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**Privatization, Ownership Structure,
and Firm Performance:
New Evidence from the Romanian Experiment**

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Abstract

We construct and analyze 1992-2001 panel data to study the effects of alternative post-privatization ownership structures on firm performance and the time profile of firm performance before and after privatization for the surviving population of initially state-owned enterprises in Romania. Applying OLS and fixed-effects methods to a variety of specifications, we find consistently positive, highly significant effects of private ownership on labor productivity growth, the point estimates implying an additional 1.5 to 1.9 percentage growth for an increase of 10 percent in the private shareholding. The strongest estimated impacts arise from sales to outside foreign and domestic blockholders, but insider transfers and voucher privatization are also estimated to have positive, although much smaller, effects on firm performance. Besides the immediate effect, privatization has an impact on firm performance over several years. We also find that the pre-privatization effect is positive.

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Introduction

The privatization of tens and hundreds of thousands of firms in East European economies during the 1990s represents a gigantic policy experiment in the sphere of corporate ownership and governance. The usefulness of analyzing these dramatic changes and their effects on the performance of firms derives not only from the large numbers of observations available for study, much larger than those in most Western studies, but also from several additional factors.¹ To start with, East European privatization policies resulted in very diverse ownership structures, including substantial levels of ownership by employees, by dispersed outside shareholders, and by both foreign and domestic blockholders, providing an opportunity to compare the effects of different types and concentration of ownership. Significant state ownership has also remained, in the form of both residual stakes in partially privatized firms and wholly-owned state enterprises, providing a useful control group for comparing the effects of alternative methods of privatization. Furthermore, and again unlike the situation in the West, where state-owned enterprises tend to operate in only a few sectors and under different conditions and thus to differ systematically from other firms in the same economy, state ownership was indiscriminate during the socialist period in Eastern Europe, accounting for nearly all productive assets. Privatization policies were almost equally indiscriminate, involving rapid transfers of massive numbers of shares in just a few years, in contrast to the careful selection and preparation of firms for privatization in the typical Western setting. These characteristics of the East European environment imply that the impact of new ownership structures on firm performance can be treated much more as a quasi-experimental situation in which the standard problems of endogeneity and selection bias are mitigated.

Despite the attractiveness of this research setting and the inherent scholarly and policy-oriented interest in these issues, however, there have surprisingly been few studies that fully exploited the possibilities with a corresponding research design. Notwithstanding the large number of privatized firms in Eastern Europe and what by now has become a fairly long time period for analysis, few studies include more than a few hundred firms and still fewer have more than three or four annual observations on each firm. With so little longitudinal information available, researchers have been unable to use such standard techniques as the comparison of pre- and post-privatization 3-year averages of performance measures used in

¹ See Megginson and Netter (2001) for a review of Western studies of privatization and some early studies of the results in transition economies.

Western studies (Megginson, Nash, and van Randenborgh, 1994; and Boubakri and Cosset, 1998; and D'Souza and Megginson, 1999), and frequently the studies marshal only one or two years of both pre- and post-privatization information.² The short time series not only make it difficult to estimate a privatization effect, they also make it hard to judge the nature of pre-privatization performance differences that might reflect selection bias in the privatization process. Most studies of East European privatizations, particularly those involving larger numbers of firms, also dispose of rather little information on the types of owners and the degree of concentration, frequently relying on a simple indicator for whether a firm was privatized.³

In this paper, we study the effects of alternative ownership structures on firm performance using longer time series, more comprehensive coverage, and more highly detailed information on privatization and ownership than in earlier research. The specific setting for our analysis, Romania, offers an unusual heterogeneity in privatization programs and ownership outcomes. Unlike most other countries of the region, which tended to specialize in some form of voucher, insider, or sales method of privatization, resulting in relatively homogeneous ownership structures, Romania undertook programs in each of these areas, and all of the major groups of new owners (employees, dispersed outsiders, domestic blockholders, and foreign investors) are well-represented. State ownership has also remained relatively high – both in majority positions and minority stakes – offering the possibility of a reference group that was not privatized. The available data cover every state-owned corporation surviving in Romania since the beginning of the 1990s, both those firms slated for privatization and those excluded from the process, and they include detailed information on privatization transactions and resulting ownership structure. They also include annual financial information for a ten-year period, from 1992 to 2001, enabling us to establish the patterns of firm performance both before and after privatization, given that most Romanian privatization occurred in the 1995-1999 period. We compare these performance patterns across firms privatized through alternative means, with differing ownership structures, and

² See for instance the papers by Earle and Estrin (1997), which studies data on 439 Russian enterprises from 1990 to 1994, or Frydman, Gray, and Rapaczynski (1999), with data on 200 Czech, Hungarian, and Polish firms from 1990 to 1993.

³ See for instance Claessens, Djankov, and Pohl (1997). Among the few papers with larger samples, longer time series, and detailed ownership information, Claessens and Djankov (1999) analyze data from 1992 to 1997 on the largest five owners of 706 privatized firms in the Czech Republic and Earle and Telegdy (2002) study industrial enterprise privatization with detailed ownership groups from 1992 to 1999 in Romania. While the results in these studies are highly informative, neither study includes information on firms remaining entirely in state hands, and both sets of time series end relatively early for firm conclusions to be established.

with firms remaining firmly in state hands. These panel data provide a nearly ideal setting for investigating the relationship between ownership and performance.

In addition to contributing to research on the effects of privatization, using a larger and longer panel than available to previous researchers, we exploit the advantages of these data to shed light on two particular issues. The first concerns the time profile of firm performance before and after privatization. It has been argued that the anticipation of privatization may affect firm behavior, resulting in a biased estimate of the privatization effect in a simple comparison of pre- and post-privatization performance; the sign of the bias depends on a number of factors, including whether managerial incentives are enhanced by the expected benefits under new owners – including the hope of remaining in the same position – or whether they are diminished as managers see little future with the firm and resort to asset-stripping (Aghion, Blanchard, and Burgess, 1994; Pinto et al., 1993; Roland and Sekkat, 2000) The time profile of performance is also relevant for assessing the degree of selection bias in the privatization process.

The second major issue concerns the different types of new ownership structures. While most reviews conclude that privatization studies tend to find an overall positive impact on performance, the level of confidence in the results disaggregated by owner-type tend to be even more attenuated, due to the data problems described above. Our data, however, contain substantial numbers of observations with employee ownership, dispersed outside ownership, domestic blockholders, and foreign investors, permitting us to test some common hypotheses about the relative advantages of each type of owner in raising firm performance.

The paper is organized as follows. Section I describes the data, Section II provides some background on Romanian privatization procedures and outcomes, and it develops hypotheses on the effects of alternative ownership structures on firm performance. Section III describes the estimation procedures. Section IV contains results, while caveats and conclusions are summarized in Section V.

I. Database Construction

Our analysis of the post-privatization ownership structure is based on unpublished data from multiple sources that we have linked together. Information on the ownership of the initially state-owned companies is compiled from eight databases: the State Ownership Fund (SOF) Transactions Database, the SOF Portfolio Database, the Romanian Enterprise Registry

and one database for each of the five Financial Investment Companies (SIFs).⁴ From these sources, we were able to construct a nearly complete evolution of the post-privatization ownership structure through the middle of 2000 for all initially state-owned enterprises. Thus, we do not have information on privatization for the second half of year 2000. The political environment during this year, however, was such that the speed of privatization decreased close to nil in this period. During Summer 2000 the Romanian press discussed several cases of privatization that were ambiguous and could be interpreted as the government favoritism, and cited cases of corruption that caused public discontent. In line with the news, the leading party of the opposition (Romanian Party for Social Democracy) submitted a memorandum to the Parliament that requested a moratorium on privatization until the elections (held in November 2000). The memorandum was passed, and privatization transactions were stopped. In the remaining two months after the elections very little privatization took place, because the new government was mostly preoccupied with replacing decision makers in the state bureaucracy.

The sample thus includes the surviving companies, and it excludes spin-offs of shops or assets from the parent companies.⁵ We constructed our final sample for the ownership structure by selecting the firms which belonged to industries with the NACE code between 100 – 7000, and kept only those firm-years in which the firm had 5 or more employees.⁶ The resulting database has 6,300 cases, representing about 70 percent of the total number of surviving firms from the SOF portfolio, or approximately 95 percent of the number of firms with employment over 4 and NACE code less than or equal to 7,000.

To study firm performance, we drew other information about these firms (four-digit industry code, average number of employees, and the value of sales) for each year from 1992 to 2001 from the corresponding Romanian Enterprise Registries, which we linked together for this purpose.⁷ The Registries are supposed to contain information on all registered firms which had 5 or more employees in the given year, but in each year 8-11 percent of firms have missing values, except for 1992 when only 82 percent of the data have complete information. Table 1 shows the number of observations in the regression sample, by year.

Insert Table 1 about here.

⁴ The establishment and functions of these organizations are discussed in detail in the next section.

⁵ The Appendix contains a detailed description of the construction of the database.

⁶ We deleted industries with NACE greater than 7000, because these include education, health services, cultural services, research and development, for which performance is very hard to measure. By this procedure we lost 463 firms, or approximately 5 percent of the surviving population. By selecting out those firms that had their employment always under 5, we lost 1,118 firms or 12.5 percent of the surviving population.

⁷ Sales are deflated by industrial production indexes, usually at the 4-digit industry level.

In conclusion, the data enable us to measure the post-privatization ownership structure on almost all companies from the surviving population of the state-owned enterprises with employment over 4 and NACE code less than or equal to 7,000, and to estimate the relationship between privatization methods and performance for about 80 percent of these companies.

II. Privatization Policies and Ownership Outcomes

This section presents a brief analysis of Romanian privatization policies and our computations of the post-privatization ownership structure. Our chief purpose is to analyze the implications of the privatization policies for corporate governance in order to motivate hypotheses concerning the effects of the policies on firm performance, but the results in this section also represent the first comprehensive picture of the ownership outcomes of privatization in Romania. Throughout this section we refer to three alternative perspectives on the ownership structure: the evolution of the unconditional mean by owner-type from end-1992 to 2000 (shown in Table 2), the conditional distribution of ownership by type (Table 3) and the evolution of the incidence of the largest owner-type over the same period (Table 4).

Corporatization and Residual State Ownership. Similarly to most other transition economies, the process of large and medium-sized enterprise reform in Romania began with corporatization of the SOEs, in order to make possible their transfer to multiple owners. In Romania the legal conversion took place relatively quickly, already in 1990, when the SOEs were divided into two groups: *regii autonome* and *companii comerciale*. The former group, designated as "strategic," was relatively small in number (about 450 companies), although estimates suggest that the included companies were large (accounting for 47 percent of total SOE assets, according to Romanian Development Agency, 1997).⁸ The legislation prohibited the privatization of these companies by 1998, and both discussions with officials and our data suggest that an overwhelming majority of these firms were not privatized even after when the legal restrictions were abolished.⁹ As presented in Table 2, out of the 6,300 firms in our data, 6.7 percent are *regii*, and they are completely state-owned during the whole period of study, as shown in Table 3.

⁸ Our data also show that the *regii* were larger than other state-owned companies. While the average employment of the *regii* was 3,720, this number was 680 for the other SOEs.

⁹ Our of the 440 *regii* included in our data, 16 could be found in the SOF portfolio. We did not categorize these firms as *regii*. For the legislative changes see Negrescu (2000).

Insert Table 2 and 3 about here

Firms belonging to the second group of firms were almost all reorganized as open joint-stock companies. The shares in these corporatized entities were subsequently placed in a newly established State Ownership Fund (SOF) and one of five Private Ownership Funds (POFs), in a ratio of 70:30 percent. The SOF's organization and governance resembled those of Ministries of Privatization and State Property Funds in other transition economies. The POFs, however, were more unusual. Despite their name, they remained state-governed, their boards of directors appointed by the Government subject to the approval of both houses of Parliament, and their nominal owners, approximately 18 million Romanian citizens, without any effective means of control. The inability of the POFs to control the firms in their portfolio is further emphasized by the 30 percent ownership they held in each firm: even if they wanted to govern the firms from their portfolio, the SOF – possessing 70 percent in each firm – could easily vote against them.¹⁰ In line with this reasoning, we do not treat the POFs as a separate ownership category, but we add their shares to the SOF's, treating them together in the empirical analysis. The holdings of the SOF, and the *regii* (which are 100 percent state-owned) form together the state ownership in our analysis.

Table 2 shows that state ownership was almost inclusive in 1992, when the privatization process began, and it persisted until the end of the period studied: on average, 18.9 percent of the firms' shares were still owned by the state in 2000. Conditional on being present in these firms, the SOF had an average ownership stake of 58 percent in 2000, and total state ownership was almost 70 percent, as Table 3 shows. The SOF was the largest owner in 13 percent of the firms by the end of the studies period, as reported in Table 4. Together with the *regii*, the state was the largest owner in 20 percent of the companies from our data in 2000, ten years after the economic transition started.

Insert Table 4 about here.

The Romanian Privatization Law of 1991 and associated regulations charged the SOF with the privatization of all the shares in its portfolio within seven years, although the Law provided little guidance on how this was supposed to be accomplished, specifying only a very general list of possible methods to be employed. In practice, however, there have been three fairly specific methods dominating Romanian privatization: management-employee buyout (MEBO), the mass privatization program (MPP), and block sales of shares to domestic and foreign outside investors. Sales were intended to be the primary method from the beginning,

¹⁰ Earle and Sapatoru (1993, 1994) describe the legal basis and incentives of the SOF and POFs.

but the MEBO method already received some encouragement in the Privatization Law's provision for preferential terms for managers and employees, which included right of first refusal and installment payments at very low interest rates, preferences that were expanded and extended in later legislation.¹¹ The MPP was adopted later, in 1995, as part of attempts to "accelerate" the rate of property transfer. Our ownership types follow the privatization methods adopted: we distinguish foreign and domestic blockholders, insiders and dispersed outsiders who obtained their shares in the MPP. In addition to these types, we control for those investment funds shares, which are the successors of the POFs, and we discuss them later in this section.¹² In the following we discuss each privatization method in more detail, and form hypotheses about the effect of the emerging owner-types on firm performance.

The Management-Employee Buyout Method. Privatization through transfers (giveaways or sales at low prices) to employees have been common but controversial in transition economies, due to their relative ease of administrative and political implementation, but they are also frequently alleged to be ill-suited to the restructuring demands of the transition.¹³ On the one hand, insider privatization may improve work incentives, company loyalty, and support for restructuring, and if ownership is widely dispersed among employees it may facilitate takeovers by outsiders.¹⁴ On the other hand, employees may lack the necessary skills, capital, access to markets and technologies necessary to turn their firms around, and corporate governance by employees may function particularly poorly when the firm requires difficult restructuring choices involving disparate distributional impacts within the firm.¹⁵

While such standard arguments might have some relevance for every form of employee ownership in the transition economies, the Romanian MEBOs also have significant institutional peculiarities. These stem largely from the legal requirement, in order to obtain

¹¹ MEBOs began in earnest in 1993, but a law formalizing the practices was adopted only in 1994; see Munteanu (1997) for a detailed discussion. After 1996, sales to employees were no longer formally referred to as "MEBOs," but the institutional arrangements remained the same.

¹² The tables also present the shares owned by "others." All we know about them is that they are private owners, but we cannot identify their type on the basis of our sources. These owners cannot be owners who obtained their shares in the voucher privatization and it is unlikely that they are the non-managerial employees of the company. From different data sources we could identify 9 "other" owners, and all of them were domestic or foreign outside investors. See the Appendix for more details.

¹³ Frydman and Rapaczynski (1994) and Lipton and Sachs (1991), for instance, argue against privatization to employees, while Ellerman (1993), Stiglitz (1999) and Weitzman (1993) argue in favor. Estrin, Jones and Svejnar (1987) analyze the performance effects of producer cooperatives in Western economies, and Earle and Estrin (1996) discuss the advantages and disadvantages of worker and manager ownership in transition economies.

¹⁴ For a review of evidence on the productivity effects of worker ownership in the West, see Bonin, Jones and Putterman (1993).

¹⁵ See Hansmann (1990) for this argument in explaining the patterns of worker ownership in Western economies.

the payment preferences, that the employees establish an employees' association to hold the shares and exercise most ownership rights during the repayment period of 3-5 years. During this period, the unpaid shares may not be resold, limiting the possibility for concentration or takeovers that might improve governance.¹⁶ Moreover, the Romanian privatization contracts often included restrictions, also valid for the repayment period, on changes in the firm's employment level and main product. The complicated governance and limitations on restructuring that resulted from these arrangements may have further attenuated any potentially positive effects of privatization on these firms' performance.

Table 2 shows that in the first four years of privatization the MEBO method was the only that diminished state ownership. At the end of 1995, out of 18.6 percent privatized, 17.4 percent of the firms' shares were held by the employees of the company, and by 2000 this percent further increased to 27.7. MEBO privatization took place in 2,488 companies, and the average holding conditional on non-zero ownership of the employees was 70.2 percent, shown in Table 3. One-quarter of the firms had the employees as the largest owner-type (Table 4). In addition to the institutional peculiarities discussed above, therefore, insider privatization in Romania also differs from that in other transition economies in the magnitude of the insider share in the affected firms. Unlike most share transfers to employees in Hungary and Poland, and to an even greater degree than in Russia, the Romanian MEBOs tended to result in overwhelming employee ownership: usually the entire SOF stake of 70 percent, although there were also some cases of minority participation (sometimes combined together with other methods, mass privatization or a block sale, described below).¹⁷ The MEBOs therefore provide an interesting opportunity to test the effect of dominant employee ownership in a large number of privatized firms.

The Mass Privatization Program, establishment of the Financial Investment Funds (SIFs). A second major method was mass or voucher privatization. As elsewhere in Eastern Europe, the rationale for this method was that the speed of privatization could be increased by overcoming the problems of insufficient demand due to low domestic savings and reluctance of foreign investors (e.g., Earle, Frydman and Rapaczynski, 1993; Boycko, Shleifer and Vishny, 1994). The programs, frequently labeled "mass privatization," were also intended to jump-start domestic equity markets with a rapid release of shares. On the other hand, such

¹⁶ Using the CEU Labor Project survey on 101 firms that underwent MEBO privatization in 1993-94, Earle and Telegdy (2003) report that approximately 20 – 20 percent is the share of producer cooperatives and managerial buyouts, the remaining 60 percent being an ESOP.

¹⁷ See Earle and Estrin (1996) for a comparative discussion. The fraction obtained by insiders in Romanian MEBOs was frequently 100 percent, as the POFs often sold their shares simultaneously with the SOF.

programs run the risk of highly dispersed ownership structures, a problem normally addressed through the creation of intermediaries – either by the state as part of the program (e.g., in Poland), or by private parties competing for individuals’ vouchers (e.g., in Czechoslovakia). Although there has been rather little empirical evidence on the effects of these programs, a number of authors have been highly critical of them.¹⁸

The Romanian mass privatization program (MPP), carried out in 1995-96, provides an opportunity to estimate the effects of a rather extreme form of voucher privatization: one that ensured maximal dispersion of ownership by prohibiting the trading of vouchers and the formation of intermediaries. The potential benefits of the program may also have been reduced by the large stake kept by the state: in most companies included in the program, only 60 percent of the shares were offered, while in those deemed “strategic” (which tended to be relatively large firms) the figure was only 49 percent. Even these percentages were reached in very few companies, due to the peculiar asymmetry of the treatment of excess demand and excess supply by the allocation procedure: oversubscription resulted in *pro rata* allocation, while undersubscription resulted in untransferred shares.¹⁹ As Table 2 shows, the voucher privatization transferred on average 22.1 percent of firms’ shares in the data. Table 3 reports that 4,260 enterprises were included in the program, and the program succeeded to privatize only 32.6 percent of the companies shares on average. The MPP owners were the largest ownership type in almost one-quarter of the companies, as shown in Table 4.

The consequence was inevitably an ownership structure heavily dominated by the state (often retaining the majority stake) facing a highly dispersed group of private owners. Any hope for a positive impact of this program would seem to rely on an indirect mechanism: either through secondary sales leading to increased private ownership concentration, through share trading increasing information about firm performance and therefore managerial incentives,²⁰ or through some complementarity with other owners, particularly blockholders that purchased shares through a direct sale. In such cases, the MPP may still have had a positive effect, despite its design.

Shares in the MPP were taken both from the SOF and the five POFs, but the latter could regain some shares if citizen-participants in the MPP exercised their option to place their vouchers with one of them. These organizations were converted into investment funds (known in Romanian as “SIFs”), but their governance remained nontransparent, each having

¹⁸ See, e.g., Stiglitz (1999), Black, Kraakman and Tarrasova (2000), Kornai (2000), and Roland (2001).

¹⁹ Earle and Telegdy (1998) report details of the MPP procedures.

several million small shareholders and rules preventing ownership concentration.²¹ On average, by the program's design, the POFs/SIFs were net losers from this procedure: their mean ownership share dropped from 22.3 percent at the end of 1995 to 6.3 percent a year later, according to our computations. As a consequence of subsequent sales, their share further decreased in the latter years, reaching 4.7 percent on average in 2000, as Table 2 shows. However, after the MPP their management probably gained independence. The state stopped controlling them, their de facto owners, the several million Romanian citizens had no means of control over their "property," while the SOF did not have a majority stake in the firms the POFs had shares. It is highly possible that the independent managers, who could not receive benefits directly from their portfolio, engaged in self-dealing rather than restructuring of the companies. Because of the new status of the SIFs, we treat them differently from the POFs, and consider them a new private ownership type. As Table 3 shows, in 2000 the SIFs held on average 25.4 percent of the shares in 1,013 firms, and in 2.7 percent of the firms they were the largest owner (Table 4).

Privatization through Sales to Domestic and Foreign Outsiders. The third major class of privatization method employed in Romania has involved case-by-case sales of large blocks of shares to domestic and foreign outside investors. The most important type of sales method has been closed-bid tender, in which not only the offered price but also the business plan, investment and employment promises, and other considerations are taken into account by the SOF in selecting the buyer. These considerations are then frequently reflected in provisions of the privatization contract that restrict post-privatization behavior, as in the MEBO privatizations (Negrescu, 2000). Although the Romanian policymakers may feel themselves politically constrained to ensure continued employment and operation of the firms, such restrictions could have reduced restructuring in the companies privatized through block sales, reducing the potential benefits of privatization.

Moreover, the sales method has a number of intrinsic problems that tend to make it slow and uncertain. First, multi-criteria tenders naturally involve a lack of transparency in the process, as there are no announced or pre-determined weights for the various aspects of the bid and potential participants are left guessing as to the tradeoffs among them. The bids are not publicly revealed after the tender either, making it difficult to monitor the SOF's decisions. Because of the lack of an objective criterion and the nontransparency of the

²⁰ After the MPP, most of the companies were listed on either the Bucharest Stock Exchange or RASDAQ (the Romanian over-the-counter market).

²¹ See Negrescu (2000) for more discussion of the POF/SIFs.

process, the selection decision can be easily manipulated, creating the appearance, if not always the reality, of corruption. Indeed, even a perfectly clean process organized by perfectly honest, well-intentioned bureaucrats can be hijacked by corruption charges, as there is little defense against charges of favoritism. Opposition parties are quick to exploit the possibility to score points against the government, and the bureaucrats, fearing charges of corruption and with few incentives to privatize aggressively, tend to act very cautiously. Of course, the problems are magnified to the extent that the bureaucrats are less than perfect and act as rent-seekers by seeking bribes in the privatization process and colluding with the enterprise managers to strip assets before privatization. Political battles may also erupt over the fulfillment of the contractual restrictions, resulting in the canceling of privatization contracts, effectively in renationalization.²² The cumulative effect is to further reduce demand and make sales more difficult as potential investors become still more reluctant to participate in the uncertain environment.

These difficulties are reflected in the pace of privatization through sales in Romania, which has been slow, similar to the experience of most other transition economies, although the Romanian privatization policy specified them as the primary method from the very beginning of the process in 1991.²³ As shown in Table 2, in the first five years of privatization, only 2.5 percent of the firms' shares were owned by domestic outsiders, and almost none by foreigners. In the second period sales speeded up to some extent, reaching in 2000 22.9 percent on average of domestic, and 1.7 percent of foreign ownership. Most of these blocks were quite large: their conditional average is 58.3 and 57.9 percent, respectively, reported in Table 3. Table 4 shows that 23.3 percent of our sample had domestic outsiders, and 2.1 percent had a foreign largest owner (not necessary majority).

Summary of Privatization Policies. By 2000, state's ownership share in our sample had fallen to 18.9 percent on average. Most of the companies with private ownership became majority private. The most prevalent types of owners were employees (27.7 percent on average), followed by domestic outsiders and participants of the Mass Privatization Program (22.9 percent and 22.1 percent on average, respectively). Foreign investors had a tiny ownership share: only 1.7 percent on average. The Financial Investment Funds established by the state and left without control held 4.7 percent of the firms' shares on average. In one-

²² Our database shows that annulments of transactions are much more common for sales than for MEBOs, and non-existent for MPP transfers.

²³ Eastern Germany, Hungary and Estonia, each of which had clear advantages in selling to outsiders, are partial exceptions to the generally slow rate of privatization through sales in transition economies, although the pace was criticized even in these three countries.

fifth of all firms, the state remained the largest owner. The heterogeneity of the Romanian privatization methods thus produced an interesting testing ground for examining the impact of alternative ownership structures on firm performance, where each typical owner-type is present, and the state also retained significant ownership stakes, which can function as a control group when we estimate the impact of privatization on firm performance.

At the same time, our analysis has also highlighted reasons why privatization may have had little or no effect in Romania, or at least had fewer benefits than if it had been optimally designed. Each of the privatization methods created possible corporate governance problems (insider control, dispersion of shareholdings, contractual restrictions) that might have blocked or reduced the new owners' incentives to restructure and raise productivity. An additional factor that could have weakened the impact of any form of privatization is the general business environment: if property rights are not respected and enforcement of contracts and corporate governance rules is poor, then the new owners may expect little return from their investments and restructuring efforts.²⁴ The business environment in Romania has come in for frequent criticism, for instance in the EBRD's regular grading of transition economies' "institutional performance." EBRD (2000, p. 21) awarded Romania a score only slightly ahead of Russia and well behind Hungary, Poland, and the Czech Republic, although none of the economies were considered to have reached "a standard that would not look out of place in an industrialized market economy" (p. 16). Regardless of the exact rankings, which are rather arbitrary, our point is that it is not a foregone conclusion that privatization under such conditions, even sales of large blocks to outsiders, would yield substantial benefits: the question can only be decided through empirical analysis.

III. Estimation Procedures

The central question of this paper concerns the relationship between the post-privatization ownership structure and firm performance. We explore this relation from more angles. First, we simply estimate a linear relationship. Then we test separately the effect of different owners to explore the differences among them. In the last part of the analysis we disaggregate privatization along the time dimension to test what is that time pattern of the impact of privatization on firm performance.

The basic estimating equation is the following:

²⁴ See Anderson *et al.* (1999) for this argument with respect to Mongolia. Black, Kraakman and Tarassova (2000) claim that privatization in a poor institutional environment actually increased asset-stripping and worsened firm performance in Russia.

$$P_{it} = \beta_0 + \beta_1 OWN_{it} + \beta_2 X_{it} + u_{it}, \quad (1)$$

where P_{it} is a measure of firm performance, OWN_{it} captures ownership in different forms, X_{it} is a vector of covariates, and u_{it} is a residual. The covariates we use are the lagged level of productivity and lagged level of employment. We also include 2-digit industry effects, regional effects and year effects.

We define P_{it} as the growth of labor productivity, measured as the logarithmic change of the ratio of real sales to number of employees. While total factor productivity (TFP) is the preferred measure of studies in mature market economies, because it provides more information on technological change, labor productivity may change when the labor-capital ratio changes, but not the underlying technology (Bartelsman and Doms, 2000). Thus, labor productivity incorporates investment and organizational changes – changes in the boundaries of the firm – more directly. While one expected outcome of privatization is that the new owners will rationalize the firm’s size and organization, we argue that changes in the labor productivity reflects additional information, compared to changes in the TFP.²⁵ Specifying the dependent variable in growth form serves to difference away any fixed firm-specific characteristics—such as superior technology or larger initial capital stock—that affect the level of labor productivity. As discussed below, we also control for industry, size, and the lagged level of labor productivity to take into account other differences across firms such as capital-labor ratios; in some specifications we also include fixed firm effects or group effects (for ownership types).

Table 5 shows summary statistics for the level of employment, real sales, labor productivity and the logarithmic change in labor productivity for the years between 1992 and 2001. The initially state-owned firms experienced a dramatic decrease in their employment for this period, from 861 employees to 301 employees on average. This drop of 280 percent was accompanied with a shrinkage of the value of sales, and a drop of the labor productivity between 1992-98, followed by a recovery.

Insert Table 5 about here

Turning to the control variables, X_{it} , we are interested in accounting for heterogeneity in performance, P_{it} , that may also be correlated with our variables of interest, OWN_{it} . A first problem involves mismeasurement in labor productivity arising if firms differ systematically with respect to their production functions and levels of investment, and capital-labor ratios. This suggests that industry effects (for each 2-digit industrial branch we specify one category

in total having 42 categories) and firm size (a proxy for capital intensity) should be included; we measure size as employment, lagged to avoid endogeneity problems. Firms may also differ in their set-up costs, quality of equipment, and technology. Again these are likely to be correlated with industry and size, and we also include the lagged level of labor productivity in X_{it} , and in some specifications firm-specific fixed effects.²⁶

A second problem involves initial conditions and the magnitude of the demand shock faced by the firm, as the state cut its orders drastically and customer and supply chains broke down (Blanchard and Kremer, 1997). A firm with better initial conditions may have been more cushioned from the impact of competition, while a greater shock suggests that firms may have greater difficulty adjusting and maintaining productivity. We hypothesize that firms facing a greater demand shock will have more difficulty maintaining productive efficiency, due to the costs of laying off workers, unbundling equipment and other capital, etc. These shocks may be correlated with industry and region, and they likely vary across years. We include year, industry, and region (6 categories) effects under the assumption that these may be correlated with unobserved shocks to a firm's productivity; and it is frequently argued that larger firms face more difficult adjustments, thus lagged employment is useful here as well. The region effects also may reflect market conditions in a firm's environment: particularly for declining firms, maintaining productivity may be easier when the industry and region is growing, facilitating the release of workers and capital to other firms. Finally, the region effects may also account for differences in relative input prices that could lead to different allocation of factors of production within firms.

We measure ownership in several different ways in this study.²⁷ First, we use the measure of privatization which was employed in most of such studies: a dummy ($Privmaj_{it}$), that is equal to one if the ownership share of the private owners larger than 50 percent. In this model we control for group effects: the variable $PrivateEver_i$ indicates whether the firm has ever become majority private during the entire sample period. Although 100 percent state-owned we include the *regii autonome* as a separate category, since these firms could not be

²⁵ Another measure used by many is Tobin's Q, but we argue that this is inappropriate, when only a tiny fraction of firms is quoted on the stock exchange.

²⁶ The lagged level of productivity is frequently included in productivity and productivity growth equations (e.g., Anderson *et al.*, 2000; Earle, 1998; Frydman *et al.*, 1999). Another argument for controlling for it is the possibility that it is more difficult, other things equal, to increase productivity if it is already high than if it is low.

²⁷ The ownership variables take into account any privatization transactions that occurred during the preceding year, thus OWN_{it} refers to the ownership structure on January 1 of year t . This date falls at the exact midpoint of the period of growth measured by the dependent variable, labor productivity growth, since the latter is calculated using total sales and average employment for year t relative to year $t-1$.

privatized for most of the studied period, contrary to the other state-owned firm, which had this option but did not use it. The estimating equation thus becomes

$$\begin{aligned} \text{Log}(S_{it}/E_{it}) - \text{Log}(S_{it-1}/E_{it-1}) &= \alpha_0 + \\ &\alpha_{00}\text{PrivateEver}_i + \alpha_{10}\text{PrivateMaj}_{it} + \alpha_{30}\text{Reg}_{ii} + \\ &\alpha_2\text{Log}(S_{it-1}/E_{it-1}) + \alpha_3\text{Log}E_{it-1} + \sum_{t=1}\alpha_t\text{YEAR}_t + \sum_{j=1}\alpha_j\text{IND}_{ij} + \sum_{k=1}\alpha_k\text{REG}_{ik} + v_{it}. \end{aligned} \quad (2)$$

Next, we disaggregate *PrivateMaj_{it}* by types of owners. We define largest-owner dummies for each ownership category that we can distinguish: domestic outside investors (*DomesticLarge_{it}*), foreign investors (*ForeignLarge_{it}*), insiders obtained their ownership in a MEBO privatization (*InsideLarge_{it}*), Romanian citizens who took part of the voucher privatization (*VoucherLarge_{it}*), the SIF (*SIFLarge_{it}*) and the unclassifiable private owners (*OtherLarge_{it}*), and include group effect, as in the previous model:

$$\begin{aligned} \text{Log}(S_{it}/E_{it}) - \text{Log}(S_{it-1}/E_{it-1}) &= \beta_0 + \beta_{01}\text{DomesticEver}_i + \beta_{02}\text{ForeignEver}_i + \\ &\beta_{03}\text{InsideEver}_i + \beta_{04}\text{VoucherEver}_i + \beta_{05}\text{SIFEver}_i + \beta_{06}\text{OtherEver}_i + \\ &\beta_{11}\text{DomesticLargest}_{it} + \beta_{12}\text{ForeignLargest}_{it} + \beta_{13}\text{InsideLargest}_{it} + \beta_{14}\text{VoucherLargest}_{it} + \\ &\beta_{15}\text{SIFLargest}_{it} + \beta_{16}\text{OtherLargest}_{it} + \beta_2\text{Reg}_{ii} + \\ &\beta_2\text{Log}(S_{it-1}/E_{it-1}) + \beta_3\text{Log}E_{it-1} + \sum_t\beta_t\text{YEAR}_t + \sum_j\beta_j\text{IND}_{ij} + \sum_k\beta_k\text{REG}_{ik} + v_{it}, \end{aligned} \quad (3)$$

where the group effects are constant over time, analogously to *PrivateEver_i*.²⁸

In the next two specifications we take advantage of the richness of our ownership measure, and instead of dummies, we use the share of private ownership and types of owners, respectively. Here we do not use group effects, but to control for simultaneity bias between privatization and firm performance, we include firm-fixed effects. In these models, the estimates of reflect the effects of the “within-firm” variation of ownership by permitting each firm to have a separate intercept. Thus, any systematic variation across firms in the rate of its labor productivity growth will not contaminate the parameter estimates. The firm fixed-effects also help to control for possible endogeneity of ownership, resulting for instance from any tendency for firms with higher productivity growth to be privatized. As long as the unobserved component of productivity growth associated with the privatization propensity is fixed over time, then the inclusion of firm effects completely controls for selection bias.

²⁸ In order to use all firms from our sample, we define the dummies according to the largest, and not to majority owner. Thus, the *XLargest* dummies may be equal to one even when owner-type *X* does not possess the majority of the shares.

In the last specification we interact the majority private dummy with year dummies, to test the timing pattern of the effect of privatization on firm performance. The estimating equation is the following:

$$\begin{aligned} \text{Log}(S_{it}/E_{it}) - \text{Log}(S_{it-1}/E_{it-1}) = & \gamma_0 + \sum_{l=-4 \dots 4} \gamma_{0l} \text{Year}(l) * \text{PrivateMaj}_{it} + \\ & \gamma_2 \text{Log}(S_{it-1}/E_{it-1}) + \gamma_3 \text{Log}E_{it-1} + \sum_t \gamma_t \text{YEAR}_t + \sum_j \gamma_j \text{IND}_{ij} + \sum_k \gamma_k \text{REG}_{ik} + v_{it}, \end{aligned} \quad (4)$$

where $\text{Year}(-l)$ is equal to 1 if the firm became majority private in l years, $\text{Year}(0)$ indicates the year of privatization and $\text{Year}(l)$ is equal to one if the firm became majority private l years before. Thus, we disaggregate the effect of majority privatization over years.

IV Empirical Results

Effect of private ownership on firm performance. Table 6 examines the effect of majority privatization on productivity growth, based on Equation (2) from the previous section. As in all regressions, we use OLS and firm fixed-effects models. Majority privatization is estimated to have a positive and statistically significant effect on productivity growth in both equations, the point estimate being equal to 0.102 for the OLS and 0.147 for the fixed effect estimation. The estimated group effects of private firms are also positive and significant, showing that firms are not randomly chosen into privatization, but this effect is much smaller, than the estimated majority privatization effect (0.065). Finally, the coefficient of the *regii autonome* is -0.073 (significant at the 5-percent level), showing that these firms perform worse than other firms in state-ownership. The worse performance of these state-owned companies relative to the other SOEs owned by the SOF may reflect the confidence of the managers, that their company will not be privatized in the medium term, to say at least. This is only true if we believe that privatization has a positive effect on firm performance before it actually takes place (and we show some evidence of this effect later in this section). However, selection of these firms can also play a role in the negativity of the coefficient. We know that on average these firms were almost three times larger in 1992 than the privatizable SOF companies. When the government prevented the privatization of these firms, it probably selected those, for which they feared the most that privatization would cause large labor shedding or the shut-down of the firm. Some rough evidence can be given for this selection with our data: the average productivity in 1992 for the *regii* was Lei 1.8 million, while for the SOF firms Lei 3.4 million, almost two time larger.

Insert Table 6 about here.

When we estimate the effect of the share of private ownership, our results do not change qualitatively, as reported in Table 7. The estimated effect of ten percent increase in *PrivateShare* implies an increase of 1.5 – 1.9 in the growth of labor productivity.

Insert Table 7 about here.

Effect of ownership-types on firm performance. The previous results referred to the effect of majority privatization and the average effect of privatizing an additional one percent of the firm's shares, without distinguishing the type of new private owner. Table 8 contains estimates of Equation (3), which disaggregates private ownership into several subcategories, indicating the ownership type of the largest owner, and adds group effects to the specification. Group effects suggest that firms with higher pre-privatization productivity growth rates were more likely to be privatized by the MEBO method (the estimated coefficient of *InsideEver* is 0.118, and significant), but other privatization types have also higher pre-privatization productivity growth, although the estimated group effect is much smaller (in the range of 0.032 – 0.059, depending on the type of privatization). This is consistent with the idea that insiders know much more about their firm than outsiders, and they took part of privatization only if they believed that their firm was viable. Notwithstanding the presence of these group effects, the results show that privatization indeed increased productivity growth for the firms in our data: among the identified owner-types, *ForeignLargest* has the largest coefficient (0.245), followed by *DomesticLargest* (0.210). *InsideLargest* and *VoucherLargest* coefficients are smaller (0.046 and 0.088, respectively), while all are highly statistically significant. The estimation shows that the SIF as the largest owner is not statistically different from the SOE (the coefficient is the smallest, 0.01, and statistically insignificant). The same model estimated including firm fixed-effects (not including group effect) does not change the results qualitatively.²⁹

Insert Table 8 about here.

When we change the dummy variable models with shares of private owners, the estimated coefficients remain qualitatively similar, as Table 9 presents. Outside blockholding has the largest point estimates (within this category the estimated effect of foreign ownership is larger than domestic ownership), while *VoucherShare* and *InsideShare* has smaller, but positive, significant coefficients. The effect of *Regii* on firm performance is consistent with our results from the other regressions: these firms perform worse than the other state firms.

²⁹ The only difference is that *OtherLargest* has a significant, large coefficient. As we describe in our data section, most of the others are probably blockholders, and the large positive coefficient reflects their effect on firm performance.

Insert Table 9 about here.

In conclusion, our results show that privatization has a positive effect on the growth of labor productivity. Among the types of owners that can be found in the firms' post-privatization ownership structure, foreign and domestic blockholders have the largest positive effect on firm performance, but alternative privatization methods – MEBO and voucher privatization – also cause positive labor productivity growth, although on more modest levels than blockholders.

Timing pattern of the privatization effect on firm performance. Having established the positive effect of privatization on labor productivity growth, we question now what is the time pattern of this effect? Does all the growth of productivity take place within one year, or the effect is distributed over several years? Are there any pre-privatization effects, and if the answer on this question is affirmative, are those effects positive or negative? Depending on the issue addressed, economic theory predicts either a positive and a negative effect. Aghion, Blanchard and Burgess (1994) construct a model in which restructuring depends on several factors. In general, if managers do not have incentive payments (as it usually happens in post communist countries), and they expect that privatization will take place relatively quickly, they do not have incentives to undertake the costly job of restructuring, because there is a high probability that privatization will happen before the positive effects of restructuring take place. However, this result is affected by the time horizon of the managers (the further the time when the firm will become private, the higher incentives the manager has to restructure), by the stake of managers in the privatized firm, and by the development of managerial labor markets, which creates incentives for signaling the quality of the managers. Roland and Sekkat (2000) reach more unambiguous conclusions. In the framework of a dynamic adverse selection model they show, that privatization has two effects on managerial behavior. It enhances the emergence of managerial labor market, and through competition induces managers to signal their ability to restructure and, as private property unfolds, it gives SOE managers an outside option, which eliminates the ratchet effect, which undermined incentives for restructuring under socialism.

Thus, only empirical analysis can determine the pre-privatization behavior of SOEs. This question also has a practical importance. For the privatization to come, it is essential to know how important is the speed of privatization: do governments have time to prepare firms for privatization, and seek for more efficient, but also more scarce owners, such as outside blockholders? Or asset stripping before privatization prevents this time consuming search,

and it is more efficient to transfer the shares to the population by voucher privatization, for example?

Our results, presented in Table 10 have two findings. First, although the largest impact of privatization happens in the year of privatization (the coefficient of this year is 0.250 for the OLS, 0.218 for the fixed-effect estimation), there is also an important a delayed effect: each year after privatization adds a productivity increase of 0.9 – 1.9 percent, depending on the year and type of regression (each coefficient is significant at the 1-percent level). Second, our estimations are more in favor of pre-privatization restructuring, rather than asset stripping or doing nothing. The coefficients showing the effect of privatization for 1, 2, and 3 years before privatization are positive and significant. The coefficients showing the effect of privatization 2 and 3 years before it actually takes place are rather small and the coefficient for the year before privatization is large: 0.155 for OLS and 0.103 for fixed-effect estimation.

V. Conclusions

What are the characteristics of an ideal data set for examining the effects of privatization and new ownership structures on firm performance? First of all, the data should include a large number of observations on both privatized and state-owned firms, and among the privatized firms, a diverse set of ownership structures. Second, there should be long time series for each firm, permitting precise comparison of performance both pre- and post-privatization, an estimation of the evolution of privatization effects over time, and an assessment of any pre-privatization differences across firms that would point to possible selection biases in the privatization process. Together these two characteristics imply the possibility of employing various versions of difference-in-differences estimators. Third, the data should cover industries from the entire economy, to permit general conclusions on the effects of privatization, not limited to particular sectors. Fourth, to mitigate problems of simultaneity bias, privatization should be randomly applied to firms, and the new ownership structures should be exogenous with respect to firm performance.

No real world data fully satisfy all of these characteristics of an ideal experiment, but the situation in East European countries comes closest in all respects. Among these countries, Romania is a particularly apt case for study, in the nature of both the privatization process and the available data. The privatization process in Romania has been massive and rapid by Western standards, creating a very diverse set of ownership structures in a large number of

firms across all economic sectors in a short time period, while leaving substantial levels of residual state ownership. The available data are comprehensive, covering all Romanian enterprises inherited from the socialist period and surviving until 2001, and they include not only detailed ownership results from the privatization process but also financial indicators for a ten-year period. As in any study that does not involve randomization, the possibility of endogeneity contaminating the results cannot be completely eliminated, and this possibility is a caveat for our results. We have attempted to reduce the problem through the use of a number of control variables and fixed effects, an analysis of timing of the performance impacts of ownership changes, an investigation of alternative performance indicators, and an assessment of the robustness of the results to changes in the specifications, but this caveat should be borne in mind.

Nevertheless, the data and the setting appear to offer a rather clear set of findings. First, privatization has a positive, statistically significant impact on the growth of labor productivity, in each regression model we employ in this analysis. Second, among the owner-types we can identify, outside blockholders have the largest influence on firm performance, and we have some evidence that foreign owners are better suited to the needs of Romanian companies, than domestic blockholders. An interesting finding concerns the effect of alternative privatization methods: although much smaller than sale privatization, both inside privatization and voucher privatization have a positive estimated coefficient. Third, majority privatization does not have a one-year effect, but its impact on labor productivity takes several years. And finally, the pre-privatization effect is positive, supporting signalling theories of managerial behavior rather than asset stripping.

Appendix: Construction of the Ownership Time-Series

Firms we study in this paper belong to the surviving population of initially state-owned companies. Information on the ownership time-series did not exist in a single database. Moreover, the existing data had missing values and internal inconsistencies. We used 10 different databases in order to overcome these problems and accumulate as much information as possible on the post-privatization ownership structure of the corporatized, initially state-owned companies. In this Appendix we describe the sources of data and our imputations, as well as the number of companies we lost during the data cleaning procedures. As a result, the time-series provide information on 7,863 companies, approximately 88 percent of the surviving population.

Our data consists of two groups: those enterprises that were corporatized at the beginning of 1990s, belonged to the SOF portfolio and were eligible to privatization (the *commercial companies*), and those which were subordinated to different ministries, and were not eligible to any privatization at least by 1998, as we discuss in Section 2 (the *regii autonome*). This last group did not change its ownership for the period studied, and we simply took them from the Romanian Enterprise Registries (424 companies). The other group, however, went through subsequent privatization programs, and the construction of the ownership time series presented a serious challenge. In the following we write down step by step our procedures.

We drew the surviving population of the corporatized SOEs from the State Ownership Fund (SOF) portfolio database, which contains each commercial company that survived through the mid of 2000. If the company was 100 percent privatized, it still remained in the portfolio. However, we do not observe firms that were taken out from the SOF's portfolio for some reason, or disappeared due to boundary changes (if a split-up happened, we observe two companies instead of one and in the case of a merger, we observe only one company instead of two). In the case of split-ups and mergers, however, we encounter in our analysis all the capital (and employment) of the initial company, except for the case when the split-up resulted in transferring the shares of one newly founded company to some other state body (most probably a ministry).

We had two major problems with the data. First, we had very little information on the SOF and Private Ownership Funds' (POF) holdings. For both of them, only for one point in time could we obtain information on the percentage held, which is the end of the Mass Privatization Program (MPP).³⁰ Second, in many cases the ownership shares of the types of owners do not add up to 100. Despite these drawbacks, we argue that the large number of firms included, and the precise information on the privatizations (exact percentage and distinguishable types of buyers) make these data particularly valuable.

Out of the companies from the database, 18 had very scarce ownership information and we dropped these cases. Pilot privatizations were not present in the 2000 portfolio data and we added them from an earlier SOF portfolio data (21 cases). Before applying cleaning rules, we had a total of 8,487 firms.

As a starting point, we used the SOF's portfolio database from July 2000, merged with the SOF transactions database. The former contains the SOF and the five POFs holdings "after the MPP," which we consider as end of 1996.³¹ In addition, the database has information on the sales of the POFs before the MPP, the MPP transactions and on managers'

³⁰ The end of the MPP is a very important date in the SOF portfolio data because the holdings of both the SOF and the SIFs are given only for this point in time. We speculate that the reason for this may be the large changes in the portfolios, both because the large amount privatized and new institutional settings, as we discuss in Section 2 in detail.

³¹ In fact, the SOF holdings are presented as the sum of post-MPP holdings and the sales made from its portfolio.

direct holdings. The latter probably represents those holdings that managers could obtain through stock options. From the SOF 1999 portfolio data we added one ownership variable, on "others" holdings. About the "others" holdings we only know that it represents private holdings, but we know neither the date when it became existent nor the type of the private owner.³² The transactions database has thorough information on each sales transaction done by the SOF (percent transferred, date of transaction and type of buyer).³³ The data identifies three types of buyers: the Employee's Organization (PAS), domestic blockholders (further disaggregated into individuals and institutions), and foreign investors.³⁴ We list all variables and their origins are in Table A1.

A1. Cleaning Rules and Treatment of Missing Data

As a first step, we cleaned SOF holding in 1996, the only date when we possess this information. Table A2 shows all our imputations, the number of firms in which we changed the ownership information and the number of firms dropped. By manual checking, we cleaned 18 cases and dropped 2 (see Table A2). If the variable representing the sum of SOF holding in 1996 and the SOF's sales before 1996 was smaller than the sum of sales in 1996, we adjusted the SOF holding. This cleaning affected 104 firms, out of which 9 were dropped.

We cleaned the MPP transactions with the help of another database (MPP transactions data). If these data brought the sum of ownership shares closer to 100 percent than the MPP holding from the SOF portfolio data, we changed the information. This cleaning rule affected 101 cases.

Having cleaned the SOF holding, we switched to the SIF holdings. We had information on the SIFs 1996 holdings from the SOF portfolio data, as we discussed above. Also, for each SIF we had two databases for the 1998 and 1999 end-of-the-year portfolios, and for one we also had information on its 97 portfolio. The problem we encountered here was that in many cases the 1996 holdings were smaller than the 1998 (1997) holdings. This is possible theoretically, since the SIFs have become in 1996 independent investment companies, but highly improbable, given the motivations and constraints of the SIFs managers, ruled by the institutional setting, discussed in Section 2. If the holdings in 1998 (97) were larger than in 96, we set the 1998 and 1997 equal to the 1996 holdings, if this imputation brought closer the sum of holdings to 100. We applied this rule to 91 companies.³⁵

One weakness of the data is the variable on the pre-MPP privatizations done by the POFs. We observed that there were many cases, when approximately 30 percent were missing from the total sum of holdings. We assumed that in these cases the POF had its 30 percent sold there. Thus, if the SOF sold something previous to the MPP, and there was

³² From different sources we could identify 9 of the 63 firms for which the largest owner belonged to this category, and all of them were domestic or foreign blockholders.

³³ Thus, we do not have information on privatization for the second half of year 2000. The speed of privatization, however, probably decreased close to nil in this period. The press discussed several cases of privatization that were ambiguous and cited cases of corruption that caused public discontent. In line with the news, the leading party of the opposition (Romanian Party for Social Democracy) submitted a memorandum to the Parliament that requested a moratorium on privatization until the elections (held in November 2000). The memorandum was passed, and privatization transactions were stopped. In the remaining two months after the elections most probably very little privatization took place, because the new government was mostly preoccupied with replacing decision makers in the state bureaucracy.

³⁴ For the completeness of the data description we mention that the SOF transactions database identifies four methods of privatization - public offering, direct negotiation, privatization through the Bucharest Stock Exchange and Rasdaq (the over-the-counter market) - but we do not use this information in the paper.

³⁵ We learned from SOF officials that information on the SIFs is imprecise in the SOF data. The difference between the holdings was usually very small (around 1-3 percent).

approximately 30 (20 - 40) percent missing from the total holdings, we assumed that the SIF sold its 30 percent to the same type of buyer.

The variable on the SIF's pre-MPP privatizations is larger than 30 percent in some cases. According to our knowledge, this is not possible. If the variable was smaller than 40 percent, we set it equal to 30, if it was larger than 40 percent, we dropped the firm (13 and 7 cases, respectively).

A2. Construction of the Ownership Time-Series and Final Cleaning

As we discussed in the previous section we had information on all owner-types holdings only for 1996. For 1992 - 1995 we computed the SOF and the five POF's shares by taking the initial shares equal to 70 - 30 percent, and subtracting from these the privatization transactions indicated in the SOF transaction data. If the SOF's share became negative but small (less than -3 percent), we set it equal to zero, if it was larger, we dropped the firm (6 and 1 case, respectively).

We did not have information on the date of the SIF privatizations, and to overcome this, we assumed that the POF always sold together with the SOF.³⁶ With this imputation we solved most of the POF privatizations. For the firms when the SOF did not sell anything, but the POFs did, we categorized the private owner as "other," and distributed the percentage privatized equally among 1993 - 1995.

For the 1997 - 2000 period we computed the SOF shares by subtracting from the 1996 holding the sales made by the SOF. For all the SIFs, we had their 1998 and 1999 holdings, (and for one the 1997 holdings, too), as we discussed in the presentation of our variables. When we did not have the 1997 holdings, we set them equal to the mean of 1996 and 1998 holdings. For 2000 we did not have any information on the SIFs, we had to set them equal to the 1999 holdings.

We had a variable on the direct managerial holdings and another on "others" share, as we discussed at the beginning of this Appendix. We added the managerial share to the insiders' share (representing transaction from the MEBO privatization) and "others" share to the variable in which we gathered all private holdings without information on the type of the buyer. We also added to this variable the SIF privatizations.

Having computed all ownership shares for all types of buyers and for all year we performed a final cleaning, which aimed to set the total sum of the different ownership shares equal to 100. If the sum of holdings was larger than 120, we dropped the firm. By this procedure we lost many firms, but we are more confident in the information we kept. After this cleaning, we still had to overcome two inconsistencies. First, the SOF holding in 1997 - 2000 was sometimes negative. (We subtracted from the 1996 holdings the post 1996 sales, which sometimes resulted a negative number.) If the SOF holding was less than -10 percent, we dropped the firm out of our sample, if it was in the range of -10 to 0, we set it equal to zero.

We had to make only one final step: rescale the ownership shares when their sum was other than 100. Here we encountered the difficulty was that not only a yearly rescale had to be performed, but the private ownership shares were linked across the years: they were computed by adding the new sales to the previous year's holdings. Had we rescaled yearly, it would have happened that private ownership shares became smaller in a latter year, than in an earlier one. Obviously, this "nationalization" would not make any sense, thus we had to keep the proportions of the private shares not only within, but also across the years. For the firms which did not have any SOF and SIF share, we rescaled the 2000 holdings to be equal to 100,

³⁶ This seems to us as a plausible assumption given the dependence of the POFs.

and also rescaled back to 1992. Having made this, we rescaled the SOF and SIF holding in the years when the sum did not add up to 100.³⁷

After all these cleaning procedures, we lost 12.5 percent of our data. The final number of firms is 7,439, and together with the *regii autonome* 7,863.

³⁷ Besides avoiding "nationalization," another argument supporting the rescaling of SOF and SIF holdings rather than the private shares is that we have much more reliable information on the private shares than on these organizations holdings.

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Tables and Figures

Table 1: Number of Firms with Complete Ownership, Employment and Sales Data

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Number	4,361	4,742	4,908	5,034	5,540	5,687	5,680	5,425	5,095	4,726
Percent	69.2	75.3	77.9	79.9	87.9	90.3	90.2	86.1	80.9	75.0

Total number of firms: 6,300

Table 2: Evolution of the Ownership Structure
(average percent at year-end)

Privatization Method	1992	1993	1994	1995	1996	1997	1998	1999	2000
Private, of which	0.3	4.1	12.4	18.6	52.2	56.8	64.8	75.9	81.1
Domestic sales	0.1	0.1	0.4	0.7	2.5	4.7	10.3	18.2	22.9
Foreign sales	0.0	0.0	0.0	0.1	0.1	0.3	0.8	1.4	1.7
Inside privatization	0.2	3.9	11.7	17.4	20.8	22.9	24.7	27.3	27.7
Voucher privatization	0.0	0.0	0.0	0.0	22.1	22.1	22.1	22.1	22.1
Investment fund (SIF)	0.0	0.0	0.0	0.0	6.3	5.8	5.3	4.7	4.7
Other private	0.0	0.1	0.2	0.4	0.5	1.0	1.6	2.1	2.1
State, of which	99.6	95.9	87.6	81.4	47.8	43.2	35.2	24.1	18.9
State Ownership Fund	92.9	89.2	80.9	74.7	41.1	36.5	28.5	17.4	12.2
Regii Autonome	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7

Number of firms: 6,300

Notes: Domestic and Foreign Sales = outside investors (domestic or foreign) who obtained their holdings through block sales, Inside privatization = employees who obtained shares through management-employee buyouts, Voucher privatization = individuals who obtained shares within the Mass Privatization Program, SIF = the five investment funds transformed from the state-founded Private Ownership Funds, Other private = owners not classifiable with available information, Regii autonome = firms not eligible to privatization.

Table 3: Average Ownership
(conditional on positive holdings)

Privatization Method	1992	1993	1994	1995	1996	1997	1998	1999	2000
Private, of which	100.0	37.0	63.9	70.1	59.1	64.3	73.0	84.2	89.3
	(21)	(699)	(1,218)	(1,669)	(5,557)	(5,563)	(5,588)	(5,681)	(5,721)
Domestic sales	96.9	69.7	74.4	72.1	48.7	43.6	50.9	56.5	58.4
	(7)	(10)	(32)	(60)	(322)	(688)	(1,280)	(2,033)	(2,468)
Foreign sales	49.0	66.1	77.7	72.3	70.8	56.9	55.8	57.2	57.9
	(1)	(2)	(3)	(6)	(8)	(29)	(94)	(159)	(182)
Inside privatization	86.8	45.1	70.3	74.0	68.0	63.7	64.1	65.3	70.2
	(18)	(539)	(1,048)	(1,485)	(1,923)	(2,260)	(2,426)	(2,635)	(2,488)
Voucher privatization	0.0	0.0	0.0	0.0	32.6	32.6	32.6	32.6	32.6
	(0)	(0)	(0)	(0)	(4,260)	(4,260)	(4,260)	(4,260)	(4,260)
Investment fund (SIF)	0.0	0.0	0.0	0.0	24.6	22.0	22.9	25.1	25.4
	(0)	(0)	(0)	(0)	(1,615)	(1,674)	(1,443)	(1,185)	(1,163)
Other private	0.0	4.5	9.1	13.6	18.1	9.4	13.4	13.0	13.0
	(0)	(171)	(171)	(171)	(171)	(662)	(747)	(1,013)	(1,013)
State, of which	100.0	99.7	98.6	95.4	64.6	63.7	65.4	67.2	68.2
	(6,279)	(6,061)	(5,600)	(5,376)	(4,662)	(4,272)	(3,394)	(2,259)	(1,742)
State Ownership Fund	100.0	99.6	98.5	95.0	61.0	59.7	60.5	59.6	58.0
	(5,855)	(5,637)	(5,176)	(4,952)	(4,238)	(3,848)	(2,970)	(1,835)	(1,318)
Regii Autonome	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	(424)	(424)	(424)	(424)	(424)	(424)	(424)	(424)	(424)

Number of firms: 6,300

Notes: Domestic and Foreign Sales = outside investors (domestic or foreign) who obtained their holdings through block sales, Inside privatization = employees who obtained shares through management-employee buyouts, Voucher privatization = individuals who obtained shares within the Mass Privatization Program, SIF = the five investment funds transformed from the state-founded Private Ownership Funds, Other private = owners not classifiable with available information, Regii autonome = firms not eligible to privatization. Number of firms with positive ownership share in parentheses.

Table 4: Ownership Structure by the Largest-Owner Type

Privatization Method	1992	1993	1994	1995	1996	1997	1998	1999	2000
Total private, of which	0.3	4.0	12.2	18.3	53.4	57.1	64.4	75.5	81.0
Domestic sales	0.1	0.1	0.4	0.8	2.2	3.7	9.4	18.1	23.3
Foreign sales	0.0	0.0	0.0	0.1	0.3	0.3	1.0	1.8	2.1
MEBO privatization	0.2	0.4	11.8	18.6	20.4	21.2	23.2	26.2	26.7
Voucher privatization	0.0	0.0	0.0	0.0	24.2	25.3	24.8	24.6	24.5
Investment fund (SIF)	0.0	0.0	0.0	0.0	3.8	3.3	3.0	2.7	2.7
Other private	0.0	0.0	0.0	0.0	0.0	0.0	0.6	1.0	1.0
Total State, of which	99.9	96.3	88.0	81.9	49.7	46.4	38.2	25.8	20.0
State Ownership Fund	92.9	89.3	81.0	74.9	42.7	39.4	31.2	18.8	13.0
Regii Autonome	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0

Number of firms: 6,300

Notes: Domestic and Foreign Sales = outside investors (domestic or foreign) who obtained their holdings through block sales, Inside privatization = employees who obtained shares through management-employee buyouts, Voucher privatization = individuals who obtained shares within the Mass Privatization Program, SIF = the five investment funds transformed from the state-founded Private Ownership Funds, Other private = owners not classifiable with available information, Regii autonome = firms not eligible to privatization.

Table 5: Summary Statistics for Employment, Real Sales and Labor Productivity

		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Employment	Mean	861	776	658	634	583	494	404	323	304	301
	Std. Dev.	4,268	4,055	3,695	3,534	3,237	2,946	2,287	1,684	1,646	1,665
Real sales	Mean	1.8	2.0	1.4	1.4	1.3	1.1	0.8	0.7	0.7	0.8
	Std. Dev.	12.2	17.4	11.1	9.9	10.1	11.3	8.5	8.9	8.5	5.4
Labor productivity	Mean	3.4	2.7	2.3	2.2	2.2	1.7	1.5	1.6	1.8	2.0
	Std. Dev.	15.0	7.5	6.3	4.3	3.9	3.2	2.7	2.6	2.9	3.5
Productivity growth	Mean	NA	-0.05	-0.12	0.06	0.00	-0.13	-0.11	-0.00	0.00	-0.06
	Std. Dev.	NA	0.58	0.53	0.52	0.46	0.50	0.52	0.58	0.65	0.79
Number of firms		4,361	4,336	4,654	4,706	4,932	5,402	5,482	5,311	5,018	4,647

Notes: Real value of sales expressed in millions of 1992 lei. Productivity growth expressed as logarithmic change.

NA: not applicable.

Table 6: Estimated Impact of Majority Privatization on Productivity Growth

	OLS		FE	
	Coeff.	SE	Coeff.	SE
Majority priv.	0.102**	0.008	0.147**	0.009
Private ever	0.065**	0.012		
Regii dummy	-0.073*	0.034		
R ²	0.108		0.239	
N	44,488		44,488	

Notes: Dependent variable = labor productivity growth. R²: R² for OLS, R²-within for fixed effects. OLS standard errors adjusted for clustering on firm, robust standard errors for fixed-effects. All regressions include controls for previous performance, employment size and year effects. OLS regressions also include regional and 2-digit industrial group effects (6 and 42 categories). ** = significant at 1 percent level, * = significant at 5 percent level.

Table 7: Estimated Impact of Private Share on Productivity Growth

	OLS		FE	
	Coeff.	SE	Coeff.	SE
Private share	0.152**	0.011	0.192**	0.012
Regii dummy	-0.101**	0.030		
R ²	0.107		0.239	
N	44,488		44,488	

Notes: Dependent variable = labor productivity growth. R²: R² for OLS, R²-within for fixed effects. OLS standard errors adjusted for clustering on firm, robust standard errors for fixed-effects. All regressions include controls for previous performance, employment size and year effects. OLS regressions also include regional and 2-digit industrial group effects (6 and 42 categories). ** = significant at 1 percent level, * = significant at 5 percent level.

Table 8: Estimated Impact of Largest Private Owner-Type on Productivity Growth Using Group Effects

	OLS		FE	
	Coeff.	SE	Coeff.	SE
DomesticLargest	0.210**	0.017	0.280**	0.018
ForeignLargest	0.245**	0.043	0.311**	0.040
InsideLargest	0.046**	0.010	0.085**	0.012
VoucherLargest	0.088**	0.012	0.123**	0.012
SIFLargest	0.010	0.022	0.044*	0.022
OtherLargest	0.065	0.069	0.184*	0.081
Ever Domestic	0.032**	0.012		
Ever Foreign	0.050**	0.020		
Ever Inside	0.118**	0.013		
Ever Voucher	0.048**	0.013		
Ever SIF	0.059**	0.017		
Ever Other	0.044	0.039		
Regii dummy	-0.078*	0.034		
R ²	0.112		0.243	
N	44,488		44,488	

Notes: Dependent variable = labor productivity growth. The reference category is state as the largest owner. R^2 : R^2 for OLS, R^2 -within for fixed effects. OLS standard errors adjusted for clustering on firm, robust standard errors for fixed-effects. All regressions include controls for previous performance, employment size and year effects. OLS regressions also include regional and 2-digit industrial group effects (6 and 42 categories). ** = significant at 1 percent level, * = significant at 5 percent level.

Table 9: Estimated Impact of Types of Owners on Productivity Growth

	OLS		FE	
	Coeff.	SE	Coeff.	SE
DomesticShare	0.257**	0.021	0.362**	0.024
ForeignShare	0.436**	0.056	0.566**	0.062
InsideShare	0.134**	0.011	0.088**	0.013
VoucherShare	0.106**	0.019	0.179**	0.023
SIFShare	0.039	0.025	0.077*	0.033
OtherShare	0.121*	0.058	0.051	0.089
Regii dummy	-0.106**	0.030		
R ²	0.110		0.244	
N	44,488		44,488	

Notes: Dependent variable = labor productivity growth. The reference category is state as the largest owner. R²: R² for OLS, R²-within for fixed effects. OLS standard errors adjusted for clustering on firm, robust standard errors for fixed-effects. All regressions include controls for previous performance, employment size and year effects. OLS regressions also include regional and 2-digit industrial group effects (6 and 42 categories). ** = significant at 1 percent level, * = significant at 5 percent level.

Table 10: Estimated Time Profile of the Impact of Majority Privatization on Productivity Growth

	OLS		FE	
	Coeff.	SE	Coeff.	SE
Priv. in 4 or more years	0.015	0.011		
Priv. in 3 years	0.093**	0.012		
Priv. in 2 years	0.079**	0.012	0.035**	0.011
Priv. in 1 year	0.155**	0.013	0.103**	0.012
Priv. in current year	0.250**	0.014	0.210**	0.014
Priv. for 1 year	0.178**	0.014	0.185**	0.016
Priv. for 2 years	0.182**	0.015	0.192**	0.019
Priv. for 3 years	0.170**	0.016	0.178**	0.021
Priv. for 4 years	0.121**	0.016	0.092**	0.025
R ²	0.113		0.242	
N	44,488		44,488	

Notes: Dependent variable = labor productivity growth. R²: R² for OLS, R²-within for fixed effects. OLS standard errors adjusted for clustering on firm, robust standard errors for fixed-effects. The regression include controls for previous performance, employment size and year effects. Omitted category: year of privatization. ** = significant at 1 percent level, * = significant at 5 percent level.

Table A1: Sources of Variables

Variable	Source
Fiscal code	Each database
County	FPS portfolio data 99, 2000
2-digit CAEN code	FPS portfolio data 99, 2000
Percent sold, date of sale, type of buyer	FPS transactions data 2000
FPS holding after the MPP (1996) + sales by the MPP	FPS portfolio data 2000
SIF holding after the MPP (1996)	FPS portfolio data 2000
FPP privatizations (before the MPP)	FPS portfolio data 2000
Percent transferred in the MPP	FPS portfolio data 2000, MPP database for missing values
Manager's direct share	FPS portfolio data 2000
"others" share	FPS portfolio data 99
Holdings of SIF Moldova in 97	SIF Moldova portfolio data
Holdings of all SIFs in 98, 99	5 SIFs portfolio data

Table A2: Cleaning Rules and Number of Firms Changed and Dropped

Cleaning or imputation rule	Number changed	Number dropped	Number left
Initial number of cases (after merging transaction data with portfolio data and pilot privatizations added)			8519
Sales add up to more than 100	18	2	8517
same type same year: set to 100	4		
same type for different years: change first transaction	6		
PAS the first buyer: change its holding	6		
total sum under 110: rescale	2		
total sum above 110: drop		2	8515
Cases without ownership information		4	8511
FPS96 smaller than sales until 96.	95	9	8502
Set FPS96 = FPS sales if the sum of holdings is closer to 100	56		
If sales happened in 96, it is possible they were not included in the FPS96. In these cases set FPS96 = sales by 96	16		
If the difference less than 20 percent, set FPS96 = sales by 96, drop if difference larger	23	9	8493
SIF98 < SIF96. Set SIF98 = SIF96 if the sum of holdings is closer to 100. (For SIF Moldova use its holdings in 97.)	91		
From the MPP database include transfers if the total sum of holdings is closer to 100.	101		
Approximately 30 percent missing from the total sum of holdings (20-40). If the FPS sold over 30 percent before the MPP, assume that the FPP also sold its 30 percent	55		
Only FPS96 is known, no other ownership info.		14	8479
SIF privatization before the MPP larger than 30. If less than 40, set it equal to 30, if above 40, drop.	13	7	8472
Compute FPS ownership shares for 92-95 by considering FPS92=70, and subtract yearly sales from it. If between [-1, -3] set to 0, if less than -3, drop.	6	1	8471
Assume FPP sold together with the FPS (to the same buyer)	1435		
If the FPS did not sell and the FPP did, put it to "other" category.	185		
If the sum of holdings in 96 > 120, drop		365	8106
FPS holding negative in some cases between 97-2000. If under -10 percent, drop, if between [-10, 0], set to 0.	80, 127, 177, 213	231	7875
If sum of holdings in any year less than 90 or larger than 110, drop.		436	7439
Still 436 cases for which the holdings do not add up to 100. (Out of these, for 154 the difference is under 1 percent) If there was no FPS or SIF holding in 2000, rescale the holdings to 100.	477 (in 2000)		
Change FPS and SIF holding to make the sum of holdings add up to 100. (The changes are mostly small, around 2 percent with a max of 7 percent)	2-71		