

Privatisation Methods and Economic Growth in Transition Economies*

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Abstract

We develop an analytical framework to investigate the impact of differences in privatisation methods, private sector and capital market on economic growth in transition economies. Using dynamic panel data methods, a growth equation is estimated. Growth is found to be positively associated with capital market development. However only mass privatisation is found to have a significant positive effect on growth. The explanations we suggest relate to the underdeveloped capital market in transition economies. If the wealth distribution inherited from communism is ‘wrong,’ the matching of owners to firms under full privatisation will be inefficient. This finding has important implications for privatisation methods in less developed countries.

J.E.L. Classification Numbers: L33, O40, P27, P31.

Keywords: Privatisation Methods, Economic Growth, Transition.

* We thank participants at the ACES/ASSA 2003 meeting (Washington, 3-6 January 2003) for valuable discussions and comments, and in particular Barry Ickes and Mario Nuti. We are also grateful for comments received in seminars at London Business School, Sheffield University, Queens University Belfast and a CEPR workshop in Herriott Watt University in August 2003. We also acknowledge helpful discussions with Anders Aslund, Stephen Fries, Simon Commander, Mark Schaffer and Jan Svejnár. We thank Maria Bytchkova, Michele Meoli and Alberto Montagnoli for data collection and research assistance. Any errors are our own.

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1. Introduction

In this paper, we examine the impact of some key policy choices on economic growth in transition economies. We estimate an aggregate growth model for 23 economies in transition over the period 1990-2001, exploring the effects of private sector development, capital market development and privatisation methods on economic growth. Although the impact of privatisation on the performance of firms has been studied extensively (see Megginson and Netter (2001)), literature addressing its macroeconomic implications is sparse.¹ Moreover, the consequences for growth of different policy choices with respect to the pace and method of privatisation, and the extent of capital market development, have not been explored.

Our framework allows us to test empirically a number of competing hypotheses. The first concerns the impact of private sector development on growth. If the positive effects of privatisation *per se* on the financial performance and productivity of firms predicted by microeconomics theory obtain, these effects will have a macroeconomic analogue, raising growth. Moreover as Djankov and Murrell (2002) have stressed, the type of owner post-privatisation may matter and this is likely to depend on the method of privatisation and the extent of capital market development. Some ownership types may lead to more efficient matching of buyers with firms and, for a given level of capital market development, with better corporate governance. Methods of privatisation may also affect aggregate demand and the government's budget constraints. The greater is the expenditure of private agents on the purchase of shares from the government, the more tightly will the spending ability of the private sector be constrained, leading to different levels of investment spending in the privatised

sector and consumption spending by households. Some methods of privatisation may also generate more government revenue than others. Greater revenue will tend to raise a government's ability to spend on infrastructure, with a potential positive feedback on aggregate productivity (Aghion and Schankerman, 1999). Finally, if economic growth is positively associated with capital market development, and so if different privatisation methods have different effects on capital market development, another channel is provided through which privatisation method may affect growth (Demirguc-Kunt and Maksimovic, 1998).

In Section 2 we outline our theoretical framework, and in Section 3 we discuss the specification of the estimating equations and the data used. The results are reported in Section 4, while in Section 5, which concludes, we interpret our findings. The data sources are reported in the Appendix.

2. Theoretical Framework

In this section we present the simple theoretical framework for our empirical contribution. We take the method of privatization to be an exogenous policy choice. We first classify privatisation methods and then specify equations for real aggregate demand and supply, in each of which the method of privatisation is an argument. Combining these equations, we obtain an expression in which real GDP depends on the method of privatisation and a variety of other factors. The impact on growth of private sector and capital market development is also explored.

¹ Hansen (1997) analyses technology choices under different privatisation schemes, and Schipke (2001) sketches general macroeconomic themes related to privatisation.

We distinguish three alternative privatisation methods between which the government chooses.² ‘Mass privatisation’ is defined to occur when the dominant form of privatisation is that firms are sold at a zero (or nominal) price. ‘Full privatisation’ occurs when the dominant form of privatisation in an economy is the sale of firms to outsiders for positive prices. ‘Mixed privatisation’ covers all cases that are not adequately represented by either of the first two categories, and includes to manager-employee buyouts (MEBOs) and leased buyouts. Choice of privatization methods appear to be driven primarily by political and ideological factors, and do not appear to correlate with economic performance pre-transition. Bennett, Estrin and Maw (2002) argue that the choice of privatization method is determined by the bargaining power of governments as against potential buyers.

For a given country and time, we denote real aggregate demand by y^d and real aggregate supply by y^s . Our formulation of real aggregate demand, where the sign above a variable is that of the relevant partial derivative, is

$$(1) \quad y^d = Y^d(\bar{p}, \bar{M}).$$

In addition to being negatively related to real price level p , y^d is assumed to depend on the method of privatisation M . Let $M = 1$ denote mass privatisation, $M = 2$ full privatisation, and $M = 3$ mixed privatisation. With mass privatisation, the recipients of shares may feel richer, and this real wealth effect can be expected to raise the demand for goods, though perhaps not by a substantial amount.³ Given imperfect

² In practice, each country has privatised in a variety of ways. Nonetheless, we have taken care to ensure that a *dominant* mode can be identified in each country, and that is the ‘privatisation method’ specified in our analysis (see Bennett *et al.*, 2003).

³ Insofar as the other methods of privatisation underprice shares, we may expect similar effects on demand, though generally less than for mass privatisation.

capital markets, the expenditure associated with the other two methods may leave buyers of firms short of liquidity, with a negative effect on real consumption demand. However this effect may be small for full privatisation if the number of buyers is relatively small or if firms are purchased by foreign owners. A similar argument may be made for the effect of privatisation method on aggregate real investment demand: at least for privatisation to domestic buyers, larger payments to the government will tend to constrain the new owners' ability subsequently to make real investments in restructuring. Hence we expect that real aggregate demand will be greatest for $M = 1$ and smallest for $M = 3$.

Real aggregate supply is specified by

$$(2) \quad y^s = Y^s(p, M, P, S, K, A, L, G).$$

P is the share of the private sector in national income; S is a measure of capital market development; K is the private sector capital stock; A is the human capital stock, L is employment and G is the public sector capital stock. We assume without comment that y^s is positively related to p , K and A . Similarly, we assume that y^s is increasing in L , though, because of labor hoarding, the relationship may be weaker than in Western economies. We now focus our discussion on the variables M, P, S and G .

Different methods of privatisation may lead to different majority ownership structures, with differentiated impacts on firm performance, as represented by M in equation (2). Since full privatisation is associated with relatively efficient matching of owners to firms, it may be expected to lead to the most effective corporate governance of our three types of privatisation. In contrast, MEBOs and leased buyouts may lead

to managerial and worker entrenchment,⁴ while mass privatisation may lead to diffuse ownership structures and long agency chains. Assuming that more effective corporate governance raises real aggregate supply, this suggests that the effect on y^s may be stronger for full privatisation ($M = 2$) and weaker for mixed and mass privatisation ($M = 1$ and 3).

Private sector development is the consequence of growth in the numbers of both privatised and *de novo* firms. An increase in the output of either, as a proportion of national income, will tend to raise y^s , and we treat this effect as a form of neutral technical progress. The sources of the positive effect of privatisation on productivity at the level of the firm include the better definition of corporate goals by private firms and some resolution of the incentive problems associated with the softer budget constraints of state-owned enterprises. Also, privatisation may generate network externalities, with more extensive market transactions creating a climate of trust, raising business confidence. And a major contribution is made by small and medium-sized *de novo* firms through their ability to fill the gaps left under communism by biases towards high capital intensity and against the provision of services. Private sector development is not correlated in the data with privatization method, though it is likely to be associated with other policy measures with respect to the private sector e.g. towards small scale privatization.

⁴ An extensive literature addresses how different privatisation methods may have influenced the structure of private ownership post-privatisation (see Djankov and Murrell, 2002). Full privatisation is found typically to have led to outsider ownership, with, in Hungary and Estonia, a high proportion of foreign participation. Mixed privatisation has led to insider ownership, often dominated by managers, and sometimes with a large retained state ownership share (e.g., Romania and Slovenia). The consequences of mass privatisation for ownership have been more complex. In Russia and Ukraine, widespread insider ownership resulted, while in the Czech Republic and Poland, mass privatisation was constructed to ensure primarily outsider ownership.

The development of capital markets is another policy tool for transition governments. It can be associated with more widespread and cheaper corporate finance, reducing the need for firms to rely on internally-generated funds for investment, and thus raising y^s . More mature capital market structures are also a necessary condition for improved corporate governance and enhanced company efficiency. (see Megginson and Netter (2002)). Privatisation itself may generate development of the capital market, and the larger the proportion of output that comes from the private sector, the greater is the scope for benefiting from capital market development. Thus, we expect that

$$(3) \quad \partial^2 y^s / \partial P \partial S > 0.$$

There is also a potential interaction between privatisation method and capital market development. For example, implementation of mass privatisation policies in Poland was explicitly associated with plans for capital market development (Balcerovic, 1995), while extensive use of MEBOs may restrict the expansion of the capital market.

Privatisation methods may also have a direct impact on the macro-economy though the effects on the government's budget constraint, and its ability to fund growth – enhancing investment in infrastructure. Full privatisation would be expected to yield the most revenue for the government, and mass privatisation the least. Mixed privatisation would be expected to yield an intermediate amount of revenue because the firm is usually sold at a positive, but preferential, price. Since different privatisation methods generate different amounts of revenue for the government, they may impact differently on public capital expenditure G , and so, potentially, on economic growth. If productive government expenditure is financed by distortionary

taxation, more such expenditure has an effect on economic growth that may be of either sign (Barro, 1991). Insofar as privatisation programs in transition economies are a non-distortionary source of revenue, productive investment financed by this revenue will have a positive impact on growth. However, a large proportion of public investment is financed in other ways, particularly by highly distortionary taxation. Also, the transition economies' investment performance during the communist era exhibited extreme inefficiency. Hence, we expect at best a weak positive relationship between public sector investment and real aggregate supply.

Let y denote real GDP. Setting $y^d = y^s$, we can solve (1) and (2) for p :

$$(4) \quad p = \rho(M, L, P, S, K, A, G).$$

Substituting (4) into (2) and writing $y = y^s$, we obtain

$$(5) \quad y = Y^s[\rho(M, L, P, S, K, A, G), M, P, S, K, A, G] \equiv Y(M, L, P, S, K, A, G).$$

Real GDP is increasing in L, P, S, K and A , and may be increasing in G . Putting together our comments concerning the effects on y^d and y^s of each privatisation method suggests that, compared to the other methods of privatisation, the direct effect of mixed privatisation will be a relatively low level of y , but the ranking of the other two methods in this respect is unclear. However, given that with mass privatisation the positive effect on demand may be relatively small, we expect that full privatisation, because of its efficient matching, will have the greatest effect on real GDP, at least in economies with more developed capital markets.

3. Specification and Data

We estimate a cross-country growth model along the lines of, e.g., Barro (1991) and Mankiw, Romer and Weil (1992). However, using equation (5), we supplement the model with indicators of private sector development, privatisation method, capital market development and government capital expenditure. We also explore potential complementarities between privatisation method, private sector development and capital market development. For emerging markets, similar methodology has been applied to capital market development by, e.g., Bekaert and Harvey (2000) and Henry (2000).

The basic model is therefore

$$(6) \quad GDP_{it} = a_1 + a_2 INV_{it} + a_3 EMP_{it} + a_4 IHC_{it} + a_5 STOCKMC_{it} + a_6 PRIV_{it} \\ + a_7 GIS + a_8 FULL_{it} + a_9 MASS_{it} + a_{10} MIXED_{it} + \varepsilon_{it},$$

where all variables are re-labelled for a more immediate interpretation of the estimates. i denotes country and t time; GDP is the first difference of the log of real gross domestic product y ; INV is the first difference of the log change in the real capital stock K ; EMP is the first difference of the log of employment L ; IHC is the first difference of the log of investment in human capital A , which is measured by gross enrolment in tertiary education; $STOCKMC$ is stock market capitalisation as a proportion of GDP , which is our measure of stock market development S ; $PRIV$ is the share of private sector output in GDP , corresponding to P in equation (5); and GIS is the share of government expenditure devoted to investment, which is our

measure of government capital expenditure G ⁵. The three methods of privatisation, M , are denoted by *FULL*, *MIXED* and *MASS*; and ε_{it} is an i.i.d. error term. The estimation period is the twelve years 1990-2001 and covers 23 transition countries⁶.

We use panel data analysis (within-groups estimators) to exploit both time-series and cross-section variation in data, in particular in the relationship between growth and privatisation method. We test for time-specific as well as country-specific fixed effects in each regression, and compare the performance of model (6) with its dynamic counterpart. For the dynamic version of the model, with lagged dependent variables, we use generalised-method-of-moments (GMM) estimation, dealing with potential problems of endogeneity of the explanatory variables by instrumenting on lagged values. GMM estimation also allows us to address the correlation between the error term and lagged endogenous variable.

The three privatisation dummies have both a cross-section and a time-series dimension. We identify the chosen method of privatisation in each country and then identify the date at which this privatisation method was introduced.⁷ In each case the

⁵ Equation (6) is estimated in first difference form to take out country specific fixed effects. Since we are addressing the impact of key policy choices – privatisation method, capital market development, private sector development – on growth, the variables are included in the estimating equations in levels form. This is clearly appropriate for privatisation methods, since it is constructed as a dummy variable. However, since the others are continuous variables, we also estimated the equations including these in first differences. The principal findings with respect to INV, EMP, IHC, G and methods of privatisation are not affected by the change in specification. However, neither PRIV, STOCKMC nor their interaction is significant in the OLS estimation. STOCKMC and its interaction with PRIV are significant in the GMM estimation, with the same signs as in Table 4.

⁶ Our data set covers all the transition countries listed by EBRD (2002), except for Bosnia and Herzegovina, FYugoslavia, Tajikistan and Turkmenistan for which relevant data are not available. We cover Albania, Armenia, Azerbaijan, Belarus, Bulgaria, Croatia, Czech Republic, Estonia, FYR Macedonia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, Ukraine and Uzbekistan.

⁷ In preparing the paper, we explored the effects of using three different ways of classifying privatisation methods (see Bennett, *et al.*, 2003). The first was based on official reports available on government websites. The second was to use external documentary sources. The third was based on EBRD classifications. In this paper we report regressions based on the third approach because it derives from a single source and does not rely on our subjective judgements. However, all the

dummy variable is zero in the years before the relevant method of privatisation was introduced and unity thereafter. The classification of privatisation method by year and country is presented in Table 1. The two columns on the right report the EBRD's classification of primary and secondary privatisation methods, which we have transformed into our categories as follows. When the primary method is identified by the EBRD as voucher, we classify privatisation as 'mass.' When the EBRD primary method is direct sales, we classify privatisation as 'full.' In other cases we classify privatisation as 'mixed.'⁸

4. Results

We first estimate versions of equation (6), before addressing issues of dynamics using GMM methods and undertaking sensitivity tests. In all equations we use White's correction for robust standard errors. In Table 2, we report four versions of equation (6), taking into account potential interactions between capital market development, private sector development and method of privatisation. Column (1) represents the simplest formulation, with no interactions. In column (2) we include a term for the interaction between capital market development and private sector development, and in column (3) we include an interaction term between stock market development and mass privatisation as an example of a large number of regressions linking capital

equations were estimated using all three approaches. When the approach was changed, five countries shifted category, but none of the conclusions with respect to method of privatisation were affected. The regressions are available from the authors on request. The robustness of our conclusions to reclassification of privatisation method in a few countries is important because it shows that our findings are not dependent on how we categorise the few countries for which the dominant privatisation method is somewhat unclear, and which may shift between Mass and Mixed. The results derive from the countries about which there is little debate as to the dominant method of privatisation.

⁸ Our approach is not sensitive to differences in the pace at which the dominant method of privatisation was introduced. This was tested by checking the sensitivity of results to different assumptions about the year of introduction or privatization in countries where the data is contentious. The main findings were not sensitive to these changes. For example, privatisation was very rapid in Russia but rather slow in Poland and Ukraine.

market development, private sector development and method of privatisation. None of the interactions with any of the methods of privatisation are significant. And therefore only are “representative” examples is ever reported. Column (4) includes both interaction terms.

All four formulations in Table 2 yield good fits, with $R^2 > .6$ and joint Wald tests ranging from 130.7 in column (1) to 179 in column (3). The Wald tests for country (dummy) and time confirm the strong significance of fixed- and time-specific effects in the growth process, while the AR tests indicate that autocorrelation is not present. Country fixed effects represents a particularly important element in the explanation (χ^2 ranges from 2703 in column (1) to 7108 in column (4)).

The coefficients on factor inputs are stable and significant across the four formulations. The findings are consistent with the type of growth process identified by Barro (1991) and many others, with the coefficient on capital estimated to be around .08. The coefficient on employment is also highly significant, but lower than typically obtains in the West, perhaps because of labor hoarding in the immediate post-transition period. Additionally, we identify a relatively small but significant impact of labour quality change on GDP growth.

Private sector and stock market development are not found to be independently significant in column (1). However, once their interaction term is included (column (2)), we identify a significant positive impact of stock market development on GDP growth, together with a small negative interaction effect. This suggests that the growth-enhancing effects of capital sector development relied on private sector development, but tailed off as an economy approached a Western

ownership and capital market structure. As noted above, the interaction of stock market development with mass privatisation (column (3)) is not significant.

Turning to the impact of privatisation methods on growth, the findings are consistent across the four specifications. Neither full nor mixed privatisation is found to exert a significant independent influence on GDP growth, but the coefficient on mass privatisation is always positive and at least weakly significant. Moreover since the coefficient on government capital expenditure is insignificant in each specification, we conclude that full privatisation neither influences growth directly through productivity enhancement, nor indirectly through the potential macro-economic externality that could derive from spending the increased government revenues on infrastructure.⁹ To check the robustness of the finding with respect to government capital expenditure, we re-estimated columns (1)-(4) of Table 2 replacing *GIS* by the EBRD (1996, 2003) index of infrastructure reform. The coefficients and standard errors on the factor inputs, *PRIV*, *STOCKMC* and privatisation methods are hardly affected by the change and the index is not significant in any regression (see Bennett, *et al.*, 2003).

Since the results could be sensitive to dynamic specification, we re-estimate the OLS regressions with the inclusion of a lagged endogenous variable. The results, which are reported in Table 3, indicate that a dynamic specification is appropriate: the lagged endogenous variable is significant in all three columns, and its inclusion

⁹ The data suggest that, even though the choice full privatisation must have relaxed the government's budget constraint, the authorities did not choose to spend this incremental revenue on capital expenditure. The correlation coefficient between full privatisation and government capital expenditure is only .05.

widens the standard error around contemporaneous employment variable, which is no longer significant. However, our conclusions about the impact of capital market development and privatisation methods on growth are the same in the dynamic specification. The coefficients on stock market development and its interaction term with private sector development are significant in columns (2) and (4), and the coefficient on mass privatisation is positive and significant in the three specifications. The coefficients on mixed privatisation, full privatisation and government capital expenditure are not significant in any of the four columns.

The results in Table 3 may be biased by correlation between the error term and the lagged endogenous variable, so we decided to undertake GMM estimation. The GMM estimates for the four specifications, with factor inputs (investment, employment and labour quality) and government expenditure all instrumented on lagged values are reported in Table 4. This again replicates the main results from the other two tables. The lagged endogenous variable is always significant, as are the coefficients on investment and the change in employment. However the measure of the human capital is not quite significant in any specification using GMM estimation methods. The findings on the relationship between policy choices in transition and growth confirm those in the earlier tables. Government capital expenditure is found to be persistently insignificant in the four specifications, as are the coefficients on full and mixed privatisation while the conclusions from Table 2 concerning private sector and capital market development are confirmed by Table 4, as are the findings concerning mass privatisation.

We sought to understand these results by breaking the data set into sub-samples geographically (non-CIS versus CIS) and over time (1990-1995 and 1996-2001).

Unfortunately, the decline in degrees of freedom made the estimated coefficients much less precise and since the equations are much less reliable, they are not reported here. They are reported in full in Bennett *et al* (2003). However, the experiments suggest that the main results with respect to stock market development, private sector development and methods of privatisation hold in particular in the CIS, and in the period after 1995. This is unsurprising given Table 1, which indicates that mass privatization methods are concentrated in CIS countries and in the post-1995 period.

However, this suggests that the mass privatisation dummy might instead be proxying for improved demand and cost conditions in the CIS countries between 1996-2001. Obvious factors here might include oil prices, which were increasing in this period to the benefit of several oil supplying CIS countries, and exchange rates. We therefore re-estimated our equations to control for this issue. A sample of the results is reported in Table 5, which uses as the base equation column (2) of Table 2 includes exchange rates (column (1)) and then exchange rates with oil prices (column (2)). It can be seen that exchange rates are significant in column (1) and both new coefficients are significant in column (2). This suggests that commodity price increases and exchange rate depreciation both had a positive effect on growth in transition economies 1990-2001. However, it also shows that, though mass privatisation was the dominant method in CIS countries, the variable MASS is not proxying for demand or costs factors in this region. The coefficient on mass privatisation in Table 5 remains positive and significant. This suggests that the correct interpretation of our previous findings is that the countries in CIS which introduced mass privatisation were in a better position to exploit the improved market conditions in the late 1990's than those which employed other privatisation methods.

Concluding Comments

Our empirical analysis shows that the method of privatisation plays an important role in economic growth. A finding that full privatisation had a significant growth effect would have verified the hypothesis that efficient corporate governance and the matching of buyers with firms are critical. An advantage of full privatisation is that it leads to concentrated ownership, whereas mass privatisation has the converse effects. Since, however, we find that it is mass privatisation that has the positive effect, the matching argument must be relatively weak for transition economies. This may be because in any economy the ability to purchase a firm, or at least a substantial ownership share, is imperfectly correlated with the skills required to run the firm efficiently. In an economy with an extremely underdeveloped capital market, 'wrong' owners will tend to persist for longer.¹⁰ The positive effect of mass privatisation has been justified on political economy grounds (Boycko, Shleifer and Vishny, 1995), but it is also consistent with the hypothesis that the method of privatisation may foster growth through the effects on the demand for consumption or investment goods and by separating the management of firms from state ownership (see Djankov and Murrell (2002)).

We hypothesised that government capital investment might have played a significant role in generating growth through the provision of public goods, in which case, of full privatisation could have yielded benefits through the greater revenue it generates for the government. However, we are unable to identify such an effect in

¹⁰ This argument is strengthened if the income distribution inherited from the communist era was misaligned with the ability to run firms. In the Czech Republic, for example, the distribution of shares at nominal cost to the general public led to shares being placed in the hands of privatisation funds, which may have exerted pressure on managers to be relatively efficient. The argument does not apply to full privatisation to foreign investors, but, as we have already noted, the amount of such privatisation has been relatively small across all transition economies less than 2% of world FDI in 1999. (see UNCTAD 2003)).

our empirical work, and this is probably because transition governments did not use incremental revenue in this way. Thus, although full privatisation raises more (immediate) government revenue than mass privatisation does, the extent to which this is translated into faster economic growth may be disappointing.

Our analysis has significant implications for countries particularly developing countries that have still to undertake large-scale privatisation programmes, for example China, India and Vietnam. It suggests that the method of privatisation is an important policy choice, and that, despite the great criticism it has received in recent years (see e.g. Stiglitz (2002)), mass privatisation may be the appropriate choice in situations where capital markets are highly imperfect and the distribution of wealth is not well correlated with the distribution of managerial ability.

Table 1
Country Privatisation Table

Country	Classification of Privatisation	Year of Privatisation	Primary Method	Secondary Method
Albania	Mixed	1995	MEBO	vouchers
Armenia	Mass	1994	vouchers	MEBO
Azerbaijan	Mass	1997	vouchers	direct sales
Belarus	Mixed	1994	MEBO	vouchers
Bulgaria	Full	1993	direct sales	vouchers
Croatia	Mixed	1992	MEBO	vouchers
Czech Republic	Mass	1992	vouchers	direct sales
Estonia	Full	1993	direct sales	vouchers
FYR Macedonia	Mixed	1993	MEBO	direct sales
Georgia	Mass	1995	vouchers	direct sales
Hungary	Full	1990	direct sales	MEBO
Kazakhstan	Full	1994	direct sales	vouchers
Kyrgyzstan	Mass	1996	vouchers	MEBO
Latvia	Full	1992	direct sales	vouchers
Lithuania	Mass	1991	vouchers	direct sales
Moldova	Mass	1995	vouchers	direct sales
Poland	Full	1990	direct sales	MEBO
Romania	Mixed	1992	MEBO	direct sales
Russia	Mass	1993	vouchers	direct sales
Slovak Republic	Full	1995	direct sales	vouchers
Slovenia	Mixed	1998	MEBO	vouchers
Ukraine	Mass	1994	vouchers	MEBO
Uzbekistan	Mixed	1996	MEBO	direct sales

Note: Year of privatisation was established using EBRD information on primary method of privatisation and its privatisation chronicle.

Table 2
Growth Equations, 1990-2001
Interacting Private Sector Share and Mass Privatisation with Stock Market Capitalisation

Regression	(1)		(2)		(3)		(4)	
Variable	Coeff.	Std. Errs	Coeff.	Std. Errs	Coeff.	Std. Errs	Coeff.	Std. Errs
<i>INV</i>	0.082	0.022***	0.077	0.020***	0.082	0.022***	0.076	0.020***
<i>EMP</i>	0.152	0.073**	0.151	0.074**	0.151	0.073**	0.149	0.074**
<i>IHC</i>	0.066	0.026**	0.059	0.025**	0.066	0.026**	0.059	0.025**
<i>GIS</i>	0.004	0.006	0.004	0.006	0.004	0.006	0.004	0.006
<i>PRIV</i>	0.078	0.082	0.105	0.085	0.080	0.083	0.110	0.087
<i>STOCKMC</i>	-0.042	0.054	1.230	0.424***	-0.032	0.066	1.262	0.420***
<i>PRIV * STOCKMC</i>	-	-	-0.017	0.006***	-	-	-0.018	0.006***
<i>MASS * STOCKMC</i>	-	-	-	-	-0.021	0.114	-0.043	0.112
<i>MASS</i>	6.588	3.272**	6.401	3.387*	6.649	3.456*	6.522	3.537*
<i>FULL</i>	-0.127	1.961	-0.313	1.948	-0.159	1.943	-0.380	1.950
<i>MIXED</i>	2.502	1.696	1.894	1.768	2.485	1.672	1.854	1.772
Constant	-2.631	2.785	-2.629	2.808	-2.645	2.780	-2.659	2.803
Dummies	Yes/No	Significance	Yes/No	Significance	Yes/No	Significance	Yes/No	Significance
Time Dummies	Yes	***	Yes	***	Yes	***	Yes	***
Group Dummies	Yes	***	Yes	***	Yes	***	Yes	***
Indicators	Value		Value		Value		Value	
Σ	5.824		5.751		5.838		5.764	
Σ^2	33.921		33.078		34.085		33.224	
R^2	0.629		0.640		0.629		0.640	

RSS	6818.050			6615.548			6817.049			6611.505		
TSS	18393.524			18393.524			18393.524			18393.524		
No. of observations	244			244			244			244		
No. of parameters	43			44			44			45		
No. of individuals	23			23			23			23		
Tests	Stat.	Value	P-value	Stat.	Value	P-value	Stat.	Value	P-value	Stat.	Value	P-value
Wald (joint):	$\chi^2(9)$	130.700	[0.000]	$\chi^2(10)$	169.300	[0.000]	$\chi^2(10)$	144.700	[0.000]	$\chi^2(11)$	179.000	[0.000]
Wald (dummy):	$\chi^2(34)$	2703.000	[0.000]	$\chi^2(34)$	4075.000	[0.000]	$\chi^2(34)$	5.28704	[0.000]	$\chi^2(34)$	7108.000	[0.000]
Wald (time):	$\chi^2(11)$	56.320	[0.000]	$\chi^2(11)$	46.750	[0.000]	$\chi^2(11)$	54.66	[0.000]	$\chi^2(11)$	44.940	[0.000]
AR(1) test:	N(0,1)	1.023	[0.306]	N(0,1)	0.977	[0.329]	N(0,1)	1.022	[0.307]	N(0,1)	0.973	[0.331]
AR(2) test	N(0,1)	0.413	[0.679]	N(0,1)	0.243	[0.808]	N(0,1)	0.409	[0.683]	N(0,1)	0.213	[0.831]

Significance levels:

- *** : 1% or less
- ** : less than 5%
- * : less than 10%

Table 3
Growth Equations, 1990-2001
OLS Dynamic Models
Interacting Private Sector Share and Mass Privatisation with Stock Market Capitalisation

Regression	(1)		(2)		(3)		(4)	
	Coeff.	Std. Errs	Coeff.	Std. Errs	Coeff.	Std. Errs	Coeff.	Std. Errs
<i>GDP</i> (-1)	0.207	0.089**	0.191	0.088**	0.207	0.089**	0.192	0.089**
<i>INV</i>	0.075	0.022***	0.070	0.020***	0.075	0.022***	0.070	0.020***
<i>EMP</i>	0.113	0.073	0.116	0.074	0.115	0.072	0.117	0.073
<i>IHC</i>	0.059	0.024**	0.054	0.023**	0.059	0.024**	0.054	0.023**
<i>GIS</i>	0.003	0.006	0.003	0.006	0.003	0.006	0.003	0.005
<i>PRIV</i>	0.053	0.082	0.075	0.084	0.050	0.082	0.074	0.085
<i>STOCKMC</i>	-0.014	0.042	1.002	0.347***	-0.029	0.054	0.989	0.358***
<i>PRIV * STOCKMC</i>	-	-	-0.014	0.005***	-	-	-0.014	0.005***
<i>MASS * STOCKMC</i>	-	-	-	-	0.035	0.099	0.017	0.101
<i>MASS</i>	7.792	2.691***	7.626	2.812***	7.708	2.839***	7.585	2.937**
<i>FULL</i>	0.119	1.698	-0.046	1.599	0.184	1.658	-0.013	1.581
<i>MIXED</i>	2.313	1.705	1.775	1.763	2.346	1.661	1.794	1.738
Constant	-6.209	3.285*	-6.280	3.342*	-6.152	3.295*	-6.251	3.350*
Dummies	Yes/No	Significance	Yes/No	Significance	Yes/No	Significance	Yes/No	Significance
Time Dummies	Yes	***	Yes	***	Yes	***	Yes	***
Group Dummies	Yes	***	Yes	***	Yes	***	Yes	***
Indicators	Value		Value		Value		Value	
Σ	5.564		5.519		5.577		5.533	
Σ^2	30.958		30.457		31.108		30.615	

R^2	0.674			0.681			0.674			0.681		
RSS	5881.972			5756.313			5879.351			5755.677		
TSS	18043.836			18043.836			18043.836			18043.836		
No. of observations	233			233			233			233		
No. of parameters	43			44			44			45		
No. of individuals	23			23			23			23		
Tests	Stat.	Value	P-value	Stat.	Value	P-value	Stat.	Value	P-value	Stat.	Value	P-value
Wald (joint):	$\chi^2(10)$	154.200	[0.000]	$\chi^2(11)$	180.400	[0.000]	$\chi^2(12)$	164.700	[0.000]	$\chi^2(12)$	180.700	[0.000]
Wald (dummy):	$\chi^2(33)$	1145.000	[0.000]	$\chi^2(11)$	7574.000	[0.000]	$\chi^2(33)$	1342.000	[0.000]	$\chi^2(33)$	2.031e+4	[0.000]
Wald (time):	$\chi^2(10)$	39.250	[0.000]	$\chi^2(10)$	32.710	[0.000]	$\chi^2(10)$	39.210	[0.000]	$\chi^2(10)$	32.780	[0.000]
AR(1) test:	N(0,1)	-1.612	[0.107]	N(0,1)	-1.499	[0.134]	N(0,1)	-1.618	[0.106]	N(0,1)	-1.503	[0.133]
AR(2) test	N(0,1)	0.413	[0.679]	N(0,1)	0.313	[0.754]	N(0,1)	0.423	[0.672]	N(0,1)	0.320	[0.749]

Significance levels:

- *** : 1% or less
- ** : less than 5%
- * : less than 10%

Table 4
Growth Equations, 1990-2001
GMM Dynamic models
Interacting Private Sector Share and Mass Privatisation with Stock Market Capitalisation

Regression	(1)		(2)		(3)		(4)	
	Coeff.	Std. Errs	Coeff.	Std. Errs	Coeff.	Std. Errs	Coeff.	Std. Errs
<i>GDP</i> (-1)	-0.328	0.103***	-0.336	0.104***	-0.336	0.102***	-0.352	0.105***
<i>INV</i>	0.0621	0.019***	0.059	0.019***	0.0627	0.019***	0.059	0.019***
<i>EMP</i>	0.186	0.082**	0.184	0.087**	0.192	0.083**	0.194	0.088**
<i>IHC</i>	0.027	0.017	0.023	0.018	0.028	0.018	0.025	0.020
<i>GIS</i>	-0.007	0.007	-0.009	0.008	-0.009	0.007	-0.012	0.00
<i>PRIV</i>	0.117	0.187	0.098	0.188	0.102	0.194	0.067	0.201
<i>STOCKMC</i>	-0.060	0.093	3.425	1.744*	-0.255	0.227	3.791	1.955*
<i>PRIV * STOCKMC</i>	-	-	-0.050	0.025**	-	-	-0.061	0.031**
<i>MASS * STOCKMC</i>	-	-	-	-	0.284	0.252	0.518	0.448
<i>MASS</i>	8.539	2.880***	7.089	2.567***	8.375	2.962***	6.490	2.619**
<i>FULL</i>	-0.587	5.168	-1.926	5.253	-0.692	5.204	-2.397	5.148
<i>MIXED</i>	2.426	4.314	1.639	4.564	2.005	4.370	0.709	4.657
Constant	-6.095	3.910	-6.855	3.841*	-5.971	3.937	-6.787	3.820*
Dummies	Yes/No	Significance	Yes/No	Significance	Yes/No	Significance	Yes/No	Significance
Time Dummies	Yes	***	Yes	***	Yes	***	Yes	***
Group Dummies	Yes	***	Yes	***	Yes	***	Yes	***
Indicators	Value		Value		Value		Value	
Σ	6.830		7.066		6.905		7.449	
Σ^2	46.651		49.932		47.679		55.494	

R^2	-			-			-			-		
RSS	8257.292			8788.099			8391.447			9711.508		
TSS	11905.183			11905.183			11905.183			11905.183		
No. of observations	220			220			220			220		
No. of parameters	43			44			44			45		
No. of individuals	23			23			23			23		
Tests	Stat.	Value	P-value	Stat.	Value	P-value	Stat.	Value	P-value	Stat.	Value	P-value
Wald (joint):	$\chi^2(10)$	71.220	[0.000]	$\chi^2(11)$	81.800	[0.000]	$\chi^2(11)$	94.410	[0.000]	$\chi^2(12)$	99.660	[0.000]
Wald (dummy):	$\chi^2(33)$	9.455e+4	[0.000]	$\chi^2(33)$	6.833e+4	[0.000]	$\chi^2(33)$	1.087e+5	[0.000]	$\chi^2(33)$	1.460e+7	[0.000]
Wald (time):	$\chi^2(10)$	81.490	[0.000]	$\chi^2(10)$	78.300	[0.000]	$\chi^2(10)$	73.950	[0.000]	$\chi^2(10)$	73.500	[0.000]
Sargan test:	$\chi^2(95)$	111.900	[0.114]	$\chi^2(94)$	99.920	[0.319]	$\chi^2(94)$	108.700	[0.143]	$\chi^2(93)$	87.780	[0.633]
AR(1) test:	N(0,1)	-0.175	[0.861]	N(0,1)	-0.335	[0.738]	N(0,1)	-0.248	[0.804]	N(0,1)	-0.642	[0.521]
AR(2) test	N(0,1)	0.010	[0.992]	N(0,1)	-0.311	[0.756]	N(0,1)	0.049	[0.961]	N(0,1)	-0.262	[0.793]

GMM model instrumenting *GDP*, *INV*, *EMP*, *IHC* and *GIS*.

Transformation used: first differences.

Level instruments: dummies, GMM(*GDP*,1,2), GMM(*INV*,1,2), GMM(*EMP*,1,2), GMM(*IHC*,1,2), GMM(*GIS*,1,2).

Significance levels:

*** : 1% or less

** : less than 5%

* : less than 10%

Table 5:
Growth equations, on 1990-2001
Including Exchange rates and oil price

Regression	(1)			(2)		
	Coeff.	Std. Errs		Coeff.	Std. Errs	
INVg	0.078	0.020***		0.078	0.023***	
EMPLg	0.188	0.087**		0.218	0.092**	
IHCg	0.050	0.025**		-0.011	0.018	
GISg	0.000	0.006		-0.001	0.006	
PrivSS	0.096	0.084		0.125	0.048***	
Stock MC	1.077	0.412***		1.130	0.434***	
PrivSS*StockMC	-0.015	0.006***		-0.015	0.006**	
Exchange Rates	-0.003	0.002*		-0.005	0.002***	
Oil Price	-	-		0.020	0.010*	
Mass	6.564	3.444*		6.971	3.863*	
Full	0.297	2.061		0.550	2.094	
Mixed	1.959	1.878		2.570	1.862	
Constant	-2.065	2.750		-6.792	2.037***	
Dummies	Yes/No	Significance		Yes/No	Significance	
Time Dummies	Yes	***		No	-	
Group Dummies	Yes	***		Yes	***	
Indicators	Value			Value		
Sigma	5.719			5.796		
Sigma^2	32.711			33.597		
R^2	0.647			0.619		
RSS	6476.840			6988.228		
TSS	18357.644			18357.644		
No. of observations	243			243		
No. of parameters	45			35		
No. of individuals	23			23		
Tests	Stat.	Value	P-value	Stat.	Value	Pvalue
Wald (joint):	Chi^2(11)	271.500	[0.000]	Chi^2(12)	811.300	[0.000]
Wald (dummy):	Chi^2(34)	8761.000	[0.000]	Chi^2(23)	1369.000	[0.000]
Wald (time):	Chi^2(11)	31.110	[0.001]	-	-	-
AR(1) test:	N(0,1)	0.827	[0.408]	N(0,1)	0.457	[0.647]
AR(2) test	N(0,1)	-0.070	[0.944]	N(0,1)	0.334	[0.739]

All the regressions: Fixed effect, and White's correction for robust standard errors.

(1) Exchange rates and time effect

(2) Exchange rates and oil price (substituting time effect)

Significance levels:

*** : 1% or less

** : less than 5%

* : less than 10%

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DATA APPENDIX

The data used in this paper describe 23 of the 27 transition economies covered in the EBRD Transition Reports (various years), which provide complete information for 1990-2001 on macroeconomic variables including GDP, employment and gross fixed capital formation, and the indicators of institutional investment used in the paper. Bosnia and Herzegovina, FRYugoslavia, Tajikistan and Turkmenistan were excluded from the analysis because complete data on these countries were unavailable.

Gross Domestic Product The base year for the GDP series was sourced from the World Bank's *Historically Planned Economies: A Guide to the Data*, taking the 1988 figure, measured in constant 1987 market prices.¹¹ Figures were converted into US dollars using the 1987 exchange rate. For the countries that later disintegrated (Czechoslovakia, Yugoslavia and USSR), we broke the GDP total into constituent parts using information on the constituent countries' proportion in total GDP provided by UN, World Bank and national sources. The total USSR figure was divided into Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Moldova, Russia, Ukraine and Uzbekistan. The total figure for Yugoslavia was divided to obtain separate country data for Slovenia, Macedonia and Croatia. The total figure for Czechoslovakia was divided to obtain separate data on Slovakia and the Czech Republic. Data for 1989-2001 were obtained by extending the series from 1988 using EBRD real GDP growth rates covering 1989-2001.

Fixed Capital Investment Fixed capital investment (*FCI*) figures were obtained from the EBRD (1999, 2000, 2001, 2002) by taking the real gross fixed investment rate, measured in annual percentage change. For the few cases in which such information was unavailable, alternative measures were used. The main alternative source was data on investment share in GDP provided by IMF and EBRD. This ratio was applied to our GDP levels figures to obtain fixed capital investment levels data. An annual percentage change in fixed capital investment was calculated from the levels figures. We also used GDP level figures in order to calculate fixed capital investment growth in the early years of the 1990s in the few cases when information on annual percentage change in investment was not available. We calculated fixed capital investment figures by applying fixed capital investment to GDP ratios, provided by IMF and National Statistics sources, to our GDP levels figures.

Employment Information on employment growth was obtained from EBRD employment time series, measured in annual percentage change, for 1989-2001.

Investment In Human Capital. The measure chosen for investment in human capital was gross enrolment in tertiary education, defined as the total number of students who had attained a certain level of education as a percentage of the total population in the age group. The data were obtained using TransMonee Database, produced by UNICEF, by taking 5-year period averages. These series were preferred to UNESCO data, which are inconsistent with the World Bank source and show some unconvincingly high growth of enrolment rates for several countries.

¹¹ In case of Albania, 1988 GDP is provided in constant 1986 market prices, and was converted into US dollars using the 1986 exchange rate.

Government Investment Share in GDP Data were derived from the measurement of government capital expenditure provided by IMF Country Reports. For CIS countries, information on early years of transition was unavailable from this source, so we used the CIS national databases. For the Baltic countries, the Baltic International Centre for Economic Policy Studies provided additional data for Estonia (1991 and 1995); for Latvia (1994 and 1995); and for Lithuania (1991, 1993, 1994 and 1995.)

Private Sector Share in GDP This information was taken from the EBRD Transition Report, 1999 and 2002.

Stock Market Capitalisation as a Share in GDP Data were taken from the EBRD (2002) and are consistent with Emerging Stock Market Facts Book. Since in many transition countries the stock market did not exist in the early 1990s, a 'zero' value was assigned for those years.

Indices of Reform The EBRD Infrastructure Reform Index was sourced from EBRD (2002).

Privatisation Data and Mode Information on privatisation mode was sourced from the EBRD (1995, 2002). This classifies privatisation methods into voucher, direct sale, and MEBO, and identifies the first year in which the primary type of privatisation was implemented. We use this as the date of privatisation our analysis (see Bennett, *et al.*, 2003).