

# Privatization and output behavior during the transition: Methods matter!

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Received 7 February 2005; revised 6 December 2006

Available online 30 January 2007

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**Gouret, Fabian**—Privatization and output behavior during the transition: Methods matter!

This paper clarifies what dominant methods of privatization contributed to the macroeconomic gains from privatization during the transition. Building upon the macroeconomic empirical literature on transition, our results first support the Kornai's view. Economic performance gains come only from the use of gradual sales as a primary method of privatization. However, we find that primary methods of privatization leading to permanent changes in the ownership structure of the economies have different effects on output levels but not on annual growth rates. *Journal of Comparative Economics* 35 (1) (2007) 3–34. Centre d'Economie de la Sorbonne, UMR8174, Pôle ROSES, Université Paris I Panthéon-Sorbonne, Paris, France; Université de Marne la Vallée, Pôle du Bois de l'Étang, Marne-la-Vallée, France.

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*JEL classification:* G38; L33; O11; P31

*Keywords:* Transition; Privatization; Methods

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## 1. Introduction

The process of privatization in the former communist countries has generated a considerable microeconomic literature.<sup>1</sup> Nevertheless, in transition economies, privatization is an institu-

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<sup>1</sup> Djankov and Murrell (2002) have applied meta-analysis techniques to summarize this literature.

tional large-scale policy reform and there is an agreement that privatization will have a positive impact on the economy's output level, if not on its rate of growth. A healthy macroeconomic empirical literature exists on the relative importance of initial conditions, macroeconomic stabilization and liberalization on growth or output recovery.<sup>2</sup> However, López-Calva and Sheshinski (2003) indicate that little macroeconometric evidence exists on the effects of privatization. In the best of the case, an EBRD privatization indicator is included in an aggregate liberalization index constructed as a weighted average of other EBRD transition indicators like price and trade liberalization.

This paper contributes to the literature on transition by seeking to clarify what methods of privatization contributed, at the macro level, to the gains from privatization. Economists, in their majority, support an economic system in which private ownership would dominate. However, this broad agreement does not resolve what method has to be used to privatize. The debate which opposed partisans of massive giveaways, e.g., Lipton and Sachs (1990), and partisans of gradual sales, e.g., Kornai (1990), at the beginning of transition, led in practice to different privatization policies. Some countries adopted fast giveaways to outsiders or insiders as did the Czech Republic and Russia, respectively; others used management employee buy out, hereafter MEBO, to sell their small and medium enterprises, e.g., Slovenia, or favored sales to outsiders, e.g., Hungary. Ten years after *The Road to a Free Economy* (Kornai, 1990), Kornai (2000) argues that in concern with ownership reform, he was right. Comparing Hungary and Poland on the one hand, and the Czech Republic and Russia on the other hand, he highlights that a strategy of privatization through gradual sales is the best way to privatize existing assets. The strategy of mass privatization is inferior at best and expressly harmful at worst. Enough data are now available to examine econometrically if Kornai is right.

Two closely related papers are Zinnes et al. (2001), hereafter ZES, and Bennett et al. (2004a, 2004b), hereafter BEMU. ZES use an econometric setting close to the MEL and include an indicator which captures the process of privatization to explain the behavior of output. They show that privatization does not have a significant impact, unless the budget constraint is hard enough and the legal and institutional framework permits owners to control their firms. While ZES consider the importance of the strength of the institutional governance regime to empower owners, we do so through the lens of methods of privatization. BEMU investigate the impact of different privatization methods in a panel data of 23 transition economies over the period 1990–2001. Their most striking result is that countries which apply massive giveaways as a primary privatization method have a higher annual growth rate than those which use gradual sales.

This result as well as the explanations provided contrast with the stylized facts of the transition experience. Given the example of the Czech Republic, BEMU (2004a, p. 24) claim that the distribution of shares at nominal cost to the general public led to shares being placed in the hands of privatization funds, which exerted pressure on managers to be relatively efficient. In fact, Glaeser et al. (2001) show that in the Czech Republic the privatization program has turned out to be disappointing because the institutional governance regime to empower owners was weak. Note that BEMU (2004a, Table 8) themselves find that countries which apply massive giveaways as a primary privatization method have a lower annual growth rate than those which use gradual sales when they consider only non-CIS countries.

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<sup>2</sup> For brevity, throughout this paper, MEL stands for this literature. Important contributions are, e.g., Berg et al. (1999), De Melo et al. (1996, 2001), Falcetti et al. (2002), Fischer et al. (1996a, 1996b), Havrylyshyn et al. (1998) and Hernández-Catá (1997).

In fact, BEMU (2004a, 2004b) derive their results from a cross-country growth model along the line of Mankiw et al. (1992) relating annual growth rate to factor inputs. This approach is certainly a valuable approach, given that a small strand of the empirical literature worth mentioning discusses the growth prospects for economies in transition using this model. Using this approach, Fischer et al. (1998) study the process of convergence of Central European countries to low-income European Union countries like Greece and Portugal. The EBRD Transition Report of 1997 also follows this method to show that the level of institutional development can hamper convergence. However, it contrasts with the MEL which prefers to explain the growth process by reforms and stabilization.<sup>3</sup>

In an econometric setting close to the MEL, this paper reports contrary results to those of BEMU. We first find that privatization through gradual sales always has a positive impact on output level. On the other hand, privatization through massive giveaways has no impact. Second, it seems that dominant privatization methods leading to a permanent change in the ownership structure of the economy have different effects on output levels but not on annual growth rates. Indeed results obtained in a cross country growth model along the line of Mankiw et al. (1992) relating annual growth rate to factor inputs are very sensitive to the inclusion/exclusion of proxies for macroeconomic stabilization and reforms like price and trade liberalization.

The rest of the paper is organized as follows. Section 2 summarizes the policy debate which has mostly opposed partisans of massive giveaways to partisans of gradual sales. In Section 3, we introduce our methodology and our database. Section 4 proceeds to examine econometrically how privatization affects the output behavior according to the primary privatization method implemented. Section 5 provides explanations of why our results and those of BEMU differ. Finally, Section 6 offers a summary of the findings of the paper.

## 2. The theory of privatization

Privatization is widely considered as an important centerpiece of the process of transition in the former communist countries. The theoretical literature argues that public ownership suffers serious efficiency losses because of agency problems and political interference in the management of firms.

First, agency problems occur when the manager maximizes his own utility function but not that of the owners of the firm. The problem of separation of ownership and control also exists in the modern capitalist corporation. Nevertheless, a state-owned enterprise is not traded on a market, so it is impossible to use market value as an indicator of good or bad management. It is the main reason of the inability of the state to monitor enterprise managers. And the reforms undertaken during the socialist era, which consisted in delegating control rights from ministries to the management of firms, could not have functioned because managers did not internalize the consequences of their actions as Kornai (1992) highlights.

Second, politicians have a tendency to distort managerial objectives to satisfy political objectives, especially excess employment. On the one hand, politicians care about votes of people whose jobs are in danger and lobbies. On the other hand, the cost to the politician of distorting firms' objectives away from profit maximization is low: the cost of a bail out is easily spread across groups of tax payers, which are less organized groups than unions. Consequently,

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<sup>3</sup> The MEL assumes, implicitly, or explicitly, like Fischer et al. (1996a) and Havrylyshyn (2001), that as far as countries have not experienced enough structural reforms and stabilization, the basic economic growth equation with neo-classical determinants is inadequate.

politicians do not internalize the cost of distorting managerial objectives as Boycko et al. (1996) highlight.

Economists, in their majority, support an economic system in which private ownership would dominate. Despite this broad agreement, an important debate has opposed partisans of massive giveaways, e.g., Lipton and Sachs (1990), to partisans of economic efficiency and revenue maximization through gradual sales, e.g., Kornai (1990) and Murrell (1995), or sales against noncash bids, e.g., Bolton and Roland (1992).<sup>4</sup>

For Kornai (1990, 2000), the inefficiency of state firms is due to the separation of ownership and control. Thus preference must be given to sales schemes that produce an ownership with a clear dominant owner. He emphasizes the role of entrepreneurs who risk personal financial losses. Therefore the transfer should be done at market price organized through sale auctions. The buyer can be an insider, but he has to pay a genuine price. It means that privatization cannot be allowed to degenerate into a form of giveaway. With sales, assets go to people with a real ownership behavior. When state firms can be restructured in order to be sold, a preprivatization restructuring has to be done. The latter serves as a screening device in order to attract private investors as Roland (2000) discusses. Indeed, private investors acquire the firms where the quality of assets yields positive expected returns. But firms should not be sustained artificially. If they have negative value, so unsaleable, they have to be liquidated.

Partisans of mass privatization have used different arguments to justify massive giveaways. First, Lipton and Sachs (1990) argue that a standard technique of transfer may take millennia for two reasons. On the one hand, the private wealth is limited in transition economies. On the other hand, a costly preprivatization restructuring would be necessary in too many cases to attract strategic investors. Thus, coupons could accelerate the process.

Second, partisans of mass privatization believe that privatization means the ending of subsidies, which drain state finances. Lipton and Sachs (1990) consider that it is due to the inability of the state to monitor managers. For Boycko et al. (1996), this soft budget constraint syndrome is due to self-interested politicians who want to satisfy their constituencies.<sup>5</sup>

Third, other partisans of massive giveaways invoked the Coase theorem to claim that the question of how to privatize was irrelevant. Thus massive giveaways could be implemented. The basic concept is that it does not matter if the initial allocation of legal entitlements, like the Russian mass privatization to insiders, is inefficient. An efficient allocation will ultimately appear, regardless of how the property rights are allocated. Nevertheless, this result has not occurred because the existence of both well defined and enforceable property rights, the exchange on a perfectly competitive market and bargaining between parties without cost, are necessary conditions which are still not fulfilled in some transition economies. For example in Russia the renegotiation and recontracting of the allocation of property rights were blocked by powerful interest groups, because de facto regulatory and legal institutions responsible for shareholder protection did not develop. Without these regulatory and legal institutions supporting ownership, owners do not have the power to exercise their prerogatives of ownership and control as Pistor (2001) discusses.

Let's note that Lipton and Sachs (1990) have been conscious that free distribution leads to a dispersed shareholding. So mass privatization proposals to outsiders have proposed intermediaries between citizens and firms to concentrate the shareholding. As Nivet (2001) points out, the

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<sup>4</sup> A noncash sale includes payment against credit or leasing contract.

<sup>5</sup> In a nutshell, partisans of mass privatization believe that privatization was a sufficient condition to harden the budget constraint. For Kornai (2001), a dominant role for the private sector is a necessary condition for a hard budget constraint but not a sufficient one.

controversies revolved around the precise form of these intermediaries, e.g., holdings or mutual funds, and the way they had to be created, i.e. by the state or spontaneously. Launched in 1992, the Czech Privatization Program is a typical example of spontaneous creation of intermediaries. The Czech Program was initially designed in a way that would lead to dispersed ownership. However, coupons were concentrated afterwards in Investment Funds. Various Funds were launched by big state-owned banks. Consequently, Kornai (2001) highlights that this privatization has not permitted to sever the umbilical cord between the firms and the state because the state, through the banking system, was the ultimate purchaser of the privatizing assets.

### 3. Empirical approach and data description

Our database covers the period from 1990 to 2001 and includes the 25 countries usually used in the MEL.<sup>6</sup>

Our main dependent variable is *IGDP*, an index of real GDP relative to 1989, so that the value for each country is 100 in 1989. Therefore, the index gives the degree of economic recovery by showing the percent of pretransition GDP attained in the year  $t$ , like Hernández-Catá (1997) and ZES. To construct this variable, we use annual GDP growth rates from EBRD (2002b). This approach differs from some papers of the MEL, e.g., Falcetti et al. (2002) and Fischer et al. (1996a), as well as BEMU (2004a, 2004b), which use the annual growth rate and not growth since 1989 as a left-hand-side variable. Two reasons motivate our choice. First, Berg et al. (1999) argue that an index of real output has to be used because of the time-series properties of the data.<sup>7</sup> Second, the MEL existing on the relative importance of initial conditions, macroeconomic stabilization and liberalization on growth takes an ad hoc approach to specification. An important exception is Hernández-Catá (1997) who derives a structural form from first principles. He starts with a standard production function with a new and an old sector.<sup>8</sup> Liberalization increases the share of the new sector. At the end, his right-hand-side variables have no inputs, but instead policy variables like other studies. However, his left-hand-side variable is the degree of output recovery.

An important objection to *IGDP* is that it is based on calendar time. However, years of beginning of transition are different from a country to another. That is why various authors prefer to use a data set based on what they call transition time. Following Falcetti et al. (2002), it is a data set in which the first year for each country is the year when the break with the past political regime occurred. Thus, we will also consider *IGDPTRY* an index of real GDP relative to the

<sup>6</sup> The 25 countries are Albania, Armenia, Azerbaijan, Belarus, Bulgaria, Croatia, the Czech Republic, Estonia, Georgia, Hungary, the Kyrgyz Republic, Latvia, Lithuania, Kazakhstan, Macedonia, Moldova, Poland, Romania, Russia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.

<sup>7</sup> They assume that the right-hand-side policy variables are stationary, as they presumably evolve toward some international standard defined by market economies. Thus, if output is  $I(1)$ , changes in stationary policy variables have permanent effects on growth. Nevertheless, if output is  $I(0)$  the left-hand-side variable should be the level of output. The Dickey–Fuller test permits to reject the unit root in half of the countries considered. Considering the  $t$ -bar test statistic of Im et al. (2003), which is a panel unit root test based on the Dickey–Fuller statistics averaged across the countries, they also reject the unit root null hypothesis. Thus they define the endogenous variable as the output level. However, these tests have extremely weak power in short time series. So, we give more importance to the second argument that follows.

<sup>8</sup> Campos and Coricelli (2002) and Havrylyshyn (2001) assimilate the new and the old sector of Hernández-Catá to the private and the state sector. This assimilation goes too far because ownership does not appear explicitly neither implicitly in the work of Hernández-Catá. The unique conclusion that can be drawn from Hernández-Catá is that the new sector is roughly 2.6 to 3.6 times more productive than the old sector. However, we do not know if the old and the new sector are the state and the private sector, respectively.

pretransition output, i.e. the output obtained during the ultimate year of the past political regime, with a data set only based on transition time.<sup>9</sup>

Using fixed effects model estimations with the data sets based on calendar or transition time will control for selection bias only to the extent that the unobserved characteristics correlated with the right-hand-side variables are constant over time. However, most of the countries implement a clear privatization policies until two or three years after the beginning of transition. In the meanwhile, different factors might occur which can potentially influence the choice and the implementation of a privatization policy. For instance, it is possible that some countries chose mass privatization because they had deeper output declines prior to their choice; countries might also wait the amelioration of the legal and regulatory institutions supporting ownership prior the implementation of gradual sales. To deal with this problem, we use a third data set which begins for each country the year when a dominant privatization method had been implemented. In analogy with the data set based on transition time, we say that this data set is based on privatization time.<sup>10</sup> The dependent variable, *IGDPPRY*, is an index of real GDP relative to the year prior the dominant privatization method was implemented.<sup>11</sup>

Concerning explanatory variables, we can not take advantage of the indicators developed in Sachs et al. (2000) and used by ZES which especially includes an indicator of change-of-title, *COT*. We construct an indicator *Priv* which aims to capture the privatization stricto sensu, like *COT*. *Priv* includes three EBRD indicators: the large scale privatization index, *LSP*, the small scale privatization index, *SSP*, and the private sector share of GDP, *PSG*.<sup>12</sup> To generate our indicator *Priv*, we proceed the following steps. First, to aggregate these three indexes, they need to be on the same scale. *LSP* and *SSP* comes from 1 to 4.33. *PSG* is in percent. Thus we rescale these three indicators between 0 and 1. Second, we compute the simple average of the sum of the three rescaled indicators to obtain *Priv*. As a result, *Priv* covers the value between 0 and 1. Tables 1 and 2 present the five countries with the highest value and the five countries with the lowest value of *Priv* for some selected calendar and transition years. These tables reflect the effects of privatization. In 1990, the countries with the highest indicator of privatization were Poland, Hungary and some countries of the Former Yugoslavia. Extensive small-scale private trade and service activity existed in these countries. If we look at the classification based on transition time, one sees that Hungary and Slovenia disappear off the classification for the first

<sup>9</sup> Transition has begun in 1990 in Bulgaria, the Czech Republic, Hungary, Poland, Romania and Slovakia; in 1991 in Albania, Croatia, Macedonia and Slovenia; in 1992 in Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, the Kyrgyz Republic, Lithuania, Latvia, Moldova, Russia, Ukraine, Tajikistan, Turkmenistan and Uzbekistan.

<sup>10</sup> Privatization is widely considered as the centerpiece of the process of transition in the former communist countries. Thus it is as if our preferred definition of transition time is based one the year in which a clear privatization policy is implemented.

<sup>11</sup> Contrary to the data sets based on calendar time and transition time, we do not balance the data set based on privatization time because Azerbaijan began its privatization policy only in 1996. Consequently, a balanced panel will imply a data set of only 5 years for each country. However, we have considered such a panel data set and results are qualitatively identical to those presented in the next section.

<sup>12</sup> Note that ZES distinguish between the privatization stricto sensu, i.e. *COT*, and the depth of privatization. The depth of privatization is broken in two components, *COT* and *OBCA*. Our *Priv* indicator is broadly identical to *COT*. *COT* includes *LSP*, *SSP* and *PSG* and two others sub-index that we do not have for all the series: the private sector employment share and the percentage of all small firms privatized. *OBCA* is composed of additional important factors identified by the literature: institutions to address agency issues, hardening of the budget constraints, market competition as well as developing institutions and a regulatory framework to support them. *O* is for the firm's objectives, *BC* is for the firm's budget constraint, and *A* is for the agency problem.

Table 1  
Countries with the 5 highest and the 5 lowest *Priv* by calendar time

	1990	1995	2001
<i>Highest</i>	Poland (0.3)	Czech Republic (0.83)	Czech Republic (0.89)
	Croatia (0.15)	Estonia (0.81)	Hungary (0.89)
	FYR Macedonia (0.15)	Hungary (0.77)	Slovakia (0.89)
	Slovenia (0.15)	Lithuania (0.71)	Estonia (0.88)
	Hungary (0.08)	Slovakia (0.70)	Poland (0.81)
<i>Lowest</i>	Albania (0.016)	Uzbekistan (0.52)	Tajikistan (0.55)
	Belarus (0.016)	Azerbaijan (0.48)	Azerbaijan (0.53)
	Kazakhstan (0.016)	Tajikistan (0.40)	Uzbekistan (0.52)
	Kyrgyz Republic (0.016)	Turkmenistan (0.25)	Turkmenistan (0.18)
	Russia (0.016)	Belarus (0.16)	Belarus (0.16)

Note. The levels of *Priv* are reported after the countries.

Table 2  
Countries with the 5 highest and 5 lowest *Priv* by transition time

	1	5	10
<i>Highest</i>	Lithuania (0.33)	Estonia (0.86)	Czech Republic (0.89)
	Poland (0.30)	Czech Republic (0.81)	Hungary (0.88)
	Latvia (0.28)	Lithuania (0.81)	Estonia (0.88)
	Russia (0.28)	Latvia (0.73)	Slovakia (0.88)
	Croatia (0.26)	Russia (0.70)	Lithuania (0.79)
<i>Lowest</i>	Bulgaria (0.03)	Bulgaria (0.33)	Tajikistan (0.55)
	Moldova (0.03)	Tajikistan (0.33)	Azerbaijan (0.53)
	Turkmenistan (0.03)	Azerbaijan (0.18)	Uzbekistan (0.52)
	Ukraine (0.03)	Belarus (0.13)	Turkmenistan (0.18)
	Uzbekistan (0.03)	Turkmenistan (0.13)	Belarus (0.16)

Note. The levels of *Priv* are presented in parentheses.

and fifth years of transition. Hungary favored gradual sales to outsiders.<sup>13</sup> Concerning Slovenia, it did not have a very active privatization policy. It is also interesting to look at the Russian case. Russia had one of the lowest level in 1990. However, considering transition years, it had one of the highest level for its first and fifth years of transition, because Russia implemented a fast voucher scheme in 1992, its first year of transition.

Alternatively, we use an indicator, *Pbis*, which only includes *LSP* and *SSP* for the following reason. *LSP* and *SSP* measure the amount of privatization of existing assets, while *PSG* measures the size of the private sector. It means that the latter also includes the de novo sector. Consequently, a privatization is counted twice, once through *LSP* or *SSP* and once as the privatization increases the size of the private sector. Such double counting does not occur for the privatization from below, which only enters once and directly into *Priv*. Consequently, we also consider *Pbis* as an indicator of change-of-title. As robustness tests, we also replicate the specifications using the *PSG* variable.

For the dominant privatization methods, we follow the EBRD classification which distinguishes vouchers, MEBO and gradual sales to outsiders. These three dominant privatization methods correspond to our three vectors *MASS*, *MEBO* and *VEN*, respectively (see Table 3). We

<sup>13</sup> However, Hungary had the highest level of *Priv* in 2001 and the second if we consider the tenth year of transition.





Table 3 (continued)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
<i>Latvia</i>												
MASS	0	0	0	1	1	1	1	1	1	0	0	0
MEBO	0	0	0	0	0	0	0	0	0	0	0	0
VEN	0	0	0	0	0	0	0	0	0	1	1	1
<i>Lithuania</i>												
MASS	0	1	1	1	1	1	1	1	1	1	1	1
MEBO	0	0	0	0	0	0	0	0	0	0	0	0
VEN	0	0	0	0	0	0	0	0	0	0	0	0
<i>Moldova</i>												
MASS	0	0	0	0	1	1	1	1	1	1	1	1
MEBO	0	0	0	0	0	0	0	0	0	0	0	0
VEN	0	0	0	0	0	0	0	0	0	0	0	0
<i>Poland</i>												
MASS	0	0	0	0	0	0	0	0	0	0	0	0
MEBO	1	1	1	1	1	1	0	0	0	0	0	0
VEN	0	0	0	0	0	0	1	1	1	1	1	1
<i>Romania</i>												
MASS	0	0	0	0	0	0	0	0	0	0	0	0
MEBO	1	1	1	1	1	1	1	1	1	1	1	1
VEN	0	0	0	0	0	0	0	0	0	0	0	0
<i>Russia</i>												
MASS	0	0	1	1	1	1	1	1	1	1	1	1
MEBO	0	0	0	0	0	0	0	0	0	0	0	0
VEN	0	0	0	0	0	0	0	0	0	0	0	0
<i>Slovakia</i>												
MASS	0	0	1	1	1	0	0	0	0	0	0	0
MEBO	0	0	0	0	0	1	1	1	0	0	0	0
VEN	0	0	0	0	0	0	0	0	1	1	1	1
<i>Slovenia</i>												
MASS	0	0	0	0	0	0	0	0	0	0	0	0
MEBO	1	1	1	1	1	1	1	1	1	1	1	1
VEN	0	0	0	0	0	0	0	0	0	0	0	0
<i>Tajikistan</i>												
MASS	0	0	0	0	0	0	0	0	0	0	0	0
MEBO	0	1	1	1	1	1	1	1	1	1	1	1
VEN	0	0	0	0	0	0	0	0	0	0	0	0
<i>Turkmenistan</i>												
MASS	0	0	0	0	0	0	0	0	0	0	0	0
MEBO	0	0	0	1	1	1	1	1	1	1	1	1
VEN	0	0	0	0	0	0	0	0	0	0	0	0
<i>Ukraine</i>												
MASS	0	0	0	0	0	1	1	1	1	1	1	1
MEBO	0	0	1	1	1	0	0	0	0	0	0	0
VEN	0	0	0	0	0	0	0	0	0	0	0	0
<i>Uzbekistan</i>												
MASS	0	0	0	0	0	0	0	0	0	0	0	0
MEBO	0	0	1	1	1	1	1	1	1	1	1	1
VEN	0	0	0	0	0	0	0	0	0	0	0	0

Note. Based on EBRD (1994, 1996, 1997, 1998, 1999, 2000, 2001, 2002a).

use the EBRD reports (EBRD, 1994, 1996, 1997, 1998, 1999, 2000, 2001, 2002a) to construct these vectors. The EBRD has provided the primary privatization method since the Transition Report of 1998. For the period of 1990–1997, the data are manually collected from the country assessments of preceding Transition Report (EBRD, 1994, 1996, 1997).<sup>14</sup> Our privatization dummies have both a cross section and a time dimension. Indeed, the primary privatization method may change during the transition process. For example, Slovakia began its privatization policy with massive giveaways.<sup>15</sup> A first wave, launched in 1992, was completed in 1993. A second wave, launched in 1994, was canceled in 1995. Privatization continued via MEBO. Finally, the dominant privatization method has been sales since 1998. As we mentioned previously, some countries have no primary privatization method during initial years, despite of a growing *Priv* variable.<sup>16</sup> It occurs in 47 observations when our regressions are based on calendar time, i.e. 15% of the database; in 23 observations when our regressions are based on transition time, i.e. 9% of the database. We might include these few points, corresponding to an undetermined privatization method, in one of the three categories cited above. However, it would be misleading to give an interpretation to their signs and their statistical significances. Consequently, we will also introduce *UND*, a vector of the undetermined privatization method.

Our classification is broadly consistent with BEMU. We reconcile some differences on the method used in particular countries. First, for Latvia, BEMU have considered that the primary dominant method has been sales since 1992. However, between 1994 and 1998, the EBRD (1998, p. 177) reports the vouchers as the primary method. Second, for Poland, we identify MEBO, instead of direct sales, as the primary method from 1990 to 1994 which is consistent with Garibaldi et al. (2001, p. 142). Third, we define a mass privatization for Slovakia between 1992 and 1994. For Azerbaijan, BEMU have considered that the primary dominant method has always been mass privatization since 1997. The EBRD reports that the primary privatization method is MEBO in 1996, the year when it began the small-scale privatization, mass privatization from 1997 to 2000, and sales for the year 2001. Finally, for Kazakhstan, the EBRD reports that the privatization method is massive giveaways from 1994 to 1998, and gradual sales after. BEMU consider that the dominant privatization method is gradual sales since 1996. Besides these marginal differences our main data seems to remain unchanged.

Table 4 provides descriptive statistics of the output recovery in function of primary privatization methods. Because the primary privatization method might have changed, we take for each country the most recurrent one during the transition process. The table shows that the countries with the best output recovery, whether in calendar time or transition time, are those which have followed essentially a strategy of privatization by gradual sales to outsiders. These basic descriptive statistics are no more than suggestive and we will see in the next section if the identified relationships hold in a multivariate analysis.

In some regressions, we introduce  $CFDI_{pc}$  which measures cumulative FDI per capita. We construct this variable using *FDI*, which is the net inflows of FDI, and *hbts*, which is the number of residents. These two variables are provided by the EBRD (2001, 2002a) and the World Bank

<sup>14</sup> Note that Garibaldi et al. (2001) propose a classification of dominant privatization methods by year. Two main differences exist with our classification. First, we propose dominant privatization methods since the beginning of transition. Second, they include MEBO and massive giveaways to insiders in the same category whereas we include massive giveaways to insiders in the same category than massive giveaways to outsiders.

<sup>15</sup> In 1992, Slovakia was still a part of Czechoslovakia.

<sup>16</sup> For example, the Czech Republic began its mass privatization policy in 1992. Consequently, we do not have a privatization method for 1990 and 1991, like Garibaldi et al. (2001).

Table 4  
Means of output recovery by primary privatization methods

Method	IGDP in 2001	IGDPTRY in $try = 10$
MASS	62.47 (19.68)	69.71 (16.89)
MEBO	87.02 (18.89)	88.98 (19.26)
VEN	107.31 (16.61)	107.28 (10.39)

Notes. (i) Standard deviations are reported below the means.  
(ii) The first column is output recovery based on calendar time. The second column is output recovery based on transition time ( $try$ ). Because of possible change in the primary privatization method during the transition process, we take for each country the most recurrent one.

Table 5  
Means of cumulative FDI per capita by primary privatization methods (US dollars)

Method	$CFDI_{pc}$ in 2000
MASS	492.83 (597.16)
MEBO	290.26 (291.54)
VEN	4727.59 (586.94)

Notes. (i) Standard deviations are reported below the means.  
(ii) Because of possible change in the primary privatization method during the transition process, we take for each country the most recurrent one.

(2003), respectively. Therefore, for the country  $i$  in the year  $t$ ,  $CFDI_{pc}$  is:

$$CFDI_{pc,i,t} = \sum_{T=1989}^t FDI_{i,T}/hbt_{i,t}.$$

This variable serves as a control to ensure that privatization through gradual sales does not proxy for FDI. Table 5 shows that the countries with the highest level of  $CFDI_{pc}$  are those which have followed a strategy of privatization by gradual sales to outsiders. Contrary to the local owners, they have the most up-to-date technology and have a crucial intangible asset: they know how a market economy functions which is not the case for the local entrepreneurs.

In order to ensure that our variables of interest do not proxy for other reforms, we also introduce the right-hand-side variables used in the MEL. First, we develop an aggregate liberalization indicator,  $Ref$ , of the other reforms under way.  $Ref$  comprises 5 EBRD indexes: price liberalization,  $LP$ , trade liberalization,  $TL$ , banking sector reform,  $BR$ , competition policy,  $CP$ , and enterprise reform,  $ER$ . The sum of these 5 indexes is rescaled to have  $Ref$  included between 0 and 1. By introducing such an indicator, we follow, e.g., De Melo et al. (2001), Falcetti et al. (2002) or Merlevede (2003). Second, we consider a proxy for stabilization,  $\ln(\pi)$ , which is the natural logarithm of 1 plus the inflation rate in decimal, as do Fischer et al. (1996b).

We will control for country specific initial conditions using the cluster-fixed effects of ZES (p. 151). They use different variables to assign countries to groups based on similarities at the

start of transition.<sup>17</sup> Compared to a fixed-country effects model, the cluster-fixed effects model is less costly in term of degrees of freedom.<sup>18</sup> However, cluster-fixed effects control for time-invariant characteristics only on the assumption that the countries within each cluster have similar characteristics and that all the relevant variables for the assignation of countries to clusters have been considered. If an unobserved characteristic influencing the macro performance is not related to the cluster, controlling for cluster-fixed effects is not enough to avoid possible selection bias. To eliminate possible doubts, we also use country-fixed effects.

#### 4. Privatization and output behavior

In a first subsection, we briefly consider the impact of privatization on macroeconomic performance without taking account of how a country privatized. Despite having a slightly different database, we confirm the first results of ZES (pp. 156–157): privatization per se does not seem to have a significant impact. Consequently, to explain this result we include in Section 4.2 the dominant method of privatization.

##### 4.1. Does privatization have an impact on macroeconomic performance?

We begin our analysis as do ZES. We place our indicator of privatization of the economy, *Priv*, without accounting for the privatization method used, in regressions with performance measures as dependent variables. We consider the following equation:

$$PERF_{i,t} = C + \sum_k [\gamma_k CLUST(k)_i] + \beta_1 Priv_{i,t} + \beta_2 Ref_{i,t} + \beta_3 \ln(\pi_{i,t}) + \beta_4 t + \beta_5 t^2 + \varepsilon_{i,t} \quad (1)$$

where the *i* and *t* subscripts are for country and year, respectively. *PERF* stands for our two measures of output recovery described in Section 3, namely *IGDP* and *IGDPTRY*. *C* is our constant.  $\varepsilon_{i,t}$  is the regression's error term. Initial conditions appear through the cluster-fixed effects  $CLUST(k)_i$ . They are dummy variables for each of the clusters.<sup>19</sup> The uniform nonlinear time trend, *t* and *t*<sup>2</sup>, is introduced to avoid possible spurious relations, since both output recovery and reforms follow a clear time pattern.

This equation is very similar to those of the MEL, especially the first one of ZES (p. 156). We do it because our variables to capture the level of privatization, the other reforms under way and macroeconomic stabilization are slightly different than those of ZES.<sup>20</sup> Furthermore our data set includes more years than ZES.

<sup>17</sup> They identify twelve categories of initial conditions: physical geography, macroeconomics, demographics and health, trade and trade orientation, infrastructure, industrialization, wealth, human capital, market memory, physical capital, culture, and political situation. For a detailed of the key variables in each category, one might read Sachs et al. (2000, p. 6). At the end, they obtain 7 clusters. Cluster 1 includes Croatia, the Czech Republic, Hungary, Poland, Slovakia and Slovenia; cluster 2 includes Estonia, Latvia, Lithuania; cluster 3 includes Bulgaria, Macedonia and Romania; cluster 4 is Albania; cluster 5 includes Belarus, Moldova, Russia and Ukraine; cluster 6 includes Armenia, Azerbaijan and Georgia; cluster 7 includes Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan and Uzbekistan.

<sup>18</sup> The country-fixed effects model implies to include a set of 24 dummy variables, considering that one is our base group to avoid the dummy variable trap, whereas the cluster fixed effects implies to include a set of 6 dummy variables.

<sup>19</sup>  $CLUST(k)_i$  is equal to one if country *i* belongs to cluster *k* and it is zero otherwise; Albania is our base group.

<sup>20</sup> ZES especially use a system of dummy variables to capture the impact of macroeconomic stabilization.

Table 6 provides the regression estimates for the alternative specifications of Eq. (1). Successful macroeconomic stabilization seems to be necessary for economic recovery. Indeed, the estimator associated to  $\ln(\pi)$  has the expected negative sign and is statistically different from zero across most specifications, though this effect is somewhat muted once we base our regression on transition time. The contemporaneous variable of liberalization is significant and has a negative sign, like Hernández-Catá (1997). It reflects the fact that the process of liberalization results into a large fall in output. The lagged effect is robustly beneficial for growth when we add it in columns C and D. However, the net benefit is weak: we do not obtain a *J*-curve effect, i.e. the absolute value of the lagged variable is statistically inferior to the absolute value of the contemporaneous variable. It confirms results found by Falcetti et al. (2002), who highlight the difficulty of finding, for the moment, a net benefit of reforms. However, an interesting point is that ZES have a positive sign for their contemporaneous indicator of reform *REF* in most of their regressions. A possible explanation for this contrary result is that the sign of the aggregate reform index is very sensitive to its individual components, as Radulescu and Barlow (2002) show. It seems to be confirmed by the results presented in column E. We have regressed Eq. (1) splitting *Ref* in two sub-indicators, *EC* and *Reflib*. *EC* includes *ER* and *CP*. This indicator is close to the *OBCA* indicator of ZES which reflects hardening of the budget constraints and market competition.<sup>21</sup> The other indicator, *Reflib*, comprises *LP*, *TL* and *BR*. It is close to the *REF* indicator of ZES that also comprises a social safety net component and a tax reform component.<sup>22</sup> *EC* is significant and has a positive sign. *Reflib* is significant but has a negative sign. It is possible that the positive sign obtained by ZES is due to the inclusion of social safety nets and tax reform subcomponents. Such an argument is especially in line with Berkowitz and Li (2000) and Roland and Verdier (2003). They explain that the dramatic trajectories of Russia and Ukraine during the nineties are due to fiscal externalities, which are the results of malfunctioning tax administrations.

Finally, privatization does not seem to have a significant and positive impact in most of our regressions. This result confirms the work of ZES (p. 157) who conclude that privatization per se is not enough to generate macroeconomic performance gains.

#### 4.2. Privatization policies matter

If we follow partisans of gradual sales, the results of the previous regressions may come as no surprise. Indeed the privatization policy implemented, i.e., gradual sales, massive giveaways or *MEBO*, might matter.

To examine if the impact of privatization depends on the primary privatization method, we estimate the following equation:

<sup>21</sup> Following the EBRD definition (EBRD, 1998, p. 27), *ER* reflects the hardness of the budget constraint, i.e. the *BC* component of ZES. When *ER* = 1, it means that the budget constraint is still soft and that there are few reforms to promote corporate governance; *ER* = 2 means that there are moderately tight credit and subsidy policy but weak enforcement of bankruptcy legislation, and so on. *CP* reflects the importance of barriers to entry and abuse of market power: *CP* = 1 means that there is no competition legislation and institutions; *CP* = 2 means that there is a competition policy legislation and that institutions are set up, and so on.

<sup>22</sup> We cannot use indicators reflecting these components because we cannot take advantage of the panel data set developed by Sachs et al. (2000). The social safety net component was constructed entirely through the use of a survey data collected from the 25 transition countries for this purpose. Concerning the tax reform component, we never have all the series of indicators which can potentially reflect improvements in the tax code and in its administration.

Table 6  
Does privatization per se generate macroeconomic performance gains?

	Estimations using calendar time					Estimations using transition time				
	A	B	C	D	E	F	G	H	I	J
	IGDP	IGDP	IGDP	IGDP	IGDP	IGDPTRY	IGDPTRY	IGDPTRY	IGDPTRY	IGDPTRY
<i>Cons</i>	100.01*** (21.32)	111.56*** (22.55)	97.03*** (18.47)	113.27*** (17.96)	118.86*** (24.62)	91.78*** (17.60)	99.46*** (17.85)	92.26*** (15.27)	96.59*** (11.48)	105.12*** (18.32)
<i>Priv</i>	11.62 (1.32)	11.79 (1.28)	1.24 (0.12)	−0.81 (−0.08)	13.34 (1.50)	17.54** (2)	9.37 (1.09)	16.32 (1.63)	7.94 (0.84)	12.31 (1.46)
<i>Ref</i>	−58.99*** (−4.92)	−36.68*** (−3.04)	−72.82*** (−4.68)	−61.51*** (−4.15)		−30.32** (−2.44)	−19.92* (−1.70)	−48.70*** (−2.99)	−35.40** (−2.19)	
<i>Ref(−1)</i>			39.73*** (2.69)	46.02*** (3.07)				28.39* (1.94)	16.42 (1.07)	
<i>Reftib</i>					−51.23*** (−6.10)					−28.43*** (−3.31)
<i>EC</i>					34.16*** (3.66)					18.55** (1.97)
$\ln(\pi)$	−5.70*** (−5.29)	−2.83** (−2.54)	−2.33* (−1.82)	−0.23 (−0.19)	−2.17** (−2.05)	−0.01 (−0.01)	0.88 (0.70)	−0.04 (−0.03)	1.18 (0.80)	0.80 (0.66)
$t$		−7.96*** (−5.22)		−8.24*** (−4.50)	−7.95*** (−5.52)		−5.69*** (−3.47)		−3.24 (−1.38)	−6.31*** (−3.90)
$t^2$		0.58*** (5.94)		0.60*** (5.34)	0.56*** (6.05)		0.60*** (4.83)		0.42*** (2.46)	0.62*** (5.07)
$R^2$	0.52	0.58	0.53	0.58	0.62	0.46	0.54	0.51	0.57	0.56
Obs.	300	300	275	275	300	250	250	225	225	250

Notes.  $t$ -statistics are reported under coefficient estimates. Cluster-fixed effects are included in all ten models but not reported.

\* Statistical significance at the 10% level.

\*\* Idem, 5%.

\*\*\* Idem, 1%.

$$\begin{aligned}
PERF_{i,t} = & C + \sum_k [\gamma_k CLUST(k)_i] + \beta_1 Priv_{i,t} + \beta_2 Priv_{i,t} \times MASS_{i,t} \\
& + \beta_3 Priv_{i,t} \times MEBO_{i,t} + \beta_4 Priv_{i,t} \times UND_{i,t} \\
& + \beta_5 Ref_{i,t} + \beta_6 \ln(\pi_{i,t}) + \beta_7 t + \beta_8 t^2 + \varepsilon_{i,t}.
\end{aligned} \tag{2}$$

*VEN* does not appear in our regression because it is our base group. *Priv* is interacted with the dominant privatization methods. By this way, we can test if the impact of *Priv* depends on the primary privatization method.

Table 7 provides the regression estimates for the alternative specifications of Eq. (2). Results concerning stabilization and liberalization policies are broadly the same as in the preceding subsection.

To test the significance of the impact of privatization of the economy by the different privatization policies, we test linear combination of coefficients, except for gradual sales which is our base group.<sup>23</sup>

First, countries which adopt gradual sales to privatize their economy have the best impact of privatization on economic performance. This impact is significant and positive in all our specifications. Column A of Table 7 presents the equation estimates of Eq. (2) without the uniform quadratic time trend. The result shows a positive impact of privatization of the economy by gradual sales method on output recovery. When we introduce the uniform quadratic time trend in column B, this impact is very similar. Column C includes cumulative FDI per capita. *Priv* is still positive and statistically different from 0. However the *Priv* estimator is reduced compared to column B. *CFDI<sub>pc</sub>* captures a part of the effect of privatization via gradual sales.

Second, privatization by massive giveaways has a lower impact than gradual sales. Indeed *Priv* × *MASS* is negative and statistically significant in all the specifications of Table 7. Testing for the impact of privatization when the dominant method of transfer is mass privatization, we conclude that there is no impact in all the specifications of Table 7.

Third, countries which privatize the economy by MEBO have an ambiguous impact of privatization as compared to gradual sales. Indeed, the impact of privatization by MEBO is lower than the impact of privatization by gradual sales, though the difference between these two methods is muted when we add cumulative FDI per capita whatever in calendar, transition or privatization time.<sup>24</sup> Indeed, in columns C, F and I, i.e. when we introduce cumulative FDI per capita, privatization by MEBO has the same impact as a privatization by gradual sales. The following interpretation is possible: privatization by MEBO and by gradual sales to local outsiders have the same positive impact on cumulated growth. However, privatization by sales to foreign investors has a higher impact than privatization by MEBO. Indeed, when we do not control for foreign investors, privatization to strategic foreign investors is captured in our base group and we see a higher positive impact when privatization is done by gradual sales to outsiders. When we introduce *CFDI<sub>pc</sub>*, this variable captures the privatization to strategic foreign investors. Consequently the estimator of *Priv*, even if statistically significant and positive, is reduced. The impact

<sup>23</sup> For example, to test the impact of privatization when the dominant method of transfer is mass privatization, we test  $\beta_1 + \beta_2 = 0$ , where the subscripts of the coefficients are the same as in Eq. (2).

<sup>24</sup> If we test  $\beta_1 + \beta_3 = 0$ , where the subscripts of the coefficients are the same as in Eq. (2), we conclude that privatization by *MEBO* has a positive but lower impact than privatization by gradual sales in columns A and B for calendar time, columns D and E for transition time and columns G and H for privatization time. In columns C, F and I, the impact is obviously identical to a privatization by gradual sales.

Table 7  
The importance of the method of privatization

	Calendar time			Transition time			Privatization time		
	A	B	C	D	E	F	G	H	I
	<i>IGDP</i>	<i>IGDP</i>	<i>IGDP</i>	<i>IGDPTRY</i>	<i>IGDPTRY</i>	<i>IGDPTRY</i>	<i>IGDPPRY</i>	<i>IGDPPRY</i>	<i>IGDPPRY</i>
<i>Cons</i>	100.16*** (21.25)	110.31*** (22.55)	109.33*** (22.04)	91.65*** (17.35)	100.29*** (17.88)	101.35*** (18.13)	105.74*** (13.91)	116.15*** (14.94)	116.76*** (15.18)
<i>Priv</i>	31.57*** (3.52)	30.82*** (3.28)	27.87*** (2.93)	33.42*** (3.77)	24.83*** (2.70)	22.13** (2.36)	28.50** (2.13)	43.36*** (3.01)	38.17*** (2.66)
<i>Priv</i> × <i>MASS</i>	−25.04*** (−6.58)	−22.56*** (−6.02)	−18.30*** (−4.44)	−22.92*** (−5.97)	−18.44*** (−4.82)	−14.44*** (−3.45)	−28.69*** (−5.42)	−29.52*** (−5.53)	−21.21*** (−3.68)
<i>Priv</i> × <i>MEBO</i>	−15.81*** (−3.73)	−10.10** (−2.40)	−3.81 (−0.80)	−10.85** (−2.46)	−6.59* (−1.65)	−2.81 (−0.61)	−24.84*** (−4.15)	−21.09*** (−3.56)	−9.02 (−1.36)
<i>Priv</i> × <i>UND</i>	7.30 (0.33)	−13.49 (−0.62)	−6.53 (−0.31)	−9.68 (−0.54)	−18.56 (−1.07)	−14.19 (−0.82)	Dropped	Dropped	Dropped
<i>Ref</i>	−64.72*** (−5.71)	−39.64*** (−3.33)	−40.02*** (−3.28)	−35.84*** (−3.00)	−22.59* (−1.94)	−20.66* (−1.74)	−25.09 (−1.38)	−23.14 (−1.31)	−26.54 (−1.53)
$\ln(\pi)$	−6.05*** (−5.97)	−3.52*** (−3.28)	−3.85*** (−3.50)	−0.78 (−0.68)	−0.46 (−0.38)	−0.62 (−0.51)	−5.36*** (−3.08)	−6.06*** (−3.46)	−5.92*** (−3.48)
<i>CFDI<sub>pc</sub></i>			0.01 (3.40)			0.006 (1.54)			0.01*** (3.75)
<i>t</i>		−7.83*** (−5.04)	−8.08*** (−4.53)		−6.22*** (−3.79)	−7.02*** (−4.07)		−8.03*** (−4.10)	−9.30*** (−4.35)
<i>t</i> <sup>2</sup>		0.53*** (5.43)	0.50*** (4.04)		0.59*** (4.71)	0.63*** (4.55)		0.60*** (4.22)	0.62*** (3.62)
<i>R</i> <sup>2</sup>	0.58	0.62	0.64	0.53	0.58	0.60	0.44	0.48	0.51
Obs.	300	300	300	250	250	235	253	253	228

Notes. *t*-statistics are reported under coefficient estimates. Cluster-fixed effects are included in all models but not reported.

\* Statistical significance at the 10% level.

\*\* Idem, 5%.

\*\*\* Idem, 1%.



is positive because outsiders who acquire firms have a real ownership behavior. But the impact is identical to a MEBO because they suffer the same problem: they do not have the latest know-how.

It is also important to note that MEBO is usually a temporary dominant privatization method. MEBO has been the primary privatization method in countries that privatized quickly their small and medium firms. However, when it was time to privatize large firms, countries usually switched to another method. They switched from MEBO to gradual sales, like Poland,<sup>25</sup> or from MEBO to massive giveaways, like Armenia, Georgia and Ukraine.<sup>26</sup> Countries where MEBO was still the dominant privatization method in 2001 were Croatia, Slovenia, Belarus, Tajikistan, Turkmenistan and Uzbekistan. Croatia and Slovenia did not have very active privatization policies. Concerning the four other countries, especially Belarus and Turkmenistan, they did not really begin the privatization process as shown in Table 1. The privatization of small firms by MEBO is perhaps less problematic than that of large firms because the smaller the firm, the lesser is the problem of free riding and the easier is the restructuring of the production process.

We also estimate regressions with the dominant privatization methods of existing assets without combining it with *Priv*. More precisely, we consider the following equation:

$$PERF_{i,t} = C + \sum_k [\gamma_k CLUST(k)_i] + \beta_1 PSG_{i,t} + \beta_2 MASS_{i,t} + \beta_3 MEBO_{i,t} + \beta_4 UND_{i,t} + \beta_5 Ref_{i,t} + \beta_6 \ln(\pi_{i,t}) + \beta_7 t + \beta_8 t^2 + \varepsilon_{i,t}. \quad (3)$$

In Eq. (3), we test a shift in intercept contrary to Eq. (2) in which we test a shift in slope. Following BEMU, we introduce *PSG* that they consider as a proxy for the emergence of the new sector. Table 8 provides the regression estimates for the alternative specifications of Eq. (3). Results about stabilization and liberalization policies are broadly the same as in Table 7. *VEN* is our base group. Countries which implement massive giveaways always have lower macroeconomic performance than those which adopt gradual sales.

To check the robustness of these results, we repeated the regressions for various specifications, sub-samples and methods.

We first estimate the same regressions replacing the cluster dummies by country dummies in columns A through F in Table 9.<sup>27</sup> The problem in the regressions of Tables 7 and 8 is that if an unobserved characteristic influencing the macro performance is not related to the cluster, controlling for cluster-type group fixed effects will not control for the resulting possible selection bias. Given the incredible number of variables used by Sachs et al. (2000) to assign countries to clusters based on similarities at the start of transition, we can easily think that the bias would be small for regressions based on calendar time. It is confirmed by equation estimates on the data set based on calendar time presented in columns A and B of Table 9. However, the results presented in Table 7 with the data set based on privatization time are more questionable because different events may have occurred between the beginning of transition and the implementation of a dominant privatization policy, like the output decline or the amelioration of the legal and reg-

<sup>25</sup> Note that Poland launched a programme of massive giveaways in 1995. Despite this flirt with a voucher scheme, it never became the dominant privatization method.

<sup>26</sup> In Ukraine, large scale privatization began officially in 1992, especially through MEBO and leasing to employees. However, the progress was slow. Thus, a presidential decree introduced in November 1994 a voucher-based mass privatization program.

<sup>27</sup> We have also tested that the constant terms are all equal with an *F*-test. Country-fixed effects or cluster-fixed effects are always globally significant. We have also regressed all the equations by random effects model which have given similar results. However, in most of the cases, a Hausman's test permits to conclude that random effects are not consistent.

Table 8  
Methods of privatization and macroeconomic performance gains without interaction with *PSG*

	Calendar time			Transition time			Privatization time		
	A	B	C	D	E	F	G	H	I
	<i>IGDP</i>	<i>IGDP</i>	<i>IGDP</i>	<i>IGDPTRY</i>	<i>IGDPTRY</i>	<i>IGDPTRY</i>	<i>IGDPPRY</i>	<i>IGDPPRY</i>	<i>IGDPPRY</i>
<i>Cons</i>	89.73*** (14.28)	98.07*** (15.40)	96.81*** (14.99)	86.99*** (12.57)	96.67*** (13.93)	96.42*** (13.87)	116.85*** (11.82)	120.56*** (12.29)	117.53*** (12.17)
<i>PSG</i>	44.67*** (5.13)	47.19*** (4.88)	44.21*** (4.54)	34.32*** (3.76)	26.74*** (2.60)	27.10*** (2.59)	6.4 (0.49)	26.57* (1.67)	20.37 (1.29)
<i>MASS</i>	-14.69*** (-5.77)	-13.38*** (-5.34)	-10.38*** (-3.80)	-13.50*** (-5.14)	-11.03*** (-4.24)	-8.27*** (-2.95)	-19.41*** (-5.16)	-19.37*** (-5.23)	-12.32*** (-3.09)
<i>MEBO</i>	-6.22** (-2.26)	-3.03 (-1.09)	-0.72 (-0.24)	-4.74* (-1.66)	-2.63 (-0.94)	-0.70 (-0.24)	-15.03*** (-3.67)	-10.92*** (-2.58)	-4.37 (-0.99)
<i>UND</i>	6.35 (1.49)	4.47 (1.19)	5.42 (1.43)	0.38 (0.09)	-1.41 (-0.35)	0.40 (0.10)	Dropped	Dropped	Dropped
<i>Ref</i>	-66.46*** (-6.89)	-43.69*** (-4.09)	-43.50*** (-3.92)	-33.10*** (-3.07)	-19.54* (-1.82)	-18.49* (-1.69)	-19.82 (-1.21)	-11.01 (-0.69)	-9.82 (-0.62)
<i>CFDI<sub>pc</sub></i>			0.01*** (3.11)			0.006* (1.65)			0.01*** (3.95)
$\ln(\pi)$	-4.11*** (-4.13)	-2.64** (-2.57)	-3.16*** (-3.00)	-0.14 (-0.13)	-0.27 (-0.22)	-0.49 (-0.40)	-4.91*** (-2.78)	-5.66*** (-3.21)	-5.63*** (-3.29)
<i>t</i>		-6.99*** (-4.44)	-6.90*** (-3.85)		-6.27*** (-3.64)	-6.97*** (-3.90)		-8.52*** (-4.09)	-9.18*** (-4.08)
<i>t</i> <sup>2</sup>		0.45*** (4.63)	0.40*** (3.27)		0.57*** (4.46)	0.60*** (4.25)		0.62*** (4.27)	0.61*** (3.47)
<i>R</i> <sup>2</sup>	0.62	0.65	0.66	0.54	0.58	0.60	0.43	0.47	0.50
Obs.	300	300	275	250	250	235	253	253	228

Notes. *t*-statistics are reported under coefficient estimates. Cluster-fixed effects are included in all models but not reported.

\* Statistical significance at the 10% level.

\*\* Idem, 5%.

\*\*\* Idem, 1%.

Table 9  
Robustness checks

	A	B	C	D	E	F	G	H	I	J	K
	<i>IGDP</i>	<i>IGDP</i>	<i>IGDPPRY</i>	<i>IGDPPRY</i>	<i>IGDP</i>	<i>IGDPPRY</i>	<i>IGDP</i>	<i>IGDP</i>	<i>IGDP</i>	<i>IGDP</i>	<i>IGDP</i>
<i>Cons</i>	133.0*** (32.9)	108.1*** (12.9)	111.02*** (18.95)	119.4*** (10.2)	128.0*** (31.2)	119.0*** (18.0)	111.69*** (23.04)	97.64*** (18.34)	111.7*** (23.5)	109.20*** (22.04)	109.5*** (22.4)
<i>Priv</i>	30.46*** (3.43)	26.66*** (2.94)	23.04* (1.80)	27.15** (2.09)	26.33*** (3.04)	21.72* (1.72)	18.17** (2.44)	59.60*** (6.06)	32.44*** (3.55)	29.51*** (2.86)	28.81*** (3.07)
<i>Priv</i> × <i>MASS</i>	-25.30*** (-6.38)	-25.33*** (-6.35)	-23.67*** (-4.43)	-22.25*** (-4.10)	-23.83*** (-6.16)	-23.37*** (-4.42)	-20.51*** (-5.82)	-25.37*** (-6.16)	-18.19*** (-4.89)	-22.11*** (-5.80)	-21.10*** (-5.65)
<i>Priv</i> × <i>MEBO</i>	-9.440** (-2.03)	-8.161* (-1.74)	-15.60*** (-2.63)	-14.82** (-2.45)	-10.73** (-2.37)	-18.02*** (-3.03)	-11.19*** (-2.85)	-4.24 (-0.89)	-3.838 (-0.87)	-10.51** (-2.48)	-10.22** (-2.45)
<i>Priv</i> × <i>UND</i>	0.958 (0.054)	-7.465 (-0.41)	Dropped	Dropped	-1.390 (-0.081)	Dropped	-30.62 (-1.60)	23.29 (1.21)	-12.82 (-0.61)	-8.84 (-0.40)	-11.99 (-0.56)
<i>Ref</i>	-31.32*** (-2.87)	-19.44 (-1.63)	-34.43** (-2.54)	-32.52** (-2.36)			-30.14*** (-2.59)	-49.26*** (-4.76)	-41.64*** (-3.54)	-43.70*** (-3.44)	-38.58*** (-3.24)
<i>Reftib</i>					-35.52*** (-4.72)	-34.92*** (-3.53)					
<i>EC</i>					24.68** (2.50)	14.97 (1.17)					
$\ln(\pi)$	-3.078*** (-3.68)	-1.206 (-1.10)	-1.71 (-1.45)	-0.884 (-0.71)	-2.678*** (-3.27)	-1.665 (-1.43)	-3.44*** (-3.17)	-3.31*** (-3.22)	-3.319*** (-3.15)	-3.82*** (-3.43)	-3.601*** (-3.28)
$t$	-8.420*** (-5.87)		-4.14*** (-2.64)		-8.524*** (-6.12)	-4.411*** (-2.83)	-7.50*** (-4.90)	-8.15*** (-5.36)	-9.011*** (-5.76)	-6.96*** (-4.33)	-7.546*** (-4.86)
$t^2$	0.569*** (6.71)		0.47*** (4.71)		0.562*** (6.83)	0.478*** (4.76)	0.53*** (5.40)	0.51*** (5.38)	0.597*** (6.03)	0.49*** (4.88)	0.528*** (5.34)
$R^2$	0.80	0.81	0.81	0.82	0.81	0.82	0.62	0.65	0.63	0.62	0.63
Obs.	300	300	253	253	300	253	300	300	288	288	288
Notes	FE	FE DY	FE	FE DY	FE	FE	CFE <i>Pbis</i> instead of <i>Priv</i>	CFE <i>PSG</i> instead of <i>Priv</i>	CFE Poland excluded	CFE Russia excluded	CFE Ukraine excluded

(concluded on next page)

Table 9 (concluded)

	L	M	N	O	P	Q	R	S	T
	<i>IGDP</i>	<i>IGDP</i>	<i>IGDP</i>	<i>IGDP</i>	<i>IGDP</i>	<i>IGDP</i>	<i>IGDP</i>	<i>IGDPPRYEL</i>	<i>IGDPPRYEL</i>
<i>Cons</i>	113.66*** (24.12)	109.44*** (20.90)	112.09*** (21.30)	101.80*** (27.30)	108.82*** (22.29)	108.37*** (21.30)	104.98*** (21.06)	109.89*** (19.30)	74.41*** (12.28)
<i>Priv</i>	31.73*** (3.27)	34.40*** (3.20)	36.41*** (3.45)	28.26*** (3.01)	30.26*** (2.86)	28.78*** (2.79)	23.80** (2.58)	33.70*** (2.62)	35.24*** (2.70)
<i>Priv</i> × <i>MASS</i>	-21.16*** (-4.81)	-26.08*** (-5.52)	-23.64*** (-5.90)	-22.24*** (-6.03)	-16.60*** (-4.42)	-21.38*** (-5.37)	-24.15*** (-6.32)	-11.45** (-2.16)	-15.92*** (-2.65)
<i>Priv</i> × <i>MEBO</i>	3.57 (0.64)	-11.46** (-2.50)	-12.93*** (-2.59)	-13.55*** (-3.21)	-9.69** (-2.37)	-9.70** (-2.23)	-9.48** (-2.16)	-3.46 (-0.58)	-1.03 (-0.16)
<i>Priv</i> × <i>UND</i>	-9.67 (-0.42)	-14.00 (-0.55)	-15.93 (-0.58)	-22.43 (-1.05)	-0.43 (-0.02)	-16.54 (-0.74)	-8.29 (-0.39)	Dropped	Dropped
<i>Ref</i>	-47.45*** (-3.78)	-36.55*** (-2.76)	-45.84*** (-3.42)	-40.87*** (-3.43)	-30.31** (-2.32)	-35.35*** (-2.81)	-42.79*** (-3.34)	-28.51** (-2.08)	-28.60** (-2.03)
<i>Reftib</i>									
<i>EC</i>									
$\ln(\pi)$	-3.44*** (-3.32)	-3.50*** (-3.00)	-3.46*** (-2.95)	-3.73*** (-3.51)	-3.81*** (-3.25)	-2.32* (-1.83)	-4.42*** (-3.70)	3.28*** (2.74)	3.96*** (3.02)
<i>t</i>	-9.58*** (-6.12)	-8.01*** (-4.77)	-8.21*** (-4.80)	-7.53*** (-4.89)	-8.46*** (-4.96)	-7.74*** (-4.58)	-5.32*** (-2.92)	-1.82 (-1.17)	-1.37 (-0.84)
<i>t</i> <sup>2</sup>	0.60*** (5.96)	0.53*** (4.96)	0.56*** (5.13)	0.51*** (5.21)	0.58*** (5.50)	0.54*** (5.05)	0.41*** (3.73)	0.12 (1.27)	0.08 (0.85)
<i>R</i> <sup>2</sup>	0.65	0.61	0.63	0.64	0.62	0.54	0.67	0.85	0.86
Obs.	228	264	264	288	252	264	240	242	220
Notes	CFE Cluster 1 excluded	CFE Cluster 2 excluded	CFE Cluster 3 excluded	CFE Cluster 4 excluded	CFE Cluster 5 excluded	CFE Cluster 6 excluded	CFE Cluster 7 excluded	FE Total sample	FE Excluding Armenia & Kyrgyzy.

Notes. (i) *t*-statistics are reported under coefficient estimates.

(ii) CFE and FE stand for cluster-fixed effects and country-fixed effects, respectively. DY stands for time specific effects (year dummies).

(iii) Cluster 1 corresponds to Croatia, the Czech Republic, Hungary, Poland, Slovakia, Slovenia; Cluster 2: Estonia, Latvia, Lithuania; Cluster 3: Bulgaria, Macedonia, Romania; Cluster 4: Albania; Cluster 5: Belarus, Moldova, Russia, Ukraine; Cluster 6: Armenia, Azerbaijan, Georgia; Cluster 7: Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan, Uzbekistan.

\* Statistical significance at the 10% level.

\*\* Idem, 5%.

\*\*\* Idem, 1%.

ulatory institutions. These events are not taken into consideration to assign countries to clusters because they occur after the beginning of transition. However, all these events occurring prior the implementation of a dominant privatization policy are time-invariant for the sample based on privatization time. And if it is impossible to control for all possible factors without identifying them and checking for each one, country unobserved effects will span all these time invariant-variables for the sample based on privatization time. Columns C and D of Table 9 present the same regression estimates than columns A and B with the data set based on privatization time. The estimator of *Priv* is reduced when we use country instead of cluster effects, but it is still statistically significant and positive. Note that in columns B and D the uniform quadratic time trend is replaced by year dummies. A system of year-dummies implies an important loss of degrees of freedom compared to the quadratic time trend. However, it is more flexible to take account of specific year-effects. Columns E and F present results with country-fixed instead of cluster-fixed effects using the data sets based on calendar and privatization time but splitting the reform indicator.

Second, we estimate the same regressions replacing the *Priv* indicator by *Pbis* or *PSG*. Column G of Table 9 provides the regression estimates using *Pbis* instead of *Priv*. In column H, we estimate the same regression with *PSG*.

Third, the dominant method of privatization may not be as clear as the EBRD classification indicates. For example, the dominant privatization method in Russia is massive giveaways since 1992 if we follow the EBRD classification. However, the World Bank (1996) and Dabrowski et al. (2001) consider the main privatization method in Russia as being MEBO because majority ownership passed into the hands of existing managers and employees. Thus, we test the sensitivity of our results, excluding one country or one cluster of countries at a time from the original sample of 25 countries. Column J of Table 9 excludes the observations for Russia. In columns L through R we present results when we have dropped one cluster of countries at a time.

Fourth, data on GDP can lack precision in transition economies due to the substantial size in the informal sector. Hernández-Catá (1997), Johnson et al. (1997) and Kaufmann and Kaliberda (1996) suspect that the official national accounts in transition countries underestimate the output by a substantial margin. A simple and appealing proxy for overall output, official and unofficial, is electricity consumption, which is a good physical indicator of production. Electricity consumption and overall economic activity have been empirically observed to move in lock-step with an output elasticity of electricity close to one. However, the unit elasticity assumption for all countries can be criticized, especially in transition economies because the use of electricity is more efficient in Central European countries than in former Soviet Union, or because there may be a shift of the output mix away from electricity intensive industries. To take account of these critics, we proceed like Johnson et al. (1997), i.e. we consider the Kaufmann and Kaliberda classification of ex post output elasticity for electricity consumption. They consider that the Central and Eastern European countries have an output elasticity of electricity consumption of 0.9; the Baltic countries have a unitary elasticity; and the rest of the former Soviet Union have an elasticity of 1.15. The number for total GDP is derived by assuming that changes in electricity consumption corrected by the elasticity mentioned above equal changes in total GDP. Data on electricity consumption come from the World Bank (2003). They are incomplete or missing for Croatia and Macedonia. Because there are missing values for countries of the FSU before 1992 and Johnson et al. (1997) consider that these elasticities are true when economies begin to grow again, we present the results with this correction applied to *IGDPPRY*. Column S presents the results with *IGDPPRYEL*, the corrected left-hand-side variable. In column T, we drop Armenia

and the Kyrgyz Republic, as do Johnson et al. (1997, p. 176), because of enormous disruptions in electricity generation and large shifts toward electricity consumption, respectively.

We also verify that our results do not change when we replace *Priv*, *Priv* × *MEBO* and *Priv* × *MASS* by one-year-lagged *Priv*, *Priv* × *MEBO* and *Priv* × *MASS*. In all these cases, the two main conclusions cited above still hold: privatization of the economy by gradual sales to outsiders is the best way to privatize the economy, especially when outsiders are foreign investors. The privatization of the economy by massive giveaways has no impact or a positive but lower impact than the privatization by gradual sales. The difference between privatization by MEBO and gradual sales is often muted when we add cumulative FDI per capita.

The econometric setting in the previous tables is very close to the MEL, i.e. like Berg et al. (1999), De Melo et al. (1996, 2001), Falcetti et al. (2002), Fischer et al. (1996a, 1996b), Havrylyshyn et al. (1998), Hernández-Catá (1997), Merlevede (2003) and ZES. Fischer et al. (1996a, p. 232) and Havrylyshyn (2001, p. 74) explicitly say that as far as countries have not experienced enough reforms and macroeconomic stabilization, the neo-classical determinants of growth are not important and the basic economic growth equation like the one of Mankiw et al. (1992) are not the adequate tool for transition economies. However, Central and Eastern Europe have achieved macroeconomic stabilization and undertaken deeper reforms. Thus, factor inputs, i.e. the determinants of macroeconomic performance of typical market economies, should predominate, at least in these countries.<sup>28</sup> Not surprisingly, Fischer et al. (1998) themselves use models of macroeconomic performance related to factor inputs to study the process of convergence of Central and Eastern European countries, as well as the Baltics, to EU countries.

Consequently, Table 10 presents the estimation results of specifications with neo-classical determinants of growth as control variables.  $\ln(L)$  is the logarithm of working-age population, where working-age is defined as 15 to 64, and  $\ln(I/GDP)$  is the logarithm of investment as percent of GDP. Data are from the World Bank (2003) and the EBRD (1999, 2000, 2003), respectively. Data on investment share in GDP are particularly weak, varying considerably from one Transition Report to another in various countries for the years considered, as highlighted by Havrylyshyn et al. (1998, p. 24).<sup>29</sup> In columns A through E, we test shift in slopes, as we did in Table 7. *VEN* is our base group. To avoid spurious relation, we introduce a system of year dummies. It is preferred to a nonlinear time trend because of numerous gaps in the data.

In columns A and B of Table 10, we control for  $\ln(I/GDP)$  and  $\ln(L)$ . Countries adopting gradual sales have no impact of privatization whereas countries adopting massive giveaways have a negative impact of privatization.<sup>30</sup> In fact these results are driven by the inclusion of  $\ln(I/GDP)$ . Column C excludes this variable and results are the same as in Tables 7 and 9: privatization via gradual sales has a positive impact, and privatization via massive giveaways has no impact. In fact  $\ln(I/GDP)$  is statistically correlated with *Priv* × *VEN* at the 5% level, the coefficient of correlation being 0.15 and the *p*-value 0.0174. On the other hand, it is not correlated with *Priv* × *MASS*, the coefficient of correlation being 0.02 and the *p*-value 0.67. It

<sup>28</sup> For nearly two-third of the observations, the level of *Ref* is less than halfway between unreformed and full-fledged market economies and for 40% of the observations inflation is above 50%. However, countries for which the indicator of reform is more than 0.6 are the Czech Republic and Poland since 1993, Hungary and Slovakia since 1994, Estonia and Slovenia since 1997, Latvia since 1999 and Croatia and Lithuania since 2000.

<sup>29</sup> For example, the EBRD Transition Report of 1999 assigns for Kazakhstan a value of 14.6 to this ratio for the year 1992, while the one of 2000 assigns 30.4 for the same year. A high number of observations are concerned by this problem.

<sup>30</sup> We test if the sum of the coefficients of *Priv* and *Priv* × *MASS* is equal to zero. We have to reject the null hypothesis at the 1% level.

Table 10  
Alternative frameworks: Controlling for the working-age population and the investment share in GDP

	A	B	C	D	E	F	G	H
	<i>IGDP</i>	<i>IGDP</i>	<i>IGDP</i>	<i>IGDP</i>	<i>IGDP</i>	<i>IGDP</i>	<i>IGDP</i>	<i>IGDP</i>
<i>Cons</i>	−899.4*** (−4.09)	−775.6*** (−3.39)	265.4 (0.80)	−966.4*** (−4.24)	−932.1*** (−4.05)	−905.1*** (−3.99)	−715.7*** (−3.06)	−715.7*** (−3.06)
<i>Priv</i>	−3.626 (−0.48)	−3.058 (0.34)	25.85*** (2.75)		15.37* (1.72)			
<i>Priv</i> × <i>MASS</i>	−23.72*** (−6.44)	−22.92*** (−5.73)	−25.06*** (−5.41)		−30.97*** (−4.03)			
<i>Priv</i> × <i>MEBO</i>	−14.83*** (−3.16)	−14.11*** (−2.90)	−7.697 (−1.23)		−28.53*** (−3.36)			
<i>Priv</i> × <i>UND</i>	−24.21 (−1.38)	−12.12 (−0.67)	−6.318 (−0.28)		−87.16*** (−3.87)			
<i>PSG</i>						−0.0800 (−0.74)	0.0241 (0.20)	0.0241 (0.20)
<i>MASS</i>						−15.20*** (−6.15)	−13.99*** (−5.55)	−13.99*** (−5.55)
<i>MEBO</i>						−8.927*** (−2.89)	−9.171*** (−3.10)	−9.171*** (−3.10)
<i>UND</i>						−0.979 (−0.29)	−0.232 (−0.070)	−0.232 (−0.070)
$\ln(L)$	68.35*** (4.31)	59.84*** (3.64)	−10.20 (−0.57)	73.93*** (4.52)	71.62*** (4.35)	70.23*** (4.31)	56.57*** (3.38)	56.57*** (3.38)
$\ln(\frac{I}{GDP})$	9.479*** (5.02)	9.730*** (5.30)		11.86*** (5.65)	5.080** (2.03)	9.193*** (4.79)	9.631*** (5.10)	9.631*** (5.10)
$\ln(\frac{I}{GDP}) \times MASS$				−4.926*** (−6.16)	2.170 (1.24)			
$\ln(\frac{I}{GDP}) \times MEBO$				−2.834*** (−2.80)	2.974 (1.55)			
$\ln(\frac{I}{GDP}) \times UND$				−0.405 (−0.39)	7.006*** (4.00)			
<i>Ref</i>		−23.17** (−2.10)	−21.87* (−1.68)				−30.88** (−2.57)	−30.88** (−2.57)
$\ln(\pi)$		−1.461 (−1.22)	−1.310 (−0.97)				−1.148 (−1.08)	−1.148 (−1.08)
Obs.	275	275	300	275	275	275	275	275
$R^2$	0.87	0.88	0.81	0.87	0.88	0.87	0.88	0.88

Notes. *t*-statistics are reported under coefficient estimates. Country-fixed effects as well as year effects are included in all models but not reported.

\* Statistical significance at the 10% level.

\*\* Idem, 5%.

\*\*\* Idem, 1%.

suggests that the impact of investment on macro performance depends of the type of ownership, i.e. the dominant method of privatization. Consequently, column D presents a regression in which  $\ln(I/GDP)$  is interacted with dominant privatization methods. Again, *VEN* is our base group. The impact of investment depends largely of the dominant privatization method: investment has the largest impact when the dominant privatization method is gradual sales. In column E, we interact both  $\ln(I/GDP)$  and *Priv* with dominant privatization methods. Privatization via gradual sales has a positive impact. Privatization via massive giveaways has no impact. However there is no more difference in the impact of investment. This is due to the high level of multicollinearity which inflates the variance of the estimators of  $\ln(I/GDP) \times MASS$  and  $\ln(I/GDP) \times MEBO$ .<sup>31</sup>

In columns F through H of Table 10, we test a shift in intercept, as we did in Table 8: countries which adopted massive giveaways always have lower macro performance than those which adopt gradual sales.

Our paper and the one of ZES are in line with the economic mechanisms expressed by Dabrowski et al. (2001), Kornai (2000, 2001) or Roland (2000), and these economic mechanisms permit to support and complement the results of ZES. ZES find that privatization has no impact if a set of institutional structures is not in place. Their indicator of institutional development, *OBCA*, aims to capture especially the quality of corporate governance and the hardness of the budget constraint. Thus it would mean that gradual sales are concomitant with a hard budget constraint and a strong government control of management contrary to massive giveaways. It is true that gradual sales necessitate preprivatization restructuring to attract strategic investors. Examples of Hungary and Poland are revealing. In Hungary, the Hungarian State Property Agency firmly reestablished its control to avoid waste. Consequently it targeted strategic foreign investors. In Poland, state managers began to restructure when budget constraints became harder due to the slowdown of subsidies as Aghion and Blanchard (1994) and Dabrowski et al. (2001) discuss. In these two countries, Kornai (2001) argues that privatization via bankruptcy and liquidation of inviable state firms played a big role. On the other hand, massive giveaways seem to be linked with poor corporate control of management and soft budget constraint. Examples of the Czech Republic and Russia are also revealing to explain why. As mentioned previously, in the Czech Republic, some Funds, in which coupons were concentrated afterwards, were launched by state-owned banks which bailed out unstructured firms. In Russia policymakers gave away ownership and control of old firms to managers to lean on them for supporting reforms; thus, it was difficult for the Russian government not to give subsidies to managers: the political capital that the government obtained by given away ownership to them would have been lost.

## 5. Output versus annual growth rate

If our results, like those of ZES, are in line with the transition experience, we have not explained why they are so different with BEMU. There are two methodological differences between our work and the one of BEMU. First, BEMU use annual growth rate as a left-hand-side variable. Second, BEMU's approach is to estimate a cross-country growth model along the line of Mankiw et al. (1992). BEMU supplement the standard model relating annual GDP growth to annual change in employment and annual change in investment with indicator of private sector development, privatization method and capital market development. However, contrary to the MEL, BEMU do not consider the role of macroeconomic stabilization and reforms.

<sup>31</sup> The variance inflation factors of these two estimators are 45.10 and 45.52, respectively.



Section 3 provides an argument in favor of an index of real output. Following Hernández-Catá (1997), we might derive a structural form from first principles and obtain an indicator of output recovery explained by policy variables like the regressions of the preceding section. An implication of this framework is that reforms which lead to a permanent change in, e.g., the openness or the ownership structure of the economy will have a permanent effect on output levels, but not on how output continues to evolve after transition. As mentioned in Section 3, the MEL with annual growth rate takes an ad hoc approach to specification. Nevertheless, one might think that reforms leading to permanent change in the openness or the ownership structure of the economy have permanent effect on annual growth rates. As highlighted by Berg et al. (1999, p. 12), this is a natural assumption which has some backing in the empirical growth literature. Furthermore, the fact that a part of the MEL, e.g., Falcetti et al. (2002) and Merlevede (2003), as well as BEMU, model the output dynamics of transition in terms of growth rather than output level, argues in trying growth as an endogenous variable in a MEL framework. Table 11 provides the regression estimates for the alternative specifications. VEN is our base group. In column A, the results obtained previously in Table 8, with an index of real GDP as a left-hand-side variable, are apparently not valid. In fact, it seems that this first result is driven by countries belonging to the cluster 6, i.e. the three countries of Caucasus: Armenia, Azerbaijan and Georgia. It is a cluster of influential observations in the sense that the deletion of this cluster leads to a drastic change in the coefficient. Indeed, in columns B through H, we estimate the same regression than in column A by dropping one cluster of countries at a time. In column G, when we drop cluster 6, results are identical to those previously found with an index of real GDP: countries which adopt massive giveaways have lower annual growth rate than those which adopt gradual sales. One can argue that Hungary and Poland, or all countries belonging to the cluster 1, are perhaps influential observations too working in the other sense. It is hardly defensible given the results obtained in column B when we drop cluster 1. To avoid any doubts, column I proposes a regression estimate excluding countries belonging to cluster 6 and Hungary and Poland. In column J, we exclude countries belonging to clusters 6 and 1. Again, countries which implement massive giveaways have lower annual growth rate than those which implement gradual sales. Lastly, column K proposes a regression estimates excluding countries belonging to clusters 6 and 7 because some observations concerning countries of these clusters are outliers. On the one hand, Armenia in 1992, Azerbaijan in 1993, Georgia in 1992 and 1993 and Tajikistan in 1992 are lower outliers.<sup>32</sup> On the other hand, even if there are no upper-outliers, observation with the highest annual growth rates, say above 10%, are Armenia in 2001, Azerbaijan in 1998 and 2000, Georgia in 1996 and 1997, as well as Kazakhstan and Tajikistan in 2001 and Turkmenistan in 1999, 2000 and 2001 and Belarus in 1997. With the exception of Belarus, all these countries belong to cluster 6 or cluster 7. Results in column K are identical to those in columns G, I and J.

Note that if the *PSG* variable was significant in columns G, I, J and K, one could have argued that both the privatization methods and the share of private businesses were sharing the same information. They could have been statistically equal. However, both *PSG* and *MASS* variables entail different information. In the specifications of Table 11, the *PSG* variable alone is not significant. Thus, the share of private businesses does not influence the annual growth rate.

<sup>32</sup> An observation is considered to be a lower outlier if  $Growth_{i,t} < Q_l - 1.5 \times IQR$  and an upper outlier if  $Growth_{i,t} > Q_u + 1.5 \times IQR$ , with  $Q_l$  and  $Q_u$  the lower and upper quartile and  $IQR = Q_u - Q_l$  the inter quartile range. In our data set  $Q_u = 4.75$ ,  $Q_l = -7.15$  and  $IQR = 11.9$ . Thus an observation is a lower outlier if  $Growth_{i,t} < -25\%$  and an upper outlier if  $Growth_{i,t} > 22\%$ . The growth rate of Georgia in 1992,  $-44.8\%$ , is even a lower far-outlier, i.e.  $-44.8\% < Q_l - 3 \times IQR$ .

Table 11  
The importance of the method of privatization with *Growth* as a left-hand-side variable

	A	B	C	D	E	F	G	H	I	J	K
	<i>Growth</i>	<i>Growth</i>	<i>Growth</i>	<i>Growth</i>	<i>Growth</i>	<i>Growth</i>	<i>Growth</i>	<i>Growth</i>	<i>Growth</i>	<i>Growth</i>	<i>Growth</i>
<i>Cons</i>	-6.03** (-2.40)	-6.20* (-1.65)	-7.47** (-2.42)	-6.32* (-1.94)	-3.29 (-1.28)	-8.37*** (-2.66)	-8.04*** (-2.98)	-6.13 (-1.16)	-6.62* (-1.82)	-7.50** (-2.04)	-7.84*** (-3.04)
<i>PSG</i>	3.50 (0.58)	2.14 (0.29)	1.4 (0.22)	5.1 (0.82)	0.04 (0.01)	8.22 (1.12)	7 (1.20)	2.5 (0.38)	5 (0.91)	4.99 (0.70)	8.34* (1.70)
<i>MASS</i>	-0.72 (-0.80)	-1.30 (-1.10)	0.003 (0.00)	-0.78 (-0.88)	-0.68 (-0.76)	0.35 (0.36)	-1.88** (-2.13)	-0.94 (-0.95)	-2.08* (-1.95)	-2.79** (-2.24)	-2.48** (-2.56)
<i>MEBO</i>	-1.08 (-0.82)	-2.92 (-1.48)	-0.88 (-0.66)	-0.73 (-0.46)	-1.89 (-1.50)	-1.43 (-1.08)	0.17 (0.14)	-0.33 (-0.22)	-0.68 (-0.43)	-1.26 (-0.64)	1.44 (1.09)
<i>UND</i>	-2.53 (-1.34)	-3.45 (-1.16)	-2.04 (-0.82)	-3.09 (-1.14)	-3.68* (-1.75)	-2.09 (-0.85)	0.45 (0.19)	-3.86 (-1.49)	-0.09 (-0.04)	0.11 (0.04)	-0.40 (-0.15)
<i>Ref</i>	-12.24** (-2.04)	-14.14** (-1.96)	-10.93* (-1.67)	-14.18** (-2.13)	-13.85** (-2.31)	-12.14* (-1.82)	-10.17** (-1.69)	-11.41* (-1.69)	-11.17* (-1.81)	-10.62 (-1.50)	-8.39 (-1.49)
$\ln(\pi)$	-5.44*** (-6.95)	-5.26*** (-6.06)	-5.07*** (-6.46)	-5.71*** (-6.59)	-5.58*** (-7.22)	-5.28*** (-5.65)	-5.40*** (-7.88)	-5.50*** (-5.81)	-5.35*** (-7.54)	-5.23*** (-6.74)	-5.52*** (-8.71)
<i>t</i>	2.79*** (3.38)	2.80*** (2.71)	2.77*** (3.17)	2.72*** (3.13)	2.86*** (3.53)	2.76*** (2.83)	2.41*** (3.17)	3.15*** (3.45)	2.50*** (2.75)	2.36** (2.44)	2.39*** (2.66)
<i>t</i> <sup>2</sup>	-0.12*** (-2.59)	-0.10* (-1.94)	-0.11** (-2.32)	-0.11** (-2.33)	-0.11** (-2.54)	-0.13** (-2.55)	-0.10** (-2.41)	-0.15*** (-3.04)	-0.10** (-1.98)	-0.08 (-1.39)	-0.12** (-2.27)
<i>R</i> <sup>2</sup>	0.56	0.57	0.54	0.58	0.58	0.57	0.58	0.57	0.57	0.58	0.59
Obs.	300	228	264	264	288	252	264	240	240	192	204
$\beta_1 = \beta_2$ ( <i>p</i> -value)	0.401	0.26	0.99	0.34	0.45	0.78	0.029**	0.33	0.046**	0.024**	0.009***
Notes	All Sample	Cluster 1 excluded	Cluster 2 excluded	Cluster 3 excluded	Cluster 4 excluded	Cluster 5 excluded	Cluster 6 excluded	Cluster 7 excluded	Cluster 6, Hungary and Poland excluded	Clusters 6 and 1 excluded	Clusters 6 and 7 excluded

Notes. (i) *t*-statistics are reported under coefficient estimates.

(ii) Cluster-fixed effects are included in all models but not reported.

(iii) Cluster 1 corresponds to Croatia, the Czech Republic, Hungary, Poland, Slovakia, Slovenia; Cluster 2: Estonia, Latvia, Lithuania; Cluster 3: Bulgaria, Macedonia, Romania; Cluster 4: Albania; Cluster 5: Belarus, Moldova, Russia, Ukraine; Cluster 6: Armenia, Azerbaijan, Georgia; Cluster 7: Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan, Uzbekistan.

(iv) The line  $\beta_1 = \beta_2$  provides the *p*-value corresponding to the *F*-stat on the equality of the coefficients of *MASS* and *PSG*.

\* Statistical significance at the 10% level.

\*\* Idem, 5%.

\*\*\* Idem, 1%.

We argue that the different methods of privatization do. *MASS* is statistically different from zero and negative in specifications G, I, J and K of Table 11. It means that countries which adopt massive giveaways have a lower annual growth rate than our base group, i.e. gradual sales. To assess the validity of this argument, we run several *F*-tests of equality between the coefficients on *PSG* and *MASS*. The line  $\beta_1 = \beta_2$  in Table 11 presents the *p*-value of the *F*-statistics for each specification. The test of their equality is rejected at least at the 5% level in columns G, I, J and K meaning that they are statistically different from one another.

These results seem different with BEMU but they are not. When BEMU (2004a, Table 8) consider only non-CIS countries, they find that countries which apply massive giveaways have lower annual growth rates than those which apply gradual sales. In fact, results obtained in columns G, I and J indicate that the results they obtained when they consider the entire sample may be driven by countries of Caucasus.

Nevertheless, at least two questions are still unanswered. First, we do not find, contrary to BEMU, that countries which have implemented massive giveaways have a higher annual growth rate when we consider all the sample. Thus, the control variables used in a growth regression, an indicator of reforms and a proxy for stabilization in the MEL or traditional factor inputs like BEMU might matter. Second, the results of Table 11 might not be robust if we use country instead of cluster-fixed effects, or if we use a data set based on privatization time instead of calendar time.

Consequently, we have estimated a cross-country growth model along the line of BEMU, controlling for change in investment and change in employment. Following these authors, we use the EBRD Transition Reports which provide  $\Delta empl$ , i.e. the percentage change in employment. Like  $\frac{I}{GDP}$ , defined in the preceding section, data on percentage change in employment are particularly weak, varying considerably from one Transition Report to another in various countries for the years considered.<sup>33</sup>

Column A of Table 12 presents a regression close to BEMU.<sup>34</sup> To avoid spurious relation, we introduce a system of year dummies. It is preferred to a nonlinear time trend because of numerous gaps in the data. And we control for unobserved characteristics with country-fixed effects, as do BEMU.

In column A of Table 12, results are close to those of BEMU: countries which implement massive giveaways have higher annual growth rate than those which implement gradual sales.

To check the robustness of this result, we first introduce  $\ln(\pi)$  and *Ref* in column B. *MASS* is no more significant. Column C proposes regression estimates excluding  $\Delta empl$  and  $\Delta \frac{I}{GDP}$ . This regression is close to regression A of Table 11, except that it controls for country instead of cluster-fixed effects.

As robustness checks, we also estimate the same regressions than A, B and C, by dropping one cluster of countries at a time from the original sample. Columns D through X present most of the results. These columns report results without  $\Delta empl$  and  $\Delta \frac{I}{GDP}$  only if changes are important. When we do not consider *Ref* and  $\ln(\pi)$ , *MASS* is significant and positive when we exclude cluster 2, cluster 3, cluster 5 or cluster 7 as reported in columns F, H, L and R, respectively.

<sup>33</sup> For some countries, the EBRD (1999, p. 281; 2003, p. 211) provides percentage change in employment and for others percentage change in employment in industry, e.g., for Ukraine. Sometimes for the same series, it varies considerably from one EBRD Report to another and some years are unavailable.

<sup>34</sup> Note that BEMU also introduce the stock market capitalization as a share in GDP in their regressions. When we introduce this variable, results obtained in column A of Table 12 do not hold. Furthermore, this variable is unavailable for 149 observations in the EBRD Transition Reports for our data set and we suppose 127 observations in the BEMU data set in which Turkmenistan and Tajikistan are excluded.

Table 12

The importance of the method of privatization with *Growth* as a left-hand-side variable and controlling for the variations of inputs variables

	A	B	C	D	E	F	G	H	I	J	K	L
	<i>Growth</i>	<i>Growth</i>	<i>Growth</i>	<i>Growth</i>	<i>Growth</i>	<i>Growth</i>	<i>Growth</i>	<i>Growth</i>	<i>Growth</i>	<i>Growth</i>	<i>Growth</i>	<i>Growth</i>
<i>Cons</i>	−4.20 (−0.76)	0.80 (0.16)	13.76*** (3.35)	11.28 (1.64)	9.727 (1.49)	14.25** (2.22)	16.64*** (2.77)	13.66** (2.06)	16.13** (2.57)	8.77** (2.25)	15.99*** (4.24)	11.56* (1.67)
<i>PSG</i>	5.9 (0.62)	1.9 (0.21)	6.9 (0.97)	−3.3 (−0.35)	−4.62 (−0.45)	3.09 (0.30)	−0.50 (−0.05)	5.93 (0.60)	3.25 (0.34)	−7.57 (−1.13)	−4.12 (−0.56)	17 (1.53)
<i>MASS</i>	3.74** (1.99)	2.14 (1.20)	1.74 (1.24)	0.56 (0.21)	0.23 (0.09)	4.38** (2.02)	2.73 (1.34)	3.43* (1.94)	2 (1.17)	0.11 (0.10)	−1.12 (−1.17)	4.31** (2.34)
<i>MEBO</i>	−3.21 (−1.31)	−2.78 (−1.24)	−2.54 (−1.28)	−7.72** (−2.15)	−7.08* (−1.94)	−2.89 (−1.15)	−2.66 (−1.19)	−2.52 (−0.93)	−2.08 (−0.86)	−2.44 (−1.60)	−2.71** (−2.07)	−4.59* (−1.84)
<i>UND</i>	−2.85 (−0.69)	−1.26 (−0.34)	−0.33 (−0.14)	−5.29 (−1.08)	−4.16 (−0.95)	−1.90 (−0.48)	−0.60 (−0.16)	−4.52 (−0.91)	−3.32 (−0.72)	−5.47 (−1.43)	−3.84 (−1.08)	−5.08 (−1.19)
$\Delta empl$	0.25* (1.71)	0.23 (1.50)		0.180 (1.03)	0.17 (0.93)	0.24 (1.46)	0.21 (1.24)	0.28* (1.75)	0.28* (1.67)	0.30** (2.45)	0.26** (2.01)	0.45*** (3.51)
$\Delta \frac{I}{GDP}$	4.29** (2.51)	3.53** (1.99)		4.11** (2.45)	3.65** (2.12)	5.81*** (3.61)	4.80*** (2.70)	3.94** (2.36)	3.07* (1.71)	4.93** (2.52)	3.99** (2.05)	3.884** (2.18)
$\ln(\pi)$		−4.50*** (−4.07)	−5.09*** (−6.01)		−2.90** (−2.21)		−4.34*** (−3.99)		−4.40*** (−3.29)		−4.99*** (−4.88)	
<i>Ref</i>		−10.37 (−1.27)	−11.91* (−1.86)		−8.09 (−0.86)		−9.09 (−1.08)		−13.28 (−1.54)		−13.68* (−1.69)	
$R^2$	0.63	0.68	0.65	0.68	0.70	0.62	0.68	0.66	0.70	0.57	0.65	0.66
Obs.	240	240	300	179	179	212	212	207	207	234	234	199
$\beta_1 = \beta_2$ ( <i>p</i> -value)	0.051*	0.235	0.232	0.82	0.90	0.04**	0.18	0.056*	0.24	0.86	0.27	0.026**
Notes	All sample	All sample	All sample	Cluster 1 excluded	Cluster 1 excluded	Cluster 2 excluded	Cluster 2 excluded	Cluster 3 excluded	Cluster 3 excluded	Cluster 4 excluded	Cluster 4 excluded	Cluster 5 excluded

Table 12 (concluded)

	M	N	O	P	Q	R	S	T	U	V	W	X
	<i>Growth</i>	<i>Growth</i>	<i>Growth</i>	<i>Growth</i>	<i>Growth</i>	<i>Growth</i>	<i>Growth</i>	<i>Growth</i>	<i>Growth</i>	<i>Growth</i>	<i>Growth</i>	<i>Growth</i>
<i>Cons</i>	11.92** (2.31)	7.38 (1.64)	7.13 (1.02)	14.90** (2.44)	11.74*** (3.14)	8.27 (1.61)	15.38*** (3.13)	-6.49 (-1.09)	-0.22 (-0.04)	6.90 (1.02)	3.27 (0.36)	9.61 (1.25)
<i>PSG</i>	-1.7 (-0.21)	6.9 (0.94)	0.077 (0.011)	1.43 (0.20)	1.20* (1.79)	-2.79 (-0.25)	-3.44 (-0.32)	6.44 (0.68)	1.07 (0.11)	9.15 (0.98)	4.05 (0.34)	7.38 (0.76)
<i>MASS</i>	-0.33 (-0.34)	0.41 (0.43)	-1.04 (-0.91)	-2.45** (-2.59)	-0.28 (-0.20)	4.81** (2.18)	2.48 (1.13)	-2.33 (-1.58)	-3.45 (-1.39)	-2.23 (-1.45)	3.23 (1.33)	-1.32 (-1.36)
<i>MEBO</i>	-2.89** (-2.12)	-1.57 (-1.23)	-0.64 (-0.42)	-1.60 (-1.26)	-1.47 (-0.84)	-2.23 (-0.82)	-1.57 (-0.63)	-7.51** (-2.12)	-8.52*** (-2.64)	-4.42 (-1.54)	1.05 (0.47)	-0.33 (-0.15)
<i>UND</i>	-4.30 (-1.15)	-1.77 (-0.72)	-1.22 (-0.29)	0.458 (0.12)	2.75 (1.11)	-3.75 (-0.80)	-1.75 (-0.42)	-2.18 (-0.42)	-1.68 (-0.39)	1.90 (0.56)	1.29 (0.25)	3.35 (0.73)
$\Delta empl$	0.39*** (2.92)		0.179 (1.58)	0.138 (1.37)		0.17 (1.01)	0.16 (0.90)	-0.065 (-0.38)	-0.087 (-0.54)		-0.030 (-0.17)	-0.03 (-0.25)
$\Delta \frac{I}{GDP}$	3.72* (1.81)		2.082 (0.84)	2.381 (1.02)		4.82** (2.02)	3.84* (1.68)	1.75 (0.81)	2.00 (0.97)		0.83 (0.20)	1.53 (0.44)
$\ln(\pi)$	-4.69*** (-4.16)	-5.16*** (-5.79)		-6.366*** (-8.17)	-5.88*** (-8.86)		-4.76*** (-3.71)		-4.977*** (-5.21)	-5.43*** (-6.43)		-6.89*** (-6.74)
<i>Ref</i>	-9.94 (-1.05)	-13.54* (-1.91)		-15.60** (-2.05)	-12.15** (-1.99)		-12.95 (-1.34)		-10.69 (-1.25)	-10.19 (-1.34)		-13.83* (-1.72)
$R^2$	0.67	0.62	0.52	0.66	0.64	0.62	0.68	0.65	0.71	0.68	0.57	0.71
Obs.	199	252	211	211	264	198	198	150	150	192	169	169
$\beta_1 = \beta_2$ ( <i>p</i> -value)	0.74	0.71	0.37	0.011**	0.56	0.03**	0.25	0.40	0.16	0.17	0.19	0.63
Notes	Cluster 5 excluded	Cluster 5 excluded	Cluster 6 excluded	Cluster 6 excluded	Cluster 6 excluded	Cluster 7 excluded	Cluster 7 excluded	Clusters 1 and 6 excluded	Clusters 1 and 6 excluded	Clusters 1 and 6 excluded	Clusters 6 and 7 excluded	Clusters 6 and 7 excluded

Notes. (i) *t*-statistics are reported under coefficient estimates.

(ii) Country-fixed effects and dummy year effects are included in all models but not reported.

(iii) Cluster 1 corresponds to Croatia, the Czech Republic, Hungary, Poland, Slovakia, Slovenia; Cluster 2: Estonia, Latvia, Lithuania; Cluster 3: Bulgaria, Macedonia, Romania; Cluster 4: Albania; Cluster 5: Belarus, Moldova, Russia, Ukraine; Cluster 6: Armenia, Azerbaijan, Georgia; Cluster 7: Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan, Uzbekistan.

(iv) The line  $\beta_1 = \beta_2$  provides the *p*-value corresponding to the *F*-stat on the equality of the coefficients of *MASS* and *PSG*.

\* Statistical significance at the 10% level.

\*\* Idem, 5%.

\*\*\* Idem, 1%.

Again when we control for the level of reforms and stabilization, i.e. in columns G, I, M and S, *MASS* is no more significant. Note that when we exclude cluster 6, i.e. countries of Caucasus, and control for stabilization and the level of reforms in regression P *MASS* is significant and negative, like in column G of Table 11. Nevertheless, column Q proposes the same regression without controlling for  $\Delta empl$  and  $\Delta I/GDP$ , i.e. a regression very close to the one of column G in Table 11. *MASS* is still negative but it is not significant. It shows the importance of controlling for country effects.

At least two conclusions might be drawn from Table 12 and one from the comparison of Tables 11 and 12 with Tables 7, 8 and 9. First, controlling for stabilization and reforms changes the results drastically when the left-hand-side variable is annual growth rate. Second, it is very difficult to find that countries which have implemented massive giveaways have a lower or a higher annual growth rate than those which have implemented gradual sales.

Furthermore, results are very sensitive to the left-hand-side variable used. On the one hand, our results and those of ZES permit to show that privatization through massive giveaways always has a lower impact on output level. On the other hand it is very difficult to find that a method of privatization have a permanent effect on annual growth rates. These two results are not contradictory. It might mean that methods of privatization leading to a permanent change in the ownership structure of the economy have different effects on the output level, but not on the annual growth rate. Given that we have utilized a variety of econometric specifications, we feel that this interpretation is the appropriate one.

## 6. Conclusion

The analysis in this paper supports various conclusions. First, our analysis supports the ZES's result that privatization per se does not have any impact on output level. Second, while ZES consider the importance of the strength of the institutional governance regime to empower owners to explain this result, we do so through the lens of methods of privatization. We especially show that countries which favor gradual sales have higher output level gains from privatization than those which favor massive giveaways.

However, if these results hold in a wide variety of specifications, they differ from BEMU who find that countries implementing massive giveaways have higher annual growth rates. BEMU's results are derived from an econometric setting relating annual growth rate to factor inputs. When we control for macroeconomic stabilization and reforms, countries implementing massive giveaways do not have higher annual growth rates. Furthermore, results are very sensitive to the inclusion or exclusion of countries of Caucasus when the left-hand-side variable is annual growth rate. At the end, it is very difficult to find that countries adopting massive giveaways have higher or lower annual growth rates than countries adopting gradual sales.

The facts prove that countries which favor gradual sales have higher output recovery than those which favor massive giveaways, and it is also very difficult to find any differences in annual growth rates between countries adopting massive giveaways and those adopting gradual sales. This might mean the following. Methods of privatization leading to a permanent change in the ownership structure of the economy have different effects on output levels but not on annual growth rates. While we have made every effort to use the best data, the amount of structural change occurring is enormous to claim unconditional success. Nevertheless, given that the results, when the left-hand-side variable is output level, are in line with mechanisms expressed by Kornai (2000, 2001), Roland (2000) and ZES, and given that we have utilized a variety of econometric specifications, we feel that future investigations will broadly support our results.

## Acknowledgments

I thank the Editor and the referees for insightful comments that have improved the paper considerably, as well as Pramuan Bunkanwanicha and Farid Toubal for their kind help during the revision process. I also thank Wladimir Andreff, Fabrice Defever, Marie-José Desaignes, José de Sousa, Gérard Duchêne, Emmanuel Flachaire, Waldek Karpa, Mathilde Maurel, Olivier Lamotte, Victor Polterovich, Richard Pomfret as well as participants at the XIVth Congress of the International Economic Association in Marrakech, Morocco, Journées de l'AFSE Annual Conference on Economic Development and Transition in Clermont-Ferrand, France, the PPF workshop, and seminar on transition and development economics at Paris I. Lastly, I thank Gaëlle Forestal without whose usual support this paper could not have been prepared. Remaining errors are mine.

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