

# **Efficiency of mass privatization and government-led restructuring: Owner vs. seller effects on performance of companies in Slovenia**

**Marko Simoneti**

CEEPN- Central & Eastern European Privatization Network, Ljubljana  
and University of Ljubljana

**Jože P. Damijan**

University of Ljubljana and IER-Institute of Economic Research, Ljubljana

**Matija Rojec**

University of Ljubljana

**Boris Majcen**

IER-Institute of Economic Research, Ljubljana

Correspondence: Marko SIMONETI  
CEEPN  
Dunajska 104, Ljubljana  
Slovenia

e-mail: [ceepn@siol.net](mailto:ceepn@siol.net)

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# **Efficiency of mass privatization and government-led restructuring: Owner vs. seller effects on performance of companies in Slovenia**

by

Marko Simoneti, Jože P. Damijan,

Matija Rojec and Boris Majcen

## **Abstract**

A new approach for studying the key policy choice in transitional economies between rapid mass privatization and continued state ownership with gradual privatization is developed by separating the owner and the seller effects on performance of companies. It is proposed that companies temporary owned by mass privatization institutions should be compared with non-privatized companies and companies sold by mass privatization institution with companies privatized by the government in a standard way.

For Slovenia, we demonstrate that mass privatization institutions are better temporary owners and better sellers to strategic investors than the government and its institutions. Companies owned/sold by mass privatization institutions experience better economic performance in comparison to companies owned/sold by the government. Both static and dynamic versions of TFP model were studied, with simultaneity and heterogeneity problems explicitly controlled for using Sys-GMM approach to panel data. The issue of simultaneity between company performance and chosen privatization methods as well as the panel selection bias were explicitly controlled for using the Heckman two-step method.

## I. Introduction

According to the recent World Bank comprehensive report<sup>1</sup> on lessons learnt in the first ten years of economic transition from plan to market, the ideal privatization strategy is to transfer assets as rapidly as possible to concentrated owners through open, fair and transparent methods. However, the report admits that is difficult to achieve on a large scale in a short period as the privatization to diffuse owners and insiders is appealing on equity grounds, and in several countries this was the only way to make private ownership politically acceptable. The main issue then is whether these intermediate ways of privatization accelerate or retard the eventual takeover of the enterprise by the “right” kind of investors. Might it not have been preferable to keep the assets in state hands, waiting to identify and then sell the enterprises to viable strategic investors? Therefore, the overall evaluation of various non-standard privatization and restructuring methods used in transitional economies depends strongly on what we consider to be the realistic alternative policy at the time in particular country. The World Bank report goes further by saying “Navigating between continued state ownership with eroding control rights and a transfer to ineffective new private owners with an inadequate institutional framework is possibly one of the most difficult challenges confronting policymakers in charge of privatization.” In the paper we develop a new analytical approach for studying these relevant policy issues by examining separately the owner and the seller effects on performance of firms in various non-traditional privatization/restructuring programs. It is proposed that companies temporary owned by mass privatization institutions should be compared with non-privatized companies and companies sold by mass privatization institution with companies privatized by the government in a standard way.

A traditional approach to examining the relation between ownership type and performance of companies prevails in the literature on economic transition. The recent extensive survey of empirical studies on corporate restructuring after privatization for most of the countries in transition can be found in Djankov and Murrell (2000) or Havrylyshyn and McGettingen (1999). In our approach we argue that the success of mass privatization schemes should be judged also by other non-traditional criteria. A mass privatization is considered successful if temporary owners sell fast and successfully to other owners, primarily to strategic investors. Positive effects of mass privatization are thus not shown by companies remaining in control of initial owners but by the companies that have already gone through secondary transactions.

Difference between owner effect and agent/seller effect in mass privatization has been somehow overlooked in the recent economic literature and economic policies of countries in transition. Originally, mass privatization models were adopted in those countries as politically acceptable and practical solutions to fast privatization of the entire enterprise sector. Initial ownership structures were intended as transitional, whereas optimal would be set up gradually and would result from secondary transactions. In that sense success of mass privatization can be judged mainly by seller effects which are the result of initial owners selling to final long-term owners. Thus, the recognition that privatization funds are not good owners should not be surprising, as ownership was not their intended role. It is more important whether privatization funds are good and fast sellers<sup>2</sup>.

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<sup>1</sup> Transition – The first ten years: analysis and lessons for Eastern Europe and former Soviet Union, The World Bank; 2002 (pages 72-73).

<sup>2</sup> In early days of transition this was rather obvious at least to privatization officials in the transition countries. Their first international conference on the topic, held in Prague in 1993 was titled:

To compare the effectiveness of mass privatization schemes with more traditional programs where the state directly sell companies to final owners one should focus primarily on the companies from mass privatization that already have »true and final« owners. How well perform companies sold to strategic investors by the funds in comparison with companies sold to strategic investors directly by the state? On the other side, companies from mass privatization that are still in the hands of intermediary owners are in a sense not yet fully privatized. They are more similar to the companies that were corporatized by the state, but the buyer for them has not yet been found. Therefore, the temporary owner effects on performance in mass privatization schemes should be compared with the performance of non-privatized companies.

In this paper we empirically verify for Slovenia how effectively initial owners from mass privatization (funds, insiders and small shareholders) perform their role of temporary owners in comparison to the temporary ownership by the government. In addition, we analyze how effective are initial owners from mass privatization as sellers in post-privatization period in comparison to government and its agencies being directly the final seller to strategic investors.

## II. Owner vs. seller effects on performance in Slovenia

In Slovenia socially-owned companies had a choice to participate in government-led restructuring program before privatization or enter directly into the mass privatization program. Initially, the restructuring program was managed through governmental restructuring agency (called Development Fund of Slovenia) that become a temporary owner of those companies with the mandate to first restructure and later privatize these companies. The original idea was that restructuring efforts would be limited to short term financial restructuring and to external governmental support for dealing with excessive employment and debts in these companies. Later on, additional troubled companies were taken over directly or indirectly by the government, its restructuring objectives become much broader and its direct or indirect ownership role lasted much longer than originally planned.

In both, government pre-privatization restructuring programs and mass privatization programs in Slovenia, we have in a way only temporary owners who are responsible to find the appropriate final owners for each company in the next stage. In the first case, temporary owner and final seller is directly the government or governmental restructuring agency. In the second case, the initial owners and final sellers are funds, insiders and small shareholders which obtained shares in exchange for vouchers. We can compare whether governmental or private institutional solutions are superior. In Slovenia, temporary ownership by the government and funds tends to be longer than expected. Therefore, it is important to know how well perform companies that are in »temporary« ownership of the government versus those that are in "temporary" ownership of initial owners from mass privatization.

Most of socially-owned companies chose to enter directly into mass privatization program without any prior restructuring. Shares of these companies were distributed free of charge to insiders, privatization funds, two para-state governmental funds and citizens at large. In this study all mass privatized companies are divided into listed and non-listed

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“Investment Funds as Intermediaries of Privatization”. Proceeding were later published in a book under the same title (see Simoneti, Triška (Eds), CEEP, 1994).

companies. The ownership structure in these two groups of companies is rather similar, only that in listed companies the ownership share of insiders is smaller at the expense of the bigger share of small financial investors. On the other hand, the corporate governance regime and institutional framework for secondary transactions is very different<sup>3</sup>. In non-listed companies initial shareholders had to rely on voice in corporate governance, while in listed companies there is much better information available and additional possibility for transparent exit on the market for shares. In non-listed companies secondary sales to strategic investors (takeovers) are taking place in a non-transparent way, while in listed companies these transactions are public and had to be completed through obligatory public bids.

The concept of transformation matrix was originally developed for companies included in mass privatization in Slovenia to study and present the quality and speed of ownership transformation after mass privatization<sup>4</sup>. A transformation matrix is constructed by taking into account the initial and final ownership categorization of companies. In this paper we group initially the companies into those that were mass privatized as listed (L) or non-listed (N) and those that were taken over by the governmental institutions for pre-privatization restructuring (G). The transformation matrix provides for distribution of these companies into the companies that remained in the same category (LL, NN, GG) and into the companies that were subject of secondary transactions (LS, NS, GS) or even more narrowly subject of the sale to strategic investors (LSt, NSt, GSt):

$$\begin{array}{rclclclcl}
 L & = & LL & + & LS(LSt) & : & 67 & = & 57 & + & 10(9) \\
 N & = & NN & + & NS(NSt) & : & 341 & = & 260 & + & 81(62) \\
 G & = & GG & + & GS(GSt) & : & 39 & = & 39 & + & 32(16)
 \end{array}$$

**Legend:**

- L = listed, LL = listed/listed, LS = listed/secondary, LSt = listed/strategic
- N = Non-listed, NN = non-listed/non-listed, NS = non-listed/secondary, NSt = non-listed/strategic
- G = Government, GG = Government/Government, GS = Government/secondary, GSt = Government/strategic

The change of performance of L, N and G companies indicate the effectiveness of individual governmental programs: mass privatization with listing on the stock-exchange, mass privatization with no listing on the stock-exchange and government-sponsored pre-privatization restructuring program. Both, owner and seller effects are present here simultaneously as we do not distinguish between companies that stayed in the same group (diagonal companies) and those that were subject of secondary transactions (off-diagonal companies).

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<sup>3</sup> More on the comparison about different methods of mass privatization see in Simoneti et al (2001).

<sup>4</sup> More details on transformation matrix for companies from mass privatization in Slovenia could be found in Simoneti et al (2001).

The change in performance of LL, NN and GG companies (diagonal companies) reflect primarily the owner effects. Therefore, to find out who is better temporary owner, governmental institutions or initial owners from mass privatization, we should compare the change in performance of LL, NN and GG companies.

The change in performance of LS, NS and GS companies (off-diagonal companies) reflect primarily the seller effects. Therefore, to find out who is better privatization agent, governmental institutions or initial owner from mass privatization, we should compare the change in performance of LS, NS and GS companies. We can study also who is better final seller to strategic investors by comparing performance of companies sold to strategic buyers that were initially grouped as listed, non-listed or governmental (LSt, NSt, GSt).

Using this simple transformation matrix we can generate relevant ownership dummies for individual companies to be used in econometric analysis. For our sample of 479 Slovenian companies included in all three programs for which data on initial and final ownership is available, as well as accounting data for the period 1994-2001, the transformation matrix is presented in Table 1. We can observe that the most intensive changes in ownership structure are in G companies (54,93% of companies stay in the same ownership) and the least intensive changes are visible in L companies (85,07% of companies stay in the same ownership). Similarly is the intensity of the sales to strategic investors: 22,54% of G companies, 18,18% of N companies and only 13,44% of L companies were sold to strategic investors until the end of 1999.

<Insert Table 1>

### III. Survival bias and simultaneity of privatization methods

Before proceeding with the empirical research of the impact of different ownership structure on performance of firm, some methodological issues regarding the dataset should be clarified. In this section, we discuss the econometric procedures to deal with two possible biases that our dataset might be subject to. We first discuss the problem of classical selection bias as in our estimations in Section IV we are dealing with a truncated panel of Slovenian firms while the inferences are made to the whole population. Subsequently, we refer to the issue of simultaneity between company's performance and ownership structure.

The estimations of performance of companies that undergone privatization or government-led restructuring is subject to the so called "survival bias", which is the classical sample selection bias problem extensively dealt with in the econometric literature (cf. Amemiya 1984 and Wooldridge 2002 for excellent surveys of the literature). In our case the survival bias arises due to the fact that the estimations of our models of the efficiency of different privatization methods (see Section IV) are performed on a truncated panel of Slovenian companies that survived throughout the period 1995-2001 while neglecting the companies that dropped from our sample. The selection of surviving companies in our panel is not random as drop-outs from the sample consist mostly of the companies that went bankrupt or were merged with other companies, which is obviously determined endogenously through companies' past performance. Making inferences on the overall efficiency of mass privatization and government-led restructuring without accounting for the fact that we are dealing with a truncated sample of companies that survived might produce biased coefficients. We deal with this problem using the Heckman two-step method proposed in Heckman (1979). In the Heckman procedure, the bias that results from using non-randomly selected samples is dealt with as an ordinary

specification bias arising due to omitted variables problem. Heckman proposes to use estimated values of the omitted variables (which when omitted from the model give rise to the specification error) as regressors in the basic model.<sup>5</sup> Hence, in the first step we account for the probability  $s_{it2} [0, 1]$  that a company will survive throughout the period 1995-2001 conditional on its structural characteristics in 1994. The following probit equation has been estimated using 1994 data:

$$(1) \quad \Pr(s_{it2} = 1 | \mathbf{X}_{it1}) = F(\mathbf{X}_{it1} \psi_1),$$

where the error terms are assumed to be IID and normally distributed, thus  $F(\cdot)$  is a cumulative distribution function of the standard normal distribution.  $\mathbf{X}_{it1}$  ( $i = 1, \dots, n$ ) is a matrix of structural characteristics. These are individual equity to assets ratio, i.e. an indicator of indebtedness, EBITDA to sales ratio, i.e. financial performance, sales to labor ratio, i.e. labor productivity, and export to sales ratio, i.e. export propensity. The results in Table 2 indicate that companies that survived throughout 1995-2001 period differed significantly from their non-survived counterparts in 1994 in terms of export propensity and financial performance. No differences among them, however, were found in terms of individual labor productivity and indebtedness.

<Insert Table 2>

In the second step, following Amemiya (1984), the predicted values based on estimated coefficient from the above estimations, are used in order to calculate a vector of so called inverse Mills ratios<sup>6</sup> for individual companies. The latter then enters as a controlling variable in the estimation of the privatization method selection mechanism.

In analyzing the performance of companies after privatization/restructuring it has to be taken into account that the selection of privatization method is not exogenous but depended on operational characteristics of companies. At the time of privatization the performance of companies influences the selection of ownership structure. For example, in Slovenia there was a strong bias in selection of privatization methods due to principle of autonomy of companies in choosing among the available privatization methods (see Vodopivec and Dubey (1995), Smith, Vodopivec, Boeh-Cheol Cin (1997), Simoneti et al (2001)). Any evaluation of individual model of privatization is therefore biased, if the endogenous selection mechanism among different privatization models is not explicitly

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<sup>5</sup> Note that there are several possible ways of dealing with the problem of sample selection. One possibility is to treat the omitted variables as unobserved individual firm specific effects that are correlated with the error term in the basic model. This method is useful, for example, when studying efficiency of different programs, when individuals can be observed or not in different time periods according to their ability to qualify in the pre-qualification procedure. In the panel data framework, one can effectively deal with this problem of missing values for some cross-section units using the fixed effects estimator (see Wooldridge 2002). In our case the problem, however, is different as we deal with a truncated but balanced panel of companies that survived throughout the period 1994-2001. Another possibility is to use firms' pre-privatization performance indicators in order to control for omitted variables. In our case, the problem of this approach lies in the fact that there exists only one pre-privatization time period that can be used for this purpose. This, however, poses a serious problem in estimation of our main model due to the dynamic specification of the model, which requires dynamic instrumentalization when using the GMM approach. According to above limitations, the Heckman approach seems to be a preferable approach in our case.

<sup>6</sup> Inverse Mill's ratios are calculated as the ratios between the normal density and its cumulative density function. Note that calculation of the inverse Mill's ratios is different for treated and nontreated observations.

taken into account. Similar simultaneity bias was found in the Czech mass privatization by Marcineien and Wijenberg (1997) and taken into account in empirical studies by Weiss and Nikitin (1998) and Kočenda (2001). The simultaneity bias was also confirmed for Polish privatization (see Claessens and Djankov (1998)).

There are several ways to deal empirically with this issue. Djankov and Murrel (2000) in their quantitative survey on privatization in transition countries offer good overview how different researchers dealt with the privatization simultaneity bias problem. In the first group of studies lagged performance variables are simply used as explanatory variables. In the second group of studies regressions are run using the differences in performance variables instead of levels in order to wipe out the individual specific effects, which, however, does not solve the problem of simultaneity between firm performance and ownership structure. In the third group of studies the selection mechanism is explicitly accounted for and incorporated into the model.

In the present paper we control for the endogeneity of the privatization method selection by referring to individual performance of companies in the pre-privatization period. The data on initial performance of the survived companies 1994 in fact confirm significant differences among companies with different ownership structure. Table 3 presents the initial characteristics of the companies in the sample grouped into *G*, *L* and *N* ownership categories. Listed companies are by far the largest in terms of labor force, assets and sales. Capital intensity (assets per employee) is also the highest in listed companies. Productivity of assets and labor is the highest in non-listed companies. The highest indebtedness is in government-owned companies and the lowest in listed companies. Export propensity is the highest in listed companies, followed by government-owned companies. According to the financial performance indicators (EBITDA to sales, EBIT to sales, net profit to sales), the best companies were listed on the stock-exchange and the worst were selected for governmental restructuring program, which is the expected outcome.

<Insert Table 3>

The procedure to control for this privatization method selection mechanism is similar to the one used in the survival bias mechanism. In the first step, the probability of companies to choose one of the three possible ownership forms (mass privatization with listing, mass privatization with no listing and pre-privatization restructuring) is being estimated. The probability  $p_{it}$  of companies to choose one of the three possible ownership forms is conditional both on their operational characteristics throughout the period 1995-2001 as well as on their survival bias. The probability  $p_{it}$  is being estimated using the following nested multinomial logit model:

$$(2) \quad \Pr(p_{it} = 1 | Z_{it}, M_{it2}) = G(\omega Z_{it} + \tau M_{it2}),$$

where  $Z_{it}$  is a matrix of operational characteristics of companies and  $M_{it2}$  is a vector of inverse Mills ratios from the survival mechanism. We assume that errors are IID distributed and have independent extreme-value distribution. The controlling variables contained in  $Z_{it}$  are sales and labor (which control for the size of companies), assets to sales ratio (which controls for capital intensity) and value added to labor ratio (which controls for technological advancement of companies). Vector of inverse Mills ratios from survival bias mechanism,  $M_{it2}$ , is included into the privatization method selection mechanism in order to control for the survival bias. Note that this variable therefore controls also for initial differences in indebtedness, financial performance, labor productivity and export propensity among companies with different ownership

structure. Indeed, the results from the multinomial estimations in the Table 4 confirm that the latter differences are essential in our case. In addition, significant differences between listed and non-listed companies are found in terms of the size, capital intensity and technological advancement. On the other hand, significant differences between listed and restructured-by-government companies are found only in terms of capital intensity and survival bias. The latter, however, implies that the companies restructured by the government were initially less export oriented, more indebted and had worse financial performance.

<Insert Table 4>

Similarly to the survival bias correction approach, the predicted values based on estimated coefficient from the multinomial logit model are being used to calculate the inverse Mills ratios for each of the companies. In the second step, a vector of these correction factors is included in our basic models of economic performance (see next section) in order to control for omitted variables.

#### IV. Models of economic performance

In this section we analyze performance of companies using measures reflecting economic efficiency while we neglect the issue of financial performance. The change in economic efficiency is not necessarily directly and immediately related to the change in financial performance. It is an interesting issue whether the improvements in financial performance are leading or lagging behind the improvements in economic efficiency. Privatization funds often claim that profitability of their companies has been improved. More important, however, is whether the economic efficiency, which is the key to a sustainable profitability in the long run, has been improved as well. Economic efficiency simply measures how successful are companies in improving their techniques of utilization of scarce factors of production over time, while financial performance of the real life companies depends on many additional factors. Above all, it is related to the power of the company on the markets for outputs and inputs, but it also depends on how the value added is distributed to capital and labor within the company. These distributional differences are of special interest and it should not be a surprise if non-listed and listed companies might show similar changes in economic efficiency, but very different changes in profitability. However, it is beyond the scope of this paper to study the financial performance of privatized companies.

To study economic efficiency we use the concept of total factor productivity (TFP) growth model. We exploit the panel data for a set of mass privatized companies and nationalized companies. Consider the following TFP growth accounting model:<sup>7</sup>

$$(3) \quad y_{it} = a_{it} + \alpha k_{it} + \beta l_{it} + \delta_t + (\eta_i + v_{it} + m_{it}), \quad r = \alpha + \beta \neq 1$$

$$v_{it} = \rho v_{i,t-1} + e_{it} \quad |\rho| < 1$$

$$e_{it}, m_{it} \sim \text{MA}(0)$$

where  $a_{it}$  is a productivity shock that depends on various factors (such as ownership structure and changes in ownership structure),  $y_{it}$  is log sales,  $K_{it}$  and  $L_{it}$  are log capital

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<sup>7</sup> Note that we use the Blundell and Bond (1999) notations.

stock and log labor inputs (there is no restriction on constant returns to scale),  $\delta_t$  is a year specific intercept. Of the error components,  $\eta_i$  is an unobserved firm-specific effect,  $v_{it}$  is an autoregressive (productivity) shock, and  $m_{it}$  represents serially uncorrelated measurement errors. Note that both labor ( $l_{it}$ ) and capital ( $k_{it}$ ) are potentially correlated with firm-specific effects ( $\eta_i$ ) as well as with both productivity shocks ( $e_{it}$ ) and measurement errors ( $m_{it}$ ).

The central point of our research is focused on estimating the productivity shock  $a_{it}$  where we believe that it is largely determined by the impact of the ownership structure and changes in ownership structure. Suppose that the firm's productivity shocks  $a_{it}$  are determined as:

$$(4) \quad a_{it} = f(L_{it}, N_{it}, G_{it}, LL_{it}, NN_{it}, GG_{it}, LS_{it}, NS_{it}, GS_{it})$$

where elements of  $a_{it}$  are the elements of the transformation matrix; i.e.  $L$ ,  $N$  and  $G$  stand for listed, non-listed and government owned companies in each time period, respectively;  $LL$ ,  $NN$  and  $SS$  indicate companies that remained in the same category after secondary privatization, and  $LS$ ,  $NS$  and  $GS$  indicate companies that were the subject of secondary transaction.

Another issue here is the importance of dynamic processes in the economy since many economic relationships are dynamic in nature and should be modeled as such. This is especially true for growth accounting models where present growth is correlated with the past performance of the company. The time dimension of panel data enable us to capture the dynamics of adjustment by inclusion of lagged dependent as well as lagged independent variables.

A dynamic version of the growth model (4) can then be written as:

$$(5) \quad y_{it} = \rho y_{i,t-1} + \alpha k_{it} - \rho \alpha k_{i,t-1} + \beta l_{it} - \rho \beta l_{i,t-1} + (\delta_t - \rho \delta_{t-1}) \\ + (\gamma a_{it} - \rho \gamma a_{i,t-1} + \eta_i(1 - \rho) + e_{it} + m_{it} - \rho m_{i,t-1}).$$

However, when estimating dynamic models based on growth accounting, one should take into account the inherent endogenous structure of the model. This means that not only present and lagged dependent variables are correlated, but lagged dependent variable (sales) might be correlated with present dependent variables (inputs); i.e. past performance determines demand for inputs in the present period. This simultaneity problem should be explicitly controlled for in econometric estimations.

The OLS estimator is unbiased and consistent when all explanatory variables are exogenous and are uncorrelated with the individual specific effects. This, however, is not the case in our model, which includes lagged variables. One can show that the OLS estimator will be seriously biased due to correlation of the lagged dependent variable with the individual specific effects as well as with the independent variables. This is due to the fact that  $y_{it}$  is a function of  $\eta_i$  in (3), and then  $y_{i,t-1}$  is also a function of  $\eta_i$ . As a consequence,  $y_{i,t-1}$  is correlated with the error term, which renders the OLS estimator biased and inconsistent, even if the  $v_{it}$  and  $m_{it}$  in (2) are not serially correlated. This holds also whether the individual effects are considered fixed or random (see Hsiao 1986, Baltagi 1995, Wooldridge 2002). There are several ways of controlling for this unobserved heterogeneity and simultaneity. One way is to include exogenous variables into the first-order autoregressive process. This, in turn, reduces the bias in the OLS estimator, but its magnitude still remains positive. Another way of controlling for the simultaneity is apply

the Anderson-Hsiao instrumental variable approach. We may first-differentiate our model (4) in order to eliminate  $\eta_i$ , which is the source of the bias in the OLS estimator. Then we may take the second lag of the level ( $y_{i,t-2}$ ) and the first difference of this second lag ( $\Delta y_{i,t-2}$ ) as possible instruments for  $\Delta y_{i,t-1}$ , since both are correlated with it ( $\Delta y_{i,t-1} = y_{i,t-1} - y_{i,t-2}$ ) but uncorrelated with the error term  $\Delta u_{it}$  ( $= u_{it} - u_{i,t-1}$ ). This approach, though consistent, is not efficient since it does not take into account all the available moment conditions (i.e. restrictions on the covariances between regressors and the error term).

Hence, a natural choice of approach that allows for controlling for the unobserved heterogeneity and simultaneity in (5) is the application of GMM (general method of moments) estimators. As shown by Arellano and Bond (1991, 1998), Arellano and Bover (1995) and Blundell and Bond (1998, 1999), an application of the system GMM estimators is a more appropriate approach to dynamic panel data than using difference GMM estimators. Our model will be estimated in first differences in order to obtain estimates of coefficients on growth performance of privatized companies as well as to eliminate unobserved firm-specific effects. Since lagged level instruments used in diff-GMM approach are shown to be weak instruments for first-differenced equation, we apply sys-GMM approach, which in addition to lagged levels uses also lagged first-differences as instruments for equations in levels. As model is estimated in first differences, corresponding instruments for  $\Delta x_{i3}$  are  $x_{i1}$  and  $\Delta x_{i1}$  (where  $x$  stands generally for all included variables), and so on for higher time periods. This allows for a larger set of lagged levels and first-differences instruments and therefore to exploit fully all of the available moment conditions. Hence, the system GMM approach maximizes both the consistency as well as the efficiency of the applied estimator.

## V. Empirical results

In this section we discuss the results of our estimated models of economic performance of companies that undergone different privatization programs. In all of subsequent estimations the TFP growth model as specified in (5) has been estimated using the 1995-2001 data for 479 privatized companies. We compare static as well as dynamic specifications of the model, where in all specifications the survival bias as well as the simultaneity between company's performance and the privatization method selected have been controlled for by including the vectors of inverse Mills ratios into main TFP models.

In the first model, we test the overall efficiency of individual privatization programs by comparing the TFP growth of companies according to their initial ownership structure in 1995. Table 5 shows that in the static model mass privatized companies (N and L) show significantly higher TFP growth than companies taken over by the government, but there is evident a problem of autocorrelation of residuals (see AR(1) and AR(2) tests). In the dynamic model this problem is solved (see AR(2) test) and the results are clear: mass privatization with listing or no listing is superior to government pre-privatization program.

<Insert Table 5>

The estimated values of the coefficients for ownership dummy variables N and L allow us to conclude that the growth of TFP in the period 1995-2001 is typically higher in mass privatized companies than in those companies that were initially taken over for

restructuring and privatization by the government and its agencies. Separate testing for diagonal and off-diagonal companies is supposed to show whether these results are due to better ownership effects or/and seller effects by the initial owners from mass privatization.

<Insert Table 6>

The changes in performance of LL, NN and GG companies (diagonal companies) reflects primarily who is better temporary owner, government and its restructuring institutions or initial owners from mass privatization. Results in Table 6 reveal that in both, static and dynamic specification of the model TFP growth in the period 1995-2001 is higher in companies controlled by initial (diagonal) owners from mass privatization.

<Insert Table 7>

<Insert Table 8>

By comparing the performance in off-diagonal companies (LS, NS, GS) or in companies sold to strategic investors (LSt, NSt, GSt) we examine who is a better seller. Mass privatization institutions in Slovenia (mostly funds) are blamed for using only price criteria in making selling decisions, while government institutions are supposed to care also about employment, investments and further development of the company in making privatization decisions. The surprising results from Slovenian data for 1995-2001 is that mass privatization institutions are better sellers since they sell companies with higher TFP growth than the government does (see Table 7). Even when only sales to strategic investors are considered, TFP growth is higher in the companies that are sold by initial owners from mass privatization than in the companies sold by the government directly (see Table 8). The above results, hence, clearly demonstrate that the efficiency of different privatization programs in terms of the owner and seller effects in Slovenia is clearly pointing towards the mass privatization (with listing or non-listing). Comparison of efficiency of different privatization programs does not justify the arguments in favor of the government-led restructuring and postponed privatization.

## VI. Conclusions

After privatization based on free distribution of shares (mass privatization) it is expected that many initial owners will sell their shares to “true” owners in the secondary privatization. Thus, the recognition that privatization funds are not good owners should not be surprising, as long-term ownership was not their intended role. It is more important whether privatization funds are good sellers. Positive effects of mass privatization are thus not shown only by companies remaining in control of initial owners (ownership effect of mass privatization) but also by the companies that have already gone through secondary privatization (seller effect of mass privatization).

By empirically separating owner from seller effects on performance in mass privatized companies we can get more relevant comparison between various mass privatization programs and traditional approaches to privatization. Companies temporarily owned by mass privatization institutions should be compared with non-privatized companies and companies sold by mass privatization institution with companies privatized by the government in a standard way.

For Slovenia, we compared mass privatization programs for listed and non-listed companies with government led pre-privatization restructuring program. We find out that mass privatization institutions are better temporary owners and better sellers to strategic investors than the government and its institutions. Companies owned/sold by mass privatization institutions experience better economic performance in comparison to companies owned/sold by the government. Results are particularly strong using the TFP model where both static and dynamic versions of the model were studied, with simultaneity and heterogeneity problems explicitly controlled for using Sys-GMM approach to panel data. The strong bias in the construction of our samples of data, since the survival of companies in the period 1995-2001 and preselection of different methods by companies are affected by their past performance, was explicitly controlled for using the Heckman two-step method.

In the future we wish to use the same methodology to compare empirically owner and seller effects of various mass privatization schemes across and within three countries: Slovenia, Czech Republic and Poland. In Slovenia distribution to insiders was combined with distribution to funds and direct distribution to citizens. In the Czech Republic distribution to funds was combined with distribution to citizens, while in Poland only distribution to funds was used. Here the problem lies in the fact that institutional, legal and economic environment after mass privatization across the countries is very different (see more in Simoneti, Estrin, Böhm (Eds., 1999)). Therefore, the same methodology can be used but careful institutional analysis should complement the comparative empirical results from different countries.

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VII. ANNEX

VIII. Table 1

*Transformation matrix since completed mass privatization until the end of 1999 and distribution of companies in the ownership groups*

*n = 479*

	<b>Government</b>	<b>Non-Listed</b>	<b>Listed</b>	<b>Strategic</b>	<b>Total</b>
Government	39	11	5	16	71
Non-Listed	8	260	11	62	341
Listed	1	0	57	9	67
<b>Total</b>	<b>48</b>	<b>271</b>	<b>73</b>	<b>87</b>	<b>479</b>

*in %, n = 479*

	<b>Government</b>	<b>Non-Listed</b>	<b>Listed</b>	<b>Strategic</b>	<b>Total</b>
Government	54,93	15,49	7,04	22,54	100
Non-Listed	2,34	76,25	3,23	18,18	100
Listed	1,49	0	85,07	13,44	100
<b>Total</b>	<b>10,02</b>	<b>56,58</b>	<b>15,24</b>	<b>18,16</b>	<b>100</b>

**Table 2**

*Evaluation of the survival mechanism using probit model (base group=companies that survived throughout 1994-2001; data for 1994)*

		<b>Coef.</b>	<b>z-stat.</b>
<b>Parameters of survived companies in the 1995-2001 sample</b>			
II.	Equity/ Assets	0,240	1,22
	EBITDA/Sales	***2,494	4,71
	Sales/Labor	-8,47E-07	-0,39
	Export/Sales	**0,305	1,95
	Const.	-0,139	-0,95
<b>IV.</b>	<b>Observations</b>		847
	<b>LR Chi<sup>2</sup> (4)</b>		33,49
	<b>Prob &gt; Chi<sup>2</sup></b>		0,0000
	<b>Pseudo R<sup>2</sup></b>		0,028

\*\*\* and \*\* indicate statistical significance of coefficients at 1 and 5 per cent, respectively

**Table 3**

*Characteristics of companies initially grouped as government (G), listed (L) and non-listed (N), mean values, 1995*

*n = 479*

	1995		
	Government	Listed	Non-Listed
Number of employees	232	506	244
Assets in 000 SIT	4.043.934	11.279.311	2.464.759
Sales in 000 SIT	2.572.042	7.833.165	2.521.501
Asset per employees in 000 SIT	16.929	33.637	12.551
Sales per employees in 000 SIT	10.462	12.911	13.309
Sales to assets	0,92	0,86	1,28
Share of capital in assets	55,9%	71,1%	60,3%
Share of export in sales	27,9%	32,1%	24,0%
EBITDA to sales	4,8%	7,1%	4,2%
EBIT to sales	-2,1%	-1,2%	-0,8%
Net profit to sales	-2,8%	1,1%	0,6%
Number of companies	71	67	341

**Table 4**

*Evaluation of the privatization method selection mechanism using nested multinomial logit model (base group=listed companies in mass privatization, data for 1994)*

		<b>Coef.</b>	<b>z-stat.</b>
<b>Parameters of selection of non-listed companies in mass privatization</b>			
V.	Mills ratios from survival bias	***17,274	3,66
	Sales	***-1,23E-07	-2,76
	Labor	0,0002	0,63
	Assets/Sales	***-0,00002	-3,52
	Value added/Labor	***0,0005	3,30
	Const.	***-9,187	-3,729
	Sector Dummies	yes	
<b>Parameters of selection of companies in government pre-privatization program</b>			
VI.	Mills ratios from survival bias	**10,997	1,88
	Sales	-6,09E-08	-1,07
	Labor	-0,00006	-0,09
	Assets/Sales	**0,00001	-2,24
	Value added/Labor	0,0002	1,43
	Const.	**6,146	-2,01
	Sector Dummies	yes	
<b>VII.</b>	<b>Observations</b>		479
	<b>LR Chi<sup>2</sup> (4)</b>		158,20
	<b>Prob &gt; Chi<sup>2</sup></b>		0,0000
	<b>Pseudo R<sup>2</sup></b>		0,206

\*\*\* and \*\* indicate statistical significance of coefficients at 1 and 5 per cent respectively

IX.

X.

XI.

XII.

XIII. Table 5

Cummulative owner and seller effects in comapnies mass privatized as listed (L) and non-listed (N) in comparison to nationalized companies (G)

	Static model (OLS)		Dynamic model SYS-GMM	
	Coef.	t-value	Coef.	t-value
y (-1)			***0,72 0	10,80
Assets	***0,24 3	7,11	***0,55 8	3,93
Assets (-1)			***- 0,512	-3,83
Labor	***0,55 3	6,76	***0,69 7	4,78
Labor (-1)			***- 0,402	-3,17
L	***1,64 7	3,81	**1,024	2,03
N	***1,60 4	3,87	*0,969	1,92
lamp 1	*-0,332	-1,86	*-0,452	-1,62
lamp 2	** 0,300	-1,99	-0,395	-1,42
lamp 3	***0,67 6	3,47	0,181	0,58
Const.	yes		yes	
Time dummies	yes		yes	
Sector dummies	yes		yes	
R2	0,350			
Observations	3353		3353	
AR (1)	-3,872 [0,000]**		-5,579 [0,000]**	

<b>AR (2)</b>	-1,915 [0,055]	1,885 [0,059]
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\*\*\*, \*\* and \* indicate statistical significance of coefficients at 1, 5 and 10 per cent respectively;

Dependent variable  $y$  = production, the model is estimated in log first differences;  
Reference group = G companies

**XIV. Table 6**

*Owner effects in listed (LL) and non-listed companies (NN) in comparison to government controlled companies (GG)*

	Static model (OLS)		Dynamic model SYS-GMM	
	Coef.	t-value	Coef.	t-value
y (-1)			***0,66 8	9,73
Assets	***0,22 6	5,62	***0,59 8	4,28
Assets (-1)			***- 0,553	-4,32
Labor	***0,60 1	6,84	***0,79 6	5,55
Labor (-1)			***- 0,465	-4,19
LL	***1,38 5	3,17	*0,941	1,67
NN	***1,38 6	3,23	*0,958	1,70
lamp 1	-0,273	-1,33	-0,172	-0,67
lamp 2	-0,272	-1,58	-0,175	-0,66
lamp 3	***0,57 0	3,02	0,414	1,13
Const.		yes		yes
Time dummies		yes		yes
Sector dummies		yes		yes
R2		0,387		
Observations		2492		2492

<b>AR (1)</b>	-3,042 [0,002]**	-2,574 [0,010]*
<b>AR (2)</b>	-1,542 [0,123]	1,258 [0,208]

\*\*\*, \*\* and \* indicate statistical significance of coefficients at 1, 5 and 10 per cent respectively;

Dependent variable  $y$  = production, the model is estimated in log first differences;  
Reference group = GG companies

XV. Table 7

Seller effects in companies sold as listed (LS) and non-listed (NS) in comparison to companies sold by the government (GS)

	Static model (OLS)		Dynamic model SYS-GMM	
	Coef.	t-value	Coef.	t-value
y (-1)			***0,83 7	9,62
Assets	***0,32 4	5,13	**0,392	2,24
Assets (-1)			** 0,343	-2,33
Labor	***0,37 3	2,73	*0,316	1,72
Labor (-1)			-0,167	-1,59
LS	***2,61 8	2,64	***3,91 0	3,43
NS	***2,43 2	2,80	***3,43 4	3,07
lamp 1	-0,395	-1,16	*-0,138	-0,21
lamp 2	-0,263	-0,902	*0,144	0,21
lamp 3	**1,234	2,35	**2,282	2,12
Const.	yes		yes	
Time dummies	yes		yes	
Sector dummies	yes		yes	
R2	0,288			
Observations	861		861	
AR (1)	-3,092 [0,002]**		-4,226 [0,000]**	
AR (2)	-1,692 [0,091]		-0,832 [0,405]	

\*\*\*, \*\* and \* indicate statistical significance of coefficients at 1, 5 and 10 per cent respectively;

Dependent variable  $y$  = production, the model is estimated in log first differences;  
Reference group = GS companies

**XVI. Table 8**

*Seller effects in companies sold to strategic investors from listed (LSt) and non-listed (NSt) companies in comparison to companies sold by the government to strategic investors (GSt)*

	Static model (OLS)		Dynamic model SYS-GMM	
	Coef.	t-value	Coef.	t-value
y (-1)			***0,88 9	9,25
Assets	***0,27 9	3,86	0,248	1,36
Assets (1)			-0,271	-1,39
Labor	**0,447	2,44	**0,574	2,29
Labor (-1)			-0,369	-1,60
LSt	***3,84 8	2,96	**4,499	2,45
NSt	***3,47 5	3,14	**4,025	2,27
lamp 1	** 1,108	-2,26	-1,162	-0,80
lamp 2	** 0,816	-2,07	-0,802	-0,56
lamp 3	**1,307	2,08	1,630	0,97
Const.	yes		yes	
Time dummies	yes		yes	
Sector dummies	yes		yes	
R2	0,321			
Observations	609		609	
AR (1)	-2,068 [0,039]*		-2,614 [0,009]**	

<b>AR (2)</b>	-1,461 [0,144]	-0,490 [0,624]
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\*\*\*, \*\* and \* indicate statistical significance of coefficients at 1, 5 and 10 per cent respectively;

Dependent variable  $y$  = production, the model is estimated in log first differences;  
Reference group = GSt companies