary to investigate the possibility of selection bias in such an evaluation. A similar statistical problem arises in studies examining the effect on firm performance of the length of time since privatization. Our result that more profitable firms are likely to be privatized early

[5] In the first half of the 1990s the unemployment rate in the Czech Republic remained low (3-4%) and stable relative to other Central European economies. Our results refer to labor market conditions just before the large scale privatization program began and thus do not reflect the effect of this program. However, if the Czechoslovakia government was always concerned about the political costs of unemployment, and the low unemployment rate before privatization reflects this concern, then we will not be able to find a significant effect of labor market conditions.

implies that unobserved firm characteristics that make the firms more profitable may be correlated with the length of time the firm has been privatized.

A few studies have considered selection bias in privatization. For example, LaPorta and Lopez de Silanes (1997) address this problem by using SOEs in the same sector as a comparison group, but this method does not account for selection biases due to firm-specific characteristics. In their analysis of the restructuring of Russian shops after privatization, Barberis, Boycko, Shleifer, and Tsukanova (1996) allow for the possibility that the new ownership structure is endogenous, but they assume that privatization is exogenous.[7] Frydman, Gray, Hessel, and Rapaczynski (1999) estimate the effects of privatization on performance and control for selectivity in privatization using fixed effects methods. This approach provides unbiased estimates if the selection effect is time invariant, while time changing selection effects can be controlled by combining our modeling approach with Heckman (1979).[8] Both the fixed effects approach of Frydman et al. (1999) and our approach (combined with Heckman, 1979) have advantages and disadvantages and thus may be viewed as complementary.[9]

Our paper is organized as follows. In Section 2 we describe the testable predictions of models where the government is concerned with each of the following objectives: maximizing privatization revenues and/or public goodwill from subsidized share transfers, increasing efficiency, and minimizing political costs of unemployment. To investigate sales revenue

[6] For an earlier survey see Vining and Boardman (1992). Studies investigating the effects of privatization include Galal et al. (1994), Estrin (1994), Kikeri et al. (1994), Megginson et al. (1994), Gordon and Li (1995), Boubakri and Cosset (1997), Claessens and Djankov (1999), Gray and Holle (1997), and Djankov and Pohl (1998).

[7] To see this, note that (i) in choosing their sample they stratify on privatization status and (ii) they later analyze only privatized firms without correcting for selection bias.

[8] Frydman et al. (1999) also consider time changing factors, but assume that the timing of privatization, conditional on being chosen for privatization, is exogenous.

[9] See Heckman and Robb (1985), pages 218 and 236 for example.

maximization, we use a model with asymmetric information that generates predictions about the sequencing of privatization, hereafter the GHS1 model. We discuss next the decision of a government maximizing public goodwill from free transfers of shares to the public, hereafter the GHS2 model. In the following subsections we describe two efficiency theories: a model of privatization sequencing aimed at maximizing static efficiency, hereafter the GHS3 model, and Glaeser and Scheinkman's (1996) model of optimal sequencing, hereafter the GS model. Finally, we consider two political cost theories: first, Shleifer and Vishny's (1994) model of the impact of privatization on restructuring, hereafter the SV model, and then a model that analyzes the effect of firm characteristics on layoffs after privatization, hereafter the GHS4 model. In Section 3 we discuss the institutional framework for the privatization process in the Czech Republic, focusing on the two waves of the large-scale privatization program. (This program was used to privatize virtually all medium-sized and large firms.) In Section 4 we use data on the population of medium-sized and large manufacturing firms in the Czech Republic to test the predictions of the theoretical models and investigate the priorities of the government. We conclude the paper in Section 5.

2. Theories of Privatization

2.1 Maximizing privatization revenues (GHS1)

We first develop a model of the maximization of privatization revenues based on asymmetric information between the government and buyers. We assume that the government

knows the true value or profitability of the firm, but buyers (external investors) do not.[10] Under the conditions of this model we find that there exists a unique pure strategy equilibrium in which the government sells the more profitable firm first.[11] Our model predicts that the probability of being privatized will be an increasing function of the profitability of the firm.

We use a two-period setting with two firms A and B, many buyers and one seller. The firms' profit is given by $\theta_{A,B} \in \Theta = \{\underline{\theta}, \bar{\theta}\}$, where θ can take on either of the two values with $\bar{\theta} > \underline{\theta}$. The two firms can be of the same type or of different types, where the type of the firm is denoted by its profit. While the government observes the profitability of the firms, the buyers do not. The government's objective is to maximize privatization revenues. We assume that all buyers have the same information about the distribution of types of the firms. To simplify issues we assume that different groups of buyers bid in each period, although second period buyers observe the quality of the first period firm. Since there is uncertainty about firm type, the value of the firm to all buyers is given by the expected profits from the firm.[12] Hence, the government is able to extract all the rents from the informational asymmetry, and obtain a price from the sale that is equal to the expected value of the firm.[13]

The timing of the game is as follows: the types (profits) of the firms are assigned, θ_A, θ_B where $\theta_i \in \{\underline{\theta}, \bar{\theta}\}, i = A, B;$ the government observes the types and picks firm A or firm

[10] This assumption is applicable to most centrally planned economies since managers of SOEs usually report directly to the relevant government ministry. Note that the empirical implication of this assumption is that firms being chosen for privatization may have characteristics that are unobservable to buyers, but are correlated with the value or profitability of the firms. Since these characteristics are also likely to be unobservable to researchers, the model predicts the selection bias problem for evaluating the effect of privatization raised in the introduction.

[11] See Gupta (2000) for a general treatment of this topic.

[12] This represents a common value auction since we assume that the value of the firm is the same for all buyers.

[13] Using a second price auction framework, Gupta (2000) shows that the equilibrium result below will hold even if buyers have some private information about the value of the firms.

B to be sold in the first period, and the firm is sold at a price equal to its expected value; in the second period, buyers observe the type of the first firm and then bid for the second firm.

Let A be the firm being sold first and B the firm sold in the second period. We specify the following probability distribution for the firms' profits:

$p(\theta_A = \bar{\theta}, \theta_B = \bar{\theta}) = p(\theta_A = \underline{\theta}, \theta_B = \underline{\theta}) = \alpha$, and $p(\theta_A = \bar{\theta}, \theta_B = \underline{\theta}) = p(\theta_A = \underline{\theta}, \theta_B = \bar{\theta}) = \beta$, where $\alpha, \beta \in (0,1)$.

Next, we calculate the prices offered for each firm under the two sets of beliefs of the buyers regarding the sequence in which the firms will be sold by the government.

(a) Buyers believe that the government will sell the better firm first.

The first period price (price offered for the firm sold in the first period) is the expected value of the firm given buyers' beliefs and is equal to

$$E(\theta_A \mid \theta_A \geq \theta_B) = p_1 = \frac{\bar{\theta}(\alpha + 2\beta) + \underline{\theta}\alpha}{2(\alpha + \beta)}. \qquad (2.1.1)$$

In the second period buyers will observe the quality of the first firm. Correspondingly, the second period price (the price for the second firm) conditional on the value of the first firm A, is given by

$$p_2 = \begin{cases} \dfrac{\bar{\theta}\alpha + 2\beta\underline{\theta}}{\alpha + 2\beta} \text{ if the buyer observes } \theta_A = \bar{\theta} \\ \underline{\theta} \text{ if the buyer observes } \theta_A = \underline{\theta}. \end{cases} \qquad (2.1.2)$$

We use these prices to check whether it is an equilibrium strategy for the government to sell the better firm first under these buyer beliefs.

Under these buyer beliefs, the respective payoffs in present value over both periods to the government from i) selling the better firm first or ii) deviating and selling the worse firm first, are given by

$$V^S = \begin{cases} p_1 + \delta\left(\dfrac{\bar{\theta}\alpha + 2\beta\underline{\theta}}{\alpha + 2\beta}\right) \textit{if it follows and sells the good firm first} \\ p_1 + \delta\underline{\theta} \textit{ if it deviates and sells the bad firm first}, \end{cases} \tag{2.1.3}$$

where $\delta \leq 1$ is the discount rate. As can be seen from the above expression, the payoff from selling the good firm first is greater than the payoff from deviating; hence the optimal strategy for the government, given that the buyers believe that it will sell the best firm first, is to follow. To see the intuition behind this result suppose that the buyers believe that the government will lead with the better firm, and the government deviates and sells the worse firm first instead. Given their beliefs, the buyers in the second period will then observe the low quality of the first firm and conclude that the second firm is of equal or lower quality. As a result, the second period price will be lower than if the government had kept to the strategy of selling the better firm first. Thus, when the buyers believe that the better firm will be sold first, it is an equilibrium strategy for the government to lead with the best firm. Next we show that this argument does not extend to the case where buyers believe that the government will sell the worst firm first.

(b) Buyers believe that the government will sell the worse firm first.

As in the previous case, the first period price is the expected value of the firm given buyers' beliefs and is equal to

$$E(\theta_A \mid \theta_A \leq \theta_B) = p_1 = \frac{\bar{\theta}\alpha + (\alpha + 2\beta)\underline{\theta}}{2(\alpha + \beta)}. \tag{2.1.4}$$

The second period price depends on the realization of θ_A (the observed value of the first period firm) and is given by

$$p_2 = \begin{cases} \bar{\theta} \text{ if the bidder observes } \theta_A = \bar{\theta} \\ \dfrac{2\beta\bar{\theta} + \alpha\underline{\theta}}{\alpha + 2\beta} \text{ if the bidder observes } \theta_A = \underline{\theta}. \end{cases} \tag{2.1.5}$$

If the buyers believe the government will sell the worse firm first, then the respective payoffs to the government from the two strategies are given by

$$V^S = \begin{cases} p_1 + \delta\left(\dfrac{2\beta\bar{\theta} + \alpha\underline{\theta}}{\alpha + 2\beta}\right) \text{if it follows and sells the bad firm first} \\ p_1 + \delta\bar{\theta} \text{ if it deviates and sells the good firm first}. \end{cases} \tag{2.1.6}$$

As can be seen from equation (2.1.6), the payoff from deviating is higher than the payoff from following and the government will always choose to deviate when the buyers believe that it will sell the worst firm first. Hence, it cannot be an equilibrium for the buyers to believe that the government will sell the best firm last. The intuition behind this result is similar to that of the previous case. Suppose that buyers believe that the government will lead with the worst firm, and instead the government deviates and sells the better firm first. In the second period, buyers observe the quality of the first firm and conclude that the second firm is of even higher quality. Second period buyers pay a higher price than they would if the government had sold the worse firm first; hence, under these buyer beliefs it is always better for the government to deviate. Thus the pure strategy equilibrium in this model is for the government to lead with the more profitable firm.

In our empirical work we use several measures of firm profitability to test whether the government in the Czech Republic privatized more profitable firms first, as predicted by this revenue maximization model. The predictions of this model and the other government

objectives discussed below are summarized in Table 1 in Section 4. Next we discuss the government's objectives when shares of firms are transferred at a highly subsidized rate to citizens, as has occurred in many transition economies.

2.2 Maximizing public goodwill (GHS2)

In this section we focus on the voucher privatization method undertaken, for example, in the Czech Republic, Kazakhstan, Lithuania, Russia, Slovakia, Slovenia, Ukraine and other transition economies, where highly subsidized shares of firms were transferred to all or a subset of interested citizens. In the Czech Republic the great majority of larger firms were privatized under the voucher program. Under this program a portion of the firms' shares (approximately 45%) were distributed to citizens at a highly subsidized rate. A similar fraction of the remaining shares were sold at market prices, with the residual shares (between 10-15%) often being retained by the government. While our revenue maximization model suggests that the government would want to sell the best firms first if it focused on the fraction of shares sold at market prices, it is likely that the government will also be concerned about the public's reaction to the subsidized shares. It is thus reasonable to assume that a government undertaking voucher privatization will be concerned about public support for the transition in general, and for the government itself in particular. As a result, we conjecture that voters prefer to acquire shares in profitable firms and that the government could maximize support for itself and the transition by privatizing the better firms first. The extent to which the government cares about voter support will then determine whether it sequences the sale of firms to maximize public goodwill.

An interesting question that arises is how the government would behave if it were liquidity constrained and faced a hard budget constraint. If the government privatized firms simply by selling all their shares at market prices, it could maximize its short term revenue by selling the best firms first. In particular, if the market price reflects the present discounted value of current and future profits, the government can gain access to the expected future profits of the best firms by selling them in the current period. In other words, profitable firms can be sold at high prices that in the short-run more than offset a loss of current revenues to the government. On the other hand, if the government privatized all shares of firms by transferring them to the public at greatly reduced prices, privatizing the worst firms first would best ease the government's liquidity problems. Since the program we are examining is a combination of transferring a fraction of shares at reduced prices and selling another fraction at market prices, we conclude that the effect of a hard budget constraint in the Czech case is a priori indeterminate.

Since a privatizing government may also be concerned with economic efficiency, we next discuss the outcomes that should be observed if the government places a priority on increasing static Pareto efficiency.

2.3 Maximizing static Pareto efficiency (GHS3)

The centrally planned system strove to generate full employment in the economy. Moreover, firms were heavily penalized for under-fulfilling the plan but virtually not at all for hoarding excess labor. As a result, SOEs operating under central planning were generally viewed as operating with surplus labor in the sense that the removal of some workers would not, on average, reduce output. Since surplus workers could make a positive contribution to profits elsewhere in the economy, a natural strategy for achieving greater efficiency from both

the private (profit maximizing) and social (GDP maximizing) standpoints would be to privatize first firms in which the wage rate greatly exceeds the marginal product of labor.[14] Since these firms are likely to have the most surplus labor, they will realize the greatest efficiency gains for themselves and for the economy by being privatized.[15] An empirical prediction in this context is that firms in which there is a large gap between the wage and the marginal product of labor should be privatized earlier.

In our data set we observe the average and not the marginal product of labor in each firm. Since the two productivities are positively correlated, and in the class of production functions such as Cobb-Douglas they are proportional to one another, we use the difference between the average product of labor and the average wage in each firm as a proxy variable in testing whether the above mentioned static inefficiency has guided the sequencing of privatization.

2.4 Maximizing efficiency through informational gains of privatization (GS)

Glaeser and Scheinkman (GS) have been the only authors to address directly the issue of sequencing the sale of firms and industries to improve economic efficiency.[16] In their model, privatization increases efficiency by increasing the firms' acquisition of, and responsiveness to, information. In this context, GS make specific inter- and intra-industry

[14] In the context of efficiency, Lau, Qian, and Roland (2000) discuss China's dual-track approach, which incorporates market liberalization and continued enforcement of the existing plan, as a means of achieving pareto-improving efficiency. The dual track approach would have been difficult to implement in the transition economies of Eastern Europe and the former Soviet Union for a number of reasons: first, retaining a command economy may not have been feasible in the post-Communist political climate; second, governments would not have been able to guarantee enforcement of this approach given the collapse of product and input markets which followed the disintegration of the Soviet system.

[15] Kikeri, Nellis, and Shirley (1992) also argue that from the viewpoint of restructuring, the worst firms are the best candidates for early privatization.

[16] As we discuss below, Shleifer and Vishny's (1994) model also provides an indirect recommendation for

predictions regarding which firms and industries are likely to benefit the most from early privatization. The authors assume that while cost and demand shocks are unobserved or ignored by the government, private firms observe the true level of demand and cost.[17] In their model, a state-owned enterprise produces a fixed level of output based on the expected value of demand and cost, while private owners observe the true values and adjust their production when demand and cost conditions change. Thus the primary advantage of private ownership is greater responsiveness to information, and the GS model predicts that privatization should begin where demand or cost volatility is the greatest.

GS compare upstream firms to downstream firms within an industry, as well as downstream industries to upstream industries. They find that when demand uncertainty dominates cost uncertainty, downstream industries should be privatized before upstream industries.[18] In an industry with a private retail sector, they find that privatization downstream dominates privatization upstream when the two sectors are similar in size and cost volatility. GS also note that the informational gains from privatization may be offset by a loss of consumer surplus if firms with significant market power are privatized and allowed to engage in monopoly pricing.[19] For the purpose of our analysis their model suggests that firms in downstream industries, firms facing demand or cost volatility, and firms with low monopoly power are the best candidates for privatization.

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increasing efficiency by the choice of firms to be privatized.

[17] It may not be necessary to assume that the government ignores these shocks as long as private firms observe these shocks with greater accuracy than the government.

[18] This prediction is not straightforward when the industry is both upstream and faces high levels of demand and cost volatility. However, due to the collapse of the Soviet-era common markets, demand volatility is considered to be the main source of uncertainty confronting firms in the former transition economies.

[19] There is a large body of literature which investigates the issue of whether monopolies create inefficiencies; see for example Demsetz and Lehn (1985).

In the empirical section we test whether downstream industries and industries which were subjected to the greatest demand shocks were privatized first. We also test if the market share of a firm affects the probability of it being privatized early, both as a test of this theory and of the revenue maximization hypothesis. In the revenue maximization hypothesis however, firms with high market share should be privatized first since this variable may also act as a proxy for profitability. Thus the market share variable also allows us to compare the relative priority placed on revenue versus efficiency objectives.

Finally, governments considering privatization in economies with large public sectors may be concerned about the fate of the surplus workers generally present in most public firms. Below we discuss how the government's concerns about unemployment may affect the type of firms selected for early privatization.

2.5 Increasing allocative efficiency in a bargaining model (SV)

Shleifer and Vishny (SV) use a bargaining model to analyze the role of managers and politicians in determining whether privatization improves efficiency in terms of resource allocation. Their work also has implications for the sequencing of privatization. SV assume that the government is concerned with employment and makes transfers to firms in the form of subsidies in exchange for the firm retaining surplus labor. The authors find that privatization does not affect resource allocation unless there are restrictions on subsidies. However, they assume that subsidies continue to be provided to unprofitable but not profitable firms after privatization and show that profitable firms are more likely to lay off surplus workers after privatization. In this context SV (p. 1023) argue that "...potentially profitable

firms are the best candidates for privatization, since they refuse to dissipate their profits on excess employment, whereas the hopeless firms continue getting subsidized." Thus an implication of the SV model is that more profitable firms are the best candidates for early privatization in terms of improving allocative efficiency and minimizing the political cost of unemployment.[20]

2.6 Minimizing political cost (GHS4)

In this section we develop an alternative model to SV to investigate the effect of firm characteristics on post-privatization layoffs. We assume that the government is concerned about political costs brought about by layoffs and rising unemployment after privatization, and that state-owned enterprises are subsidized in such a way that their level of employment is higher than the efficient employment level. In particular, we assume that the government subsidizes public firms by paying part of the wage rate for each firm (i.e., the firms effectively face a below market wage rate). The subsidized wage rate is assumed to be determined by the government's revenue constraint and by what would normally be a market-clearing wage. Hence profit maximizing state-owned firms choose a higher level of employment at the subsidized wage than they would at the market-clearing wage.

Consistent with the perceived experience of most Central European economies that have imposed tighter budget constraints during the reform process, we make the simplifying assumption that after privatization subsidies stop so that firms face the market wage rate. However our results would continue to hold even if the government continues to subsidize

[20] As SV point out, this prediction is consistent with anecdotal evidence from Russia that potentially profitable firms are more likely to reorganize and lay off workers. Accordingly, the question arises as to how this outcome is actually achieved in their framework: it would appear necessary to include another internal or external

firms after privatization, so long as these subsidies are lower, and therefore firms face a higher wage rate, after privatization. Since firms pay the market wage after privatization, they lay off surplus labor. These layoffs in turn impose a political cost since rising unemployment can result in lost voter support for the government and its reform policies. The magnitude of these costs depends on the labor demand conditions in the economy: high unemployment rates at the regional or the industry levels reduce the number of jobs available to laid-off workers, which in turn implies higher political costs. In this context, we investigate (i) the equilibrium choice of employment before and after privatization in firms that face differing marginal product of labor conditions, and (ii) how differences in firm characteristics may affect the decisions of a government that wants to minimize layoffs.

Assume that the production function of a typical state-owned firm being considered for privatization is given by $F(L) = c_1 L - (\alpha L^2/2) + c_2$, $F' > 0$ and $F'' < 0$. Assume further that c_1 and c_2 are constant across firms, while $\alpha > 0$ (the slope of the marginal product of labor function) varies across firms.[21] Suppose further that before privatization all firms face the same subsidized wage rate given by w^s. We denote the market wage rate after privatization to be w^m where $0 < w^s < w^m$; the government subsidizes public firms by paying the difference between w^m and w^s. Normalizing product price to be equal to one, we write the profit function for a typical state-owned firm prior to privatization as:

$$\Pi = F(L) - w^s L, \qquad (2.6.1)$$

where L is the level of employment chosen by the state-owned firm before privatization. The profit function is maximized with respect to L.

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participant (e.g. the International Monetary Fund) in the model.

[21] We omit the firm subscript for expositional simplicity.

Totally differentiating the first order conditions with respect to w^s and L we obtain

$$dL / dw^s = F''(L)^{-1} = -1/\alpha < 0. \qquad (2.6.2)$$

Equation (2.6.2) indicates that if the wage rate rises, the decrease in employment will be greater for firms with flatter marginal product of labor curves, i.e. firms that face smaller values of α. Hence a government concerned with minimizing layoffs would prefer to privatize firms with steeper marginal product of labor curves (higher α's), since these firms are likely to lay off fewer workers after privatization. Below, we show that more profitable firms will have steeper marginal product of labor curves.

In order to investigate the impact of a firm's profitability on the level of layoffs, note that a profit maximizing state-owned firm will choose a level of employment L so that $F'(L) = w^s$. From the first order conditions for profit maximization it follows that the equilibrium levelof L chosen by this firm is given by

$$L^* = (c_1 - w^s) / \alpha . \qquad (2.6.3)$$

To investigate the effect on profits of a change in the slope, α, of the marginal product function, we write c_1 in terms of L^* and α, so $c_1 = w^s + \alpha L^*$. Substituting the parameters of the marginal product of labor function into the equilibrium profit function of the public firm yields

$$\Pi^* = F(L^*) - w^s L^* = \alpha (L^*)^2 / 2 + (w^s + \alpha L^*) L^* + c_2 - w^s. \qquad (2.6.4)$$

Examining the effect of a change in the slope of the marginal product function of labor on the equilibrium profit function of the firm we find that

$$d\Pi^* / d\alpha = 3/2 (L^*)^2 \geq 0. \qquad (2.6.5)$$

Thus firms with steeper marginal product of labor curves (higher α terms) are also the more profitable firms. Since, as shown in equation (2.6.2), firms with steeper marginal product of labor functions also lay off fewer workers, this implies that a government minimizing political costs due to post-privatization layoffs will prefer to privatize more profitable firms because they are likely to lay off fewer workers after privatization.

As mentioned earlier, the extent to which political costs affect the government's decision will depend on several factors, including the labor demand conditions facing laid-off workers. If the unemployment rate is low, then minimizing layoffs will not be an important objective for the government. In our empirical work we measure the importance of the political cost objective relative to other government priorities using a variable measuring labor demand conditions at the industry level, since information on the regional location of firms is unavailable in our data.

Before we proceed to the data and empirical analysis, we discuss briefly the salient characteristics of the Czech privatization process.

3. Background of the Czech Privatization Program[22]

In January 1990 the Czech Republic, as part of the former Czechoslovakia, started its transition to a market economy from a position of virtually total state ownership. In 1989 only 1.2% of the labor force and 2% of all registered assets belonged to the private sector, and in 1990 only 4% of the GDP was attributed to the private sector.[23] Yet by the end of 1994, approximately 80% of all assets had been privatized as a result of three main initiatives. First,

[22] See Kotrba (1995) for a detailed description of the privatization program.
[23] Dyba and Svejnar (1995).

between 1990 and 1991, shops, restaurants, housing, and other properties valued in total between 75 and 125 billion Czech crowns ($2.5 - $4.2 billion) were transferred to previous owners. Second, small firms in retail trade, catering and other services were privatized between 1991 and 1993, mostly through auctions. Property valued at about 30 billion Czech crowns ($1 billion) was privatized in this small-scale program.[24] Third, the most important method by which the bulk of state-owned enterprises were privatized was the large-scale privatization program, accounting for about 900 billion Czech crowns ($30 billion) in asset value. The large-scale privatization program occurred in two waves, with the first wave taking place between 1992 and 1993, and the second wave between 1993 and 1995. Virtually all medium and large enterprises were privatized in this program. Large-scale privatization generally involved the transfer of some shares at subsidized prices through vouchers[25] and selling other shares at market prices. In our empirical work we focus on which firms were privatized in the first wave of the large-scale privatization program, among those privatized in both waves. In the first wave, the privatization projects were approved at the end of April 1992, the bidding for shares allocated to vouchers took place between May and December 1992, and shares were made available to new owners at the end of May 1993 (Kotrba, 1995).[26]

4. Data, Specification and Empirical Results

[24] Czechoslovakia Statistical Bulletin, 1991-1992.
[25] For an early analysis of investor behavior in the voucher privatization program, see Hingorani, Lehn and Makhija (1997).
[26] In the second wave of the voucher privatization program, the projects were approved by the end of October 1993, the bidding for shares took place between April and October 1994, and shares were transferred to new owners starting in February 1995.

Our data initially contained quarterly and annual data on the population of all industrial firms with 25 or more workers, approximately 2500 firms. The data were reported by firms to the Czech Statistical Office and contain information from balance sheets and profit and loss statements. The reported variables include sales, production, employment, average wages, total wage expenditures, and 2-digit industry classification (NACE). Region identification is not available.

From this data we exclude approximately 750 firms that were privatized in the small-scale privatization program.[27] We also exclude about 250 cooperatives and 37 electric and water utility companies.[28] This leaves a sample of 1470 firms that went through the large-scale privatization program. For the purposes of our analysis, we need annual and first quarter 1992 values for sales, value of output, average wages, labor force, accounting profits, and industry classification for each firm. After deleting firms with missing values, we obtain our sample of 1121 firms. Of these firms, 664 were privatized in the first wave of the large-scale privatization process, while 457 were privatized in the second wave. Firms to be privatized in the first wave were chosen by the end of April, 1992,[29] although new owners could not take possession until the end of May of 1993.

We estimate probit equations where the dependent variable is coded one if a firm was privatized in the first wave and zero if it was privatized in the second wave. Our goal is to assess the predictions of the theories discussed in Section 2, and we choose our explanatory

[27] We considered including the small scale firms as privatized firms in our analysis, but examination of the data indicated that they were very different from the firms privatized in the large scale program.
[28] Cooperatives were not privatized in the large scale privatization program which is the focus of our analysis. Electric and water utilities were retained under state ownership and not considered for privatization throughout the privatization process.
[29] To be precise, we classify firms as privatized if they changed their legal registration from state-owned to joint stock company by the second quarter of 1992.

variables with this in mind.[30] Some of these variables refer to the firm's industry while others are specific to the firm. In order to ensure that the explanatory variables capture firm performance before the firms were turned over to new owners starting in the spring and summer of 1993, we use 1992 annual values for the firm-specific independent variables (we do not have data prior to the first quarter of 1992). There may be a potential endogeneity problem for some of the firm-specific explanatory variables if the values of these variables are affected by the knowledge of whether the firm will be privatized in the first wave. (As noted above, this information became available in May 1992.)[31] Note, however, that the values of these variables would not be affected by the future owners since the actual transfer of shares to new owners did not occur until May 1993 or later. Based on existing evidence we do not expect much restructuring to have occurred prior to privatization in 1992, and therefore do not anticipate this type of endogeneity in the data. However, to address this issue we also use two-stage methods to estimate our model. In this approach we treat the annual 1992 firm-specific variables as endogenous, and use observations on firm-specific variables from the first quarter of 1992 as instrumental variables.[32]

[30] Our estimating equations may be interpreted as reflecting an overall government objective function that weighs the various objectives discussed earlier. In particular, the government may be thought of as having an overall objective function which weighs the utility of competing groups, and the utility of each group depends on some or all of the explanatory variables that we use. See for example Svejnar (1982), and Prasnikar et al. (1994), especially section IV.

[31] Note, however, that Aghion, et al. (1994) and Blanchard (1997) argue (and the existing empirical literature suggests) that restructuring prior to privatization was rare either due to opposition from worker coalitions or because restructuring would require investment and reorganization which was beyond the scope of the workers and managers of public firms.

[32] Specifically, we predict in a first stage equation the potentially endogenous firm-specific annual 1992 variables using observations from the first quarter of 1992 as excluded explanatory variables. (Recall that the decision to privatize firms was not made until the second quarter of 1992). All exogenous RHS variables from the second stage probit estimations are also included in the first stage. Note that we are focusing only on endogeneity caused by firms restructuring before the end of 1992 based on the information in May 1992 that they will or will not be privatized in the First Wave.

The predictions of the models discussed in section 2 are summarized in Table 1. The revenue maximization (GHS1), public good will (GHS2), SV, and political cost (GHS4) models predict that the government will want to sell the more profitable firms first. To test the predictions of these models we use (separately) annual 1992 values of three alternative variables as indicators of profitability: PROFIT (accounting profits); Q - W (difference between the value of output and the total wage bill); and Q/L - W/L (difference between the value of average product and the average wage) where Q is value of output, L is employment and W is the total wage bill.[33] The three variables complement one another in that accounting profit captures all input costs but may be subject to reporting error, while Q – W and Q/L – W/L underestimate total cost but get directly at the relationship between revenues and labor cost**.** We also use an explanatory variable MKSHARE, measuring the firm's market share in the industry (ratio of firm sales to industry sales) as a proxy for profitability, since it is expected to be positively correlated to current and future profitability.[34] These models predict that indicators of profitability (PROFIT, Q - W, Q/L - W/L, and MKSHARE) should have positive coefficients.

We test our static efficiency model (GHS3) using (Q/L - W/L) as an explanatory variable. According to this model, the estimated coefficient on this variable should be negative, since firms in which wages most exceed marginal productivity of labor are likely to benefit the most from restructuring. As mentioned earlier, Q/L is used as a proxy for marginal productivity since we cannot measure marginal product in our data and the two variables are positively correlated. Alternatively, one can also view the static efficiency model as predicting

[33] We could probably increase the explanatory power of the equation by simultaneously including all three profit variables in the specification. However, this would also lead to multicollinearity problems, and thus we have not estimated such an equation.

that firms with the largest (negative) difference between value of output and total wage bill, or the greatest dollar losses, should be privatized first. Thus the static efficiency model has exactly the opposite predictions for our three profit variables than the political cost and revenue and public goodwill maximization models.

We test the GS predictions regarding which industries should be privatized early to reap the informational gains from privatization, by creating two dummy variables to capture the firms that face the greatest demand uncertainty. The first variable is CMEA, which is coded one for industries most affected by the break-up of the Soviet common trading area known as the CMEA and zero otherwise.[35] To identify industries that faced demand uncertainty due to the collapse of the CMEA, we selected industries that experienced declining exports and output after 1991 using evidence from the Czech Statistical Yearbooks and the detailed discussion on this issue in Bohata et al. (1995). The industries included in this category are mining of non-energy materials, mining of metal ores, other mining, textiles, wood products, pulp and paper products, and other non-metallic mineral products. Our second dummy variable is DOWN, which is coded one for downstream (processed goods) industries and zero otherwise. The DOWN category includes food, tobacco, textiles, leather, footwear, paper, publishing, electronic machinery and equipment, and transportation.[36] GS argue that firms in the CMEA and DOWN industries should be privatized first, since these firms are

[34] Specifically, we calculate the ratio of firm sales to industry sales in the Czech Republic.
[35] Analyzing the effect of demand uncertainty is relevant because of what is known as the CMEA shock. The trading system between the countries of the Soviet Bloc (CMEA) was disintegrating since 1989 and was eventually dismantled in 1991, resulting in a collapse of trade. The aggregate numbers show that exports between Central European countries fell 25% between 1989 and 1990 and were still 13% lower than the previous year in 1993. Similarly, imports from other Central European countries to Czechoslovakia fell over 25% in 1991, and continued to fall through 1993. The trend is similar for exports between Central European countries and the former Soviet Union. Industries that relied heavily on exports to these other markets experienced considerable demand uncertainty after the collapse of the trade agreements.
[36] We choose these firms following the discussion in GS.

likely to benefit the most from increased responsiveness to information about demand conditions after privatization.[37] Finally, to test their proposition that firms with greater monopoly power should not be privatized early since they offer lower efficiency gains from privatization, we use MKSHARE as an explanatory variable. According to the GS model, the coefficients of CMEA and DOWN should be positive and that of MKSHARE should be negative. We also note that by assuming that MKSHARE is positively correlated with future profits, the GHS1-2, SV, and GHS4 models have the opposite prediction for the sign of this variable than the GS model, allowing us to investigate the relative priority placed on efficiency by the government.

In order to examine whether the political cost of unemployment may be driving the government's sequencing strategy, as assumed in the political cost model (GHS4), we use the industry employment growth rate between 1991 and 1992 (EMPGR) as a proxy for labor demand conditions in the industry.[38] The political cost model produces an unambiguous prediction that the coefficient on this variable should be positive, (i.e. stronger labor demand conditions increase the probability of privatization). As noted above, Table 1 contains a summary of the predictions of the theoretical models developed in section 2 and lists the variables used to test the predictions.

[Table 1 here]

We start by estimating the following probit equation:

[37] While we also wanted to include a variable for industries facing cost uncertainty, since GS recommend that these firms are also good candidates for early privatization, we could not obtain statistical evidence on this issue and the anecdotal evidence was not found to be consistent. However, since the primary source of uncertainty facing firms in transition economies has been fluctuating demand conditions, both the CMEA and DOWN variables capture one of the most significant sources of uncertainty affecting these firms.

[38] In the data we do not observe the region in which the firm is located and thus cannot use the regional unemployment rate, which could be a better indicator of labor demand conditions. Industry unemployment rates are also unavailable.

$$y_i^* = \beta_0 + \beta_1 \text{ CMEA} + \beta_2 \text{ DOWN} + \beta_3 (Q/L - W/L)_i + \beta_4 \text{ MKSHARE}_i + \beta_5 \text{ EMPGR} + \varepsilon_i. \quad (4.1)$$

where the i subscript is used to represent firm specific variables, ε_i has a standard normal distribution and y_i^* is a latent index such that a firm is privatized if y_i^* is greater than zero. As described earlier, CMEA and DOWN are dummy variables which indicate the firms most likely to experience large demand shocks, and firms in downstream industries respectively, and thus allow us to test the predictions of the GS model. In equation (4.1) we use $(Q/L - W/L)_i$ and MKSHARE_i as measures of firm profitability.[39] The GHS1-2, GHS4 and the SV models predict that these variables will have a positive coefficient, while the static Pareto efficiency model GHS3 predicts that $(Q/L - W/L)_i$ will have a negative coefficient. Also, the MKSHARE_i variable should have a negative coefficient according to GS. Finally, EMPGR measures labor demand conditions in the context of the political cost model.

To test the sensitivity of our results to the measure used for profits (or static inefficiency), in (4.2) below we replace $(Q/L - W/L)_i$ with $(Q - W)_i$, while retaining MKSHARE_i in the specification

$$y_i^* = \alpha_0 + \alpha_1 \text{ CMEA} + \alpha_2 \text{ DOWN} + \alpha_3 (Q - W)_i + \alpha_4 \text{ MKSHARE}_i + \alpha_5 \text{ EMPGR} + u_i. \quad (4.2)$$

Finally, to further investigate the sensitivity of our results to the choice of firm variables, in equation (4.3) below we replace $(Q - W)_i$ with accounting profits PROFIT_i:

$$y_i^* = \gamma_0 + \gamma_1 \text{ CMEA} + \gamma_2 \text{ DOWN} + \gamma_3 \text{ PROFIT}_i + \gamma_4 \text{ MKSHARE}_i + \gamma_5 \text{ EMPGR} + v_i. \qquad (4.3)$$

In Table 2 we present the mean 1992 values of the explanatory variables. Column 1 contains the values for all firms, while columns 2 and 3 contain the values for the firms privatized during the first wave ("first wave") and the firms privatized in the second wave ("second wave") respectively. Column 4 contains the t-statistic for the null hypothesis that the mean values in columns 2 and 3 are equal. Note that firms privatized in the first wave are, on average, located more in downstream industries and have higher average values of profits, average product minus average wage, value of output minus wage bill, and market share. Firms privatized in the first wave are also more likely to have been affected by the collapse of the CMEA, but the difference between the first and second wave firms is not statistically significant. Finally, note that there is very little difference in mean industrial employment growth between the two types of firms.

[Table 2 here].

The results in Table 2 are quite suggestive but we still need to use multivariate analysis to investigate the factors determining privatization. Our results for the specifications given by equations (4.1)-(4.3) are contained in Table 3. In the first three columns we treat 1992 annual firm-specific variables as exogenous, while in columns 4, 5 and 6 we treat the annual 1992 firm-specific variables as endogenous, using the first quarter 1992 firm specific variables as instrumental variables.

[Table 3 here]

[39] In what follows we use an 'i' subscript to distinguish firm specific variables from industry specific variables.

In column 1 of Table 3, both CMEA and DOWN have positive and statistically significant coefficients, as predicted by the GS model. The coefficient of the variable measuring the difference between the value of average product of labor and the average wage has a positive sign and is also statistically significant. This result is consistent with the government setting priorities on maximizing privatization revenues and or public goodwill (in the case of subsidized transfers).[40] It is also consistent with the political cost and SV models. However, the results are inconsistent with the government maximizing static Pareto efficiency. Recall that the coefficient on the market share variable captures two effects. While in the GS model efficiency is promoted if firms with monopoly power are not privatized early, this variable may also act as a proxy for profitability. If the first effect dominates, we would expect the coefficient to be negative, while if the second effect dominates, we would expect the coefficient to be positive. We find a positive coefficient on market share, suggesting that the profit effect dominates. Finally, the coefficient on the industry employment growth variable, which measures labor demand conditions and thus acts as a proxy for political costs, is not statistically significant at standard confidence levels. This result suggests that the extremely low level of unemployment in the Czech Republic made the political costs of high unemployment, as proxied by labor demand conditions, relatively unimportant. By privatizing more profitable firms first, the government appears to be placing a priority on maximizing privatization revenues and public goodwill and not on the political costs of unemployment.

In column 2 of Table 3 we use market share and the difference between the value of total output and the wage bill as proxies for profitability. These results are quite similar to those of column 1. In column 3 we replace the difference between the value of total output

[40] Recall that the privatization of most firms in the large-scale privatization program involved both subsidized

and the wage bill with accounting profits. The results are again very similar to those in columns 1 and 2.[41] Thus each possible measure of profitability has a positive and statistically significant coefficient, although accounting profits are significant only at the 10% level. Columns 4, 5 and 6 contain the results when the annual 1992 firm-specific variables are treated as endogenous. The results are similar to those in columns 1 through 3, suggesting that potential endogeneity due to firms restructuring in anticipation of being privatized is not a problem in the data. The only real difference in the results is that the coefficient on accounting profits doubles in size and, with the standard error rising only slightly, it becomes much more statistically significant.

Finally, to examine the possibility that equations (4.1) – (4.3) are too rich to identify the effect of the employment growth variable EMPGR (proxying the role of political costs), we next consider a narrower specification that eliminates the industry dummy variables CMEA and DOWN. These results are contained in Table 4. As before, in columns 1 through 3 of Table 4 we treat the annual firm-specific variables as exogenous, while in columns 4 through 6 we consider them to be endogenous. The results are similar to those in Table 3, except that the coefficient on accounting profits is statistically significant only when the firm-specific variables are treated as endogenous.[42] Moreover, the employment growth variable remains statistically insignificant. Hence while the model of political costs predicted that profitable firms would be privatized if the government were minimizing layoffs, political costs do not appear to have had a significant impact on the government. Thus, the predictions

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transfers as well as unsubsidized sales of shares.

[41] One could argue that variables such as $PROFIT_i$ or $(Q\text{-}W)_i$ may simply be picking up a size effect, although none of our models predict such an effect. We argue that this is not the case since the results are very similar when we use $(Q/L\text{-}W/L)_i$, which is independent of firm size.

[42] However, the coefficient on profit in column 3 of Table 4 is highly statistically significant when the variable

of the privatization revenues and public goodwill maximization models appear to be more consistent with the data than the political cost model. Of course, political costs may be more important in the other transitional economies, which had much higher rates of unemployment during this period.[43]

[Table 4 here]

For the sake of completeness, we have also estimated probit equations using the first quarter of 1992 data for the firm specific variables, rather than annual 1992 data for these variables. In Appendix Table A2 we report these results for the case where we include CMEA and DOWN, while in Table A3 we report the results for the case when we exclude them. These estimates for these specifications are similar to those based on annual data (reported in the text), differing only in the fact that the coefficient on accounting profits is not statistically significant.[44]

5. Conclusion

Our empirical evidence suggests that governments sequence the privatization of firms strategically rather than randomly. In particular, we find strong evidence that the Czech

measuring market share is excluded.

[43] As noted above, the Czech unemployment rate was low and stable over the period 1991-1995. Since we use labor market conditions between 1991 and 1992, our results are not simply the result of the government incorporating political costs in the large scale privatization program. However, the low unemployment rate before the large scale privatization program may reflect an earlier concern with political costs, and we may simply not have enough variation in industrial employment growth to identify the effect of this variable.

[44] An alternative motivation for the IV procedure would be to assume that policy makers use the expected value of the firm specific variables conditional on information available in May 1992. In this case the error term will contain an expectational error. If we had panel data with a reasonably long time series dimension, we could invoke rational expectations to argue that the first quarter variables are uncorrelated with the expectational error. However, since we only have a cross-section, we cannot appeal to rational expectations. Thus if readers believe that this expectations model is more appropriate, then the estimates in Tables A2 and A3 will be of most interest. Note that we would expect the coefficients in Tables A2 and A3 to be larger simply because the first quarter firm specific variables are smaller than the annual values of these variables.

government privatized first firms that were more profitable, firms in downstream industries, and firms in industries subject to greater demand uncertainty.

Privatizing more profitable firms first is consistent with our model of the government maximizing privatization revenues and/or public goodwill through a subsidized sale of shares. This outcome is also consistent with Shleifer and Vishny's (1994) prediction that the government will privatize profitable firms first if political concerns about employment are offset by other government objectives. Our results are not consistent with a government placing priority on improving Pareto efficiency by privatizing first firms with the largest gap between the wage and the marginal product of labor. Our finding that firms in downstream industries and in industries with greater demand uncertainty were more likely to be privatized early suggests that the government placed emphasis on efficiency in the Glaeser and Scheinkman (1996) sense, namely by privatizing first firms that were likely to benefit the most from greater responsiveness to market conditions. However, in contrast to the GS recommendation but consistent with the general evidence regarding profitability, firms with higher market share were more likely to be privatized first. Finally, our estimates indicate that political costs of unemployment, as measured by employment growth in the firm's industry, were not an important priority for the Czech government. This suggests that the government did not privatize more profitable firms first in order to minimize these political costs, but rather to maximize revenues and public goodwill.

In addition to providing key evidence on the nature of the privatization process, our results have important implications for studies evaluating the effect of privatization. These evaluations compare the performance of privatized firms with that of non-privatized firms, usually assuming that privatization is random, at least after controlling for observables.

However, our analysis indicates that more profitable firms were being privatized first, suggesting that such firms may have both observable and unobservable characteristics which make them likely to perform better after privatization. Thus, evaluation studies of the effect of privatization need to account for this potential selection bias, since otherwise they may provide upwardly biased estimates of the effect of privatization on firm performance.

Table 1
Summary Table of Theoretical Predictions

Theory	Variables	Sign(s)
GHS1 (Maximizing privatization revenues)		
A government that is informed about the quality of the firms being sold and wishes to maximize privatization revenues will sell the more profitable firms first.	$(Q/L - W/L)_i$ (value of average product - average wage) $(Q - W)_i$ (value of output - total wage bill) $(PROFIT)_i$ (accounting profit) $(MKSHARE)_i$ (market share)	All Positive
GHS2 (Maximizing public goodwill)		
A government concerned with public goodwill from free transfers of shares to citizens will privatize more profitable firms first.	Same as above	All Positive
GHS3 (Maximizing static Pareto efficiency)		
Inefficient firms are likely to benefit most from restructuring and privatization, hence firms in which wages most exceed marginal product should be privatized first.	$(Q/L - W/L)_i$ $(Q - W)_i$ $(PROFIT)_i$	All Negative
GS (Maximizing efficiency through informational gains of privatization)		
GS's theory of efficiency argues that informational gains from privatization will be higher if firms that are subject to large demand shocks are privatized early.	CMEA (demand shock industry dummy)	Positive
GS's model predicts that informational gains would also be higher from privatizing downstream industries early.	DOWN (downstream industry dummy)	Positive
GS argue that privatizing firms with high market share can decrease efficiency by creating monopolies.	$MKSHARE_i$	Negative
SV (Increasing allocative efficiency)		
When subsidies after privatization are limited to unprofitable firms, competing government objectives may lead to the early privatization of more profitable firms.	$(Q/L - W/L)_i$ $(Q - W)_i$ $PROFIT_i$ $MKSHARE_i$	All Positive
GHS4 (Minimizing political cost)		
More profitable firms are likely to have fewer layoffs. Hence, a government which faces high political costs should privatize more profitable firms first.	same as above	All Positive
If the government is concerned with political costs due to layoffs after privatization, this model predicts that a lower unemployment or higher employment growth rate in the industry will increase the probability of being privatized.	EMPGR (employment growth rate in industry between 1991 and 1992)	Positive

Table 2
Means of Principal Variables in 1992 by Firms' Privatization Status
(Standard deviations of means are in parentheses.)

Variable	All Firms	Privatized Wave 1	Privatized Wave 2	Normal Statistic H_o: (2) = (3)
	1	2	3	4
CMEA	0.255 (0.013)	0.267 (0.017)	0.239 (0.020)	-1.06
DOWN	0.678 (0.014)	0.702 (0.018)	0.643 (0.022)	-2.06**
$Profits_i \times 10^{-3}$	37.9 (5.42)	47.2 (8.31)	24.5 (5.53)	-2.06**
$(Q/L-W/L)_i \times 10^{-3}$	0.505 (0.016)	0.542 (0.022)	0.452 (0.021)	-2.78***
$(Q-W)_i \times 10^{-3}$	396.8 (37.62)	505.4 (61.07)	238.9 (23.63)	-3.50***
$Market\ Share_i$	0.020 (0.002)	0.024 (0.002)	0.013 (0.002)	-3.53***
EMPGR	-11.14 (0.124)	-11.11 (0.160)	-11.18 (0.195)	-0.286
Number of observations	1121	664	457	-

Note 1 - Profits, value of total output, wage bill, firm sales, and industry sales are measured in billions of Czech crowns, where 1 U.S. Dollar was equal to about 30 Czech crowns at the time. The firm specific variables are calculated using annual 1992 observations, and are denoted by an i subscript.
Note 2 - * significant at 10%, ** significant at 5%, *** significant at 1%.

Table 3
Estimating the Probability of Being Privatized

Dependent variable equals one if the firm is privatized in the First Wave.
Firm-specific RHS variables are annual 1992 observations.
(Standard errors are in parentheses.)

Variable	1	2	3	4	5	6
CMEA	0.164*	0.186**	0.159*	0.164*	0.182**	0.170*
	(0.092)	(0.092)	(0.092)	(0.092)	(0.092)	(0.092)
DOWN	0.236***	0.268***	0.265***	0.236***	0.266***	0.265***
	(0.086)	(0.086)	(0.086)	(0.086)	(0.086)	(0.086)
$MKSHARE_i$	3.23***	1.89*	3.16***	3.16***	1.97**	2.74***
	(0.933)	(1.03)	(0.973)	(0.942)	(1.04)	(1.00)
EMPGR	-0.001	0.004	0.010	-0.000	0.005	0.008
	(0.011)	(0.010)	(0.009)	(0.011)	(0.010)	(0.009)
$(Q/L - W/L)_i \times 10^{-4}$	2.01**	-	-	1.85**	-	-
	(0.860)			(0.905)		
$(Q - W)_i \times 10^{-7}$	-	2.70***	-	-	2.36***	-
		(0.814)			(0.802)	
$PROFIT_i \times 10^{-7}$	-	-	4.72*	-	-	9.27**
			(3.36)			(4.36)

Note - In columns 1 - 3 the firm-specific variables are treated as exogenous. In columns 4 - 6, the firm-specific variables are treated as endogenous. The first stage results are reported in Appendix Table A1. A constant is included but not reported. The sample contains 1121 firms. See notes to Table 2.

Table 4
Estimating the Probability of Being Privatized in a Simpler Model
Dependent variable equals one if the firm is privatized in the First Wave.
Firm-specific RHS variables are annual 1992 observations.
(Standard errors are in parentheses.)

Variable	1	2	3	4	5	6
$MKSHARE_i$	2.98***	1.73*	2.96***	2.91***	1.80*	2.54***
	(0.918)	(1.01)	(0.965)	(0.927)	(1.03)	(0.990)
EMPGR	-0.004	0.002	0.007	-0.004	0.002	0.005
	(0.011)	(0.009)	(0.009)	(0.011)	(0.009)	(0.009)
$(Q/L - W/L)_i \times 10^{-4}$	2.14***	-	-	1.98**	-	-
	(0.860)			(0.902)		
$(Q-W)_i \times 10^{-7}$	-	2.53***	-	-	2.18***	-
		(0.807)			(0.795)	
$PROFIT_i \times 10^{-7}$	-	-	3.60	-	-	8.06*
			(3.30)			(4.29)

Note - See notes to Tables 2 and 3.

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Appendix Table A1
First Stage Estimates of the Annual 1992 Firm-Specific Variables
(Standard errors are in parentheses.)

	Dependent Variables using annual 1992 observations			
	$(Q/L - W/L)_i \times 10^{-4}$	$(Q - W)_i \times 10^{-7}$	$MKSHARE_i$	$PROFIT_i \times 10^{-7}$
Explanatory Variables using quarter 1, 1992 observations for firm-specific variables				
$CMEA \times 10^{-3}$	0.280 (1.09)	-0.075 (1.91)	-0.148 (0.754)	0.477 (0.843)
$DOWN \times 10^{-3}$	0.083 (1.03)	-1.85 (0.181)	-0.730 (0.711)	-0.017 (0.795)
$MKSHARE_i$	0.003 (0.011)	-0.017 (0.019)	0.958*** (0.008)	-0.027*** (0.008)
$EMPGR \times 10^{-4}$	9.16*** (1.23)	2.19 (2.15)	-0.525 (0.847)	0.157 (0.947)
$(Q/L - W/L)_i \times 10^{-4}$	3.67*** (0.038)	-0.015 (0.066)	-0.020 (0.026)	-0.009 (0.029)
$(Q - W)_i \times 10^{-7}$	0.021 (0.020)	4.08*** (0.034)	0.048*** (0.014)	0.384*** (0.015)
$PROFIT_i \times 10^{-7}$	-0.285** (0.124)	-2.16*** (0.218)	-0.312*** (0.086)	1.03*** (0.096)

Note - Dependent variables are the annual observations from 1992. The right hand side firm-specific variables are observations from the first quarter of 1992. See notes to Table 2.

Appendix Table A2
Estimates of the Full Model Using First Quarter 1992 Data
(Standard errors are in parentheses.)

Variable	1	2	3
CMEA	0.164* (0.092)	0.182** (0.092)	0.151* (0.092)
DOWN	0.234*** (0.086)	0.262*** (0.086)	0.253*** (0.086)
$MKSHARE_i$	3.01*** (0.902)	1.89** (0.999)	3.19*** (0.933)
EMPGR	0.001 (0.010)	0.006 (0.009)	0.010 (0.009)
$(Q/L - W/L)_i \times 10^{-4}$	6.68** (3.31)	-	-
$(Q - W)_i \times 10^{-7}$	-	8.15*** (2.94)	-
$PROFIT_i \times 10^{-7}$	-	-	3.81 (9.52)

Note - Firm specific variables are observations from quarter 1, 1992. See notes to Table 2 and 3.

Appendix Table A3
Estimates of the Smaller Model Using First Quarter 1992 Data
(Standard errors are in parentheses.)

Variable	1	2	3
$MKSHARE_i$	2.78*** (0.890)	1.76* (0.992)	3.03*** (0.923)
EMPGR	-0.002 (0.010)	0.003 (0.009)	0.008 (0.009)
$(Q/L - W/L)_i \times 10^{-4}$	7.11** (3.30)	-	-
$(Q - W)_i \times 10^{-7}$	-	7.51*** (2.91)	-
$PROFIT_i \times 10^{-7}$	-	-	0.686 (9.44)

Note - See notes to Appendix Table A2, and Tables 2 and 3.

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