

CENTRE FOR ECONOMETRIC ANALYSIS
CEA@Cass

<http://www.cass.city.ac.uk/cea/index.html>

Cass Business School
Faculty of Finance
106 Bunhill Row
London EC1Y 8TZ

*Methods of Privatization and Economic Growth
in Transition Economies*

John Bennett, Saul Estrin and Giovanni Urga

CEA@Cass Working Paper Series

WP-CEA-03-2005

Methods of Privatization and Economic Growth in Transition Economies*

John Bennett

(Brunel University, U.K.)

Saul Estrin[†]

(London Business School, U.K.)

Giovanni Urga

(Cass Business School, London, U.K.)

May 6, 2005

*We thank participants at the 2003 ASSA Meetings and a CEPR workshop in August 2003 for valuable discussions and comments on an earlier version of this paper. We are grateful for comments received in seminars at Cass Business School, London Business School, London School of Economics, University of Michigan, Oxford University, Queens University Belfast, Rome University, and Sheffield University. We also acknowledge helpful discussions with Anders Aslund, Simon Commander, Stephen Fries, Mark Schaffer, Jan Svejnar and Chenggang Xu. We thank Maria Bychkova and Alberto Montagnoli for data collection. Michele Meoli and Rhana Neidenbach provided superb research assistance. Any errors are our own.

[†]*Corresponding author*: London Business School, Regent's Park, London, NW1 4SA, United Kingdom. Tel. +44 207262 5050. Fax. +44 207724 8060. e-mail: ses-trin@london.edu

Methods of Privatization and Economic Growth in Transition Economies

Abstract

Dynamic panel data methods are used to estimate a growth model augmented with privatization method variables and other factors potentially relevant to growth in transition economies using data from 23 countries for the period 1990 to 2003. It is found that ‘mass privatization’ is associated with a structural break in the growth process, its impact being positive; but other privatization methods have no significant impact on growth. The findings suggest that the long-term growth process was accelerated by the speed with which mass privatization allowed the links between the state and firms to be severed.

JEL Classification: L33, O40, P27, P31.

Keywords: Privatization, capital markets, economic growth.

1 Introduction

Privatization has been a world-wide phenomenon for the past twenty-five years. According to Megginson (2005), the cumulative value raised by privatization programs around the world exceeds \$1.25tr., and the cumulative proceeds of privatization by country represent 7.6% of GDP in developed economies and 3.% of GDP in developing ones. In the economics and finance literature, a large body of work now exists which tries to understand the effects of privatization. A central result of this research, as emphasized by Megginson and Netter (2001) in their survey of microeconomic empirical studies, is that privatization acts to enhance enterprise productivity in both developed and middle-income economies (see also La Porta and Lopez-de-Silanes (1999)).

Privatization has also played a major role in the former Soviet Union (FSU) and Central and Eastern Europe. Indeed, along with the price liberalization, privatization has been regarded as the defining component of the transition from communism to capitalism (Blanchard, Dornbusch, Krugman, Layard, and Summers (1990) and Roland (2000)). Yet transition governments faced an unprecedented problem in implementing their privatization policies: how to transfer into private hands the ownership of most of the economy in an environment with little or no domestic private savings and limited ability to inspire or absorb foreign direct investment (World Bank (1996)). Moreover, in some countries reformist governments saw themselves as having only a very short window of opportunity to sever the links between the state and the private sector and thereby to inhibit the return of communism (Boycko, Shleifer, and Vishny (1995)). In addition to the conventional approach

of selling state assets to the highest bidder, transition governments therefore used a variety of privatization methods, including restitution, management-employee buyouts (MEBOs), lease buyouts and, most significantly, ‘mass privatization,’ with shares being distributed at a zero or nominal price to the population as a whole (Boycko, Shleifer, and Vishny (1994)). In this paper, we are the first to examine how the method of privatization has influenced economic growth in the first decade and more of transition.

In a survey of studies of transition economies, Djankov and Murrell (2002) identify a positive effect of privatization on enterprise performance in CEE, but not in the FSU.¹ They explain this difference in terms of two factors. First, the institutional environment was weaker in the FSU than in CEE, which limited the effectiveness of privatization in improving corporate governance. Second, the privatization process in the FSU led to outcomes in which insider ownership predominated, and this was less conducive to improved enterprise performance. These conclusions appear to be supported by a numerous country-specific micro-econometric studies (for example, Claessens and Djankov (1999) and Frydman, Gray, Hessel, and Rapaczynski (1999)).² The literature also contains studies that identify significant deficiencies in the Czech and the Russian approaches to mass privatization (see, for example, Coffee (1996) and Johnson, La Porta, Lopez-De-Silanes, and Shleifer (2000)). These highlight great problems of weak governance and tunneling

¹Djankov and Murrell’s survey contain 194 references and their meta-analysis of the effects of privatization on estimated performance is based on 37 studies.

²One could, however, question the robustness of the conclusions from a micro-econometric literature that is comprised mainly of small cross-section surveys of samples of enterprises. As noted by Djankov and Murrell, data limitations have made it hard in these studies to address the problem of reverse causality, particular methods of privatization being chosen for particular firms.

soon after mass privatization was implemented. However, neither of these bodies of evidence yields cross-country evidence of the long-term effects of different privatization methods on growth

To examine these issues empirically, we estimate an aggregate growth model, controlling for factor inputs, for the 23 transition economies for which there are consistent data over the period 1990-2003. The transition economies emerged from a largely common system of central planning and communist ownership (Ericson (1991)), but are different in terms of resource endowments, have followed significantly different policy mixes (World Bank (1996) and EBRD (2002)), and have exhibited a large variance in their growth rates (Svejnar (2002)). They therefore make an excellent ‘laboratory’ to investigate the effects of different policy choices on growth, especially now that enough years have passed to permit more reliable estimation.

The central proposition that we test is that different methods of privatization have different effects on economic growth. We formulate a model that is estimated in first-difference form and includes both time- and country-specific effects. Despite the tone of much of the country-specific literature, which tends to be suspicious of mass privatization, we do not believe it to be appropriate to hold strong priors about the specific impact of alternative privatization methods. This is because, for transition economies, with underdeveloped capital markets and the possible political-economic advantages of speed in privatization, the arguments that would apply in the context of a developed market economy are questionable. Furthermore, there is likely to be a learning curve when major new policies are implemented. We also recognize that the impact of privatization methods on growth may depend

on whether capital markets are sufficiently developed to transfer financial resources at reasonable cost and to exercise adequate corporate governance over the private sector (Levine (1997), Durnev, Li, Morck, and Yeung (2004) and Morck, Wolfenzon, and Yeung (2005)),³ and the impact may be influenced by the pace of development of the *de novo* private sector. We therefore allow for potential interactions between privatization methods, the size of the capital market and the share of the private sector in production, as well as examining the direct relationship between each variable and economic growth.

Our equations are found to provide a persuasive description of the long-run growth process in the transition economies. With regard to our central proposition, we find that mass privatization enhances growth, but neither of the other privatization methods does so. We interpret this as evidence that mass privatization was effective at rapidly ending the cloying relationship between enterprises and firms, and, through hardening budget constraints, at forcing firms to operate in a profit-maximizing way. In contrast, we are not able to identify any structural break in the growth process around the time of privatization for the other privatization methods. The findings are robust across a variety of different estimation methods, data periods and specifications. However, growth appears not to be influenced by capital market development or the private sector share.

In Section 2 we outline the model used in estimation and the hypotheses being investigated, and in Section 3 we specify the estimating equations and the data. The results are reported in Section 4, while in Section 5, which concludes, we interpret our findings. The data sources are reported in an

³Previous work on the effect of capital market development on growth includes Rajan and Zingales (1998) and Beck, Levine and Loayza (2000).

appendix.

2 Conceptual Framework

In practice, each transition economy has used a variety of privatization methods though, in each country, one has been dominant in the sense that the bulk of large state-owned enterprises were transferred into the private sector by this method. We partition methods of privatization into three categories - privatization by sale, mass privatization and mixed privatization - and we identify the dominant method in each country. ‘Privatization by sale’ occurs when the dominant method in an economy takes the form of sale of firms to outsiders (agents other than a firm’s workers and managers) at a positive price. ‘Mass privatization’ occurs when the dominant method is that ownership is transferred at a zero or nominal price to the population at large. ‘Mixed privatization’ occurs when the dominant privatization method is MEBO (sale of firms to insiders), restitution or lease buyout.

Let y denote the growth rate of real GDP. We assume that y depends on the method of privatization and a variety of other factors, including growth of the private sector and capital market development. Thus,

$$y = Y(K^+, L^+, H^+, M, S^+, P^+), \quad (1)$$

where K is the change in the capital stock, L is the change in employment, and H is the change in the human capital stock. We assume that y is positively related to each of these variables (the sign above a variable represents the expected sign of the partial derivative). The other three variables in (1)

are the focus of our analysis. M denotes the method of privatization; S is a measure of capital market development; and P indicates the scale of the private sector. We now discuss the expected impacts of these three institutional variables on growth.

Privatization by sale to the highest bidder has been the preferred method in developed economies (see Megginson, Nash, Netter and Paulsen (2004)) because it leads to efficient matching of buyers and assets. However, efficient matching relies on either a close correlation between entrepreneurial ability and the distribution of wealth, or a developed capital market. In practice, when privatization occurred in transition economies, private wealth was largely in the hands of the *nomenklatura* and grey/black market operators (Ledeneva (1998)). Generally, such people had become wealthy by operating successfully in a bureaucratic economy characterized by shortages, and there can be no presumption that they possessed the right skill set to become effective private sector owners of state assets. Moreover, in transition economies capital markets were seriously underdeveloped and potential entrepreneurs lacked collateral. Hence, potential ‘good owners’ might have been largely excluded from bidding for state assets, and, as a result, privatization by sale might have led state assets to be allocated to less efficient ones. This is consistent with the analysis of Fernandes and Gali (1999), who show how the efficiency of matching is reduced by the presence of binding borrowing constraints. Furthermore, to the extent that the ‘bad’ owners used their ownership rights to pursue non-economic objectives – employment protection, their own status, and political power – privatization by sale may have led to their entrenchment.

Insofar as privatization by sale was in the form of the purchase of concentrated holdings by foreign owners, these issues would not have arisen. However, foreign direct investment flows were very small to the transition economies in the early years of transition, and nowhere did privatization by sale to foreigners predominate (UNCTAD, 2003). Additionally, whether to foreign or to domestic agents, privatization by sale is likely to be slow, in that enterprises have to be prepared for sale singly and the potential privatization lists ran into the thousands or tens of thousands of firms.

Thus, privatization by sale may enhance growth, but, for this to happen, the distributions of private domestic wealth and of entrepreneurial talent must be well correlated or the country's capacity to absorb foreign direct investment must be high; and state-owned firms must be sufficiently strong to function in a market environment in the perhaps lengthy interim period before they can be transferred to the private sector.

Mass privatization leads initially to a highly dispersed ownership structure, in which there may be weak corporate governance, allowing managers to tunnel out assets (Johnson, La Porta, Lopez-De-Silanes, and Shleifer (2000)). This situation will not be resolved if the intermediaries that emerge to manage the numerous small shareholdings create long ineffective agency chains. Hence, in the literature, there is a widespread mistrust of mass privatization for failing to create 'real owners' (see Stiglitz (2000)).

However, a fundamental problem of transition economies in the early 1990s was seen to be state ownership, which led managers to focus on serving their political masters, rather than their customers, and to the pervasive softness of budget constraints (see Dewatripont and Maskin (1995)). The

latter implied that the impact of competition from *de novo* domestic firms and imports was weak in state-owned firms, which therefore were able to continue to hoard key resources, including labor and fixed assets, hindering the development of the market economy. In this environment, mass privatization offered three potential benefits. First, it could be implemented very speedily, leading to an abrupt and almost immediate rupture between the state and most of the enterprise sector. Second, once firms had left state ownership, they could quickly be subjected to hard budget constraints without the negative political consequences that would accompany the same policy applied to state-owned firms. In most CEE countries enterprise subsidies were largely eradicated around the time of mass privatization, though in Russia and much of the rest of the FSU they persisted in one form or another until the 1998 crisis. Third, since mass privatization was based on a very broad distribution of assets, it was likely to lead to a rapidly evolving ownership structure in which more concentrated ownership could emerge without the dangers of entrenchment by ‘bad’ owners associated with privatization by sale (Boycko, Shleifer, and Vishny (1995)).⁴

The impact of mass privatization on growth is therefore likely to have depended on whether effective governance was established through secondary trading before managers destroyed value, and whether budget constraints were tightened quickly and sufficiently to allow product market competition to incentivize improved performance.

We use the term mixed privatization as our final category of privatization

⁴Boycko, Shleifer, and Vishny also argue that mass privatization can secure the political support of the general population, thereby preventing a reversal of the reform program. Similarly, Biais and Perotti (2002) analyse in a formal political economy model how the allocation of underpriced shares to median voters can keep a government in power.

method because it has many of the strengths and weaknesses of the others, with corresponding implications for economic growth. Mixed privatization in the form of MEBOs or restitution may prevent restructuring, especially employment reduction, because this would damage the interests of insiders. Furthermore, for restitution, the outcome in terms of the managerial ability of the new owners will be arbitrary – many firms were restituted to second- and third-generation former owners, including to individuals born and resident abroad. However, restitution and MEBOs are similar to privatization by sale in that ‘real’ owners (former owners or managers) are created, rather than ownership rights being dispersed across the population as a whole. Enterprise budget constraints may also be hardened rapidly, and the orientation of management may successfully be shifted from the political arena to the marketplace. Yet, like privatization by sale, restitution has to be undertaken on a case-by-case basis and can be very slow. Privatization through MEBOs can be much more rapid, but tends to result in ownership remaining rather dispersed among employees.

The share of the private sector P is included in equation (1) to pick up the network externalities from expanding private ownership in a formerly state-owned environment. The private sector share depends on the size and numbers of both privatized and *de novo* firms. For former state-owned firms, we can also hypothesize positive effects on productivity from privatization resulting from the better definition of corporate goals by private firms and a resolution of the incentive problems associated with the softer budget constraints of state-owned enterprises. Furthermore, small- and medium-sized *de novo* firms can fill the gaps left under communism by biases toward high

capital intensity and against the provision of services. We model the impact of the private sector share as a form of neutral technical progress, enhancing growth.

A large literature attests the potential role of capital market development S in economic growth (see Bekaert and Harvey (2000), Beck, Levine, and Loayza (2000) and Henry (2000)). Capital markets are regarded as a crucial institution in the development process (see, for example, Rajan and Zingales (1998)), and have frequently been used as a policy tool by transition governments. They are associated with more widespread and cheaper corporate finance, and a reduced need for firms to rely on internally-generated funds for investment. More mature capital market structures are also a necessary condition for improved corporate governance and enhanced company efficiency (Megginson and Netter (2001)). However, favorable growth conditions may also enhance the policy choice set with respect to both capital market and private sector development.

The three institutional variables M , P and S may generate complementarities in the growth process. For example, a privatization program, whatever the method, may itself accelerate the 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 $\partial^2 y / \partial P \partial S > 0$. There are also potential interactions between privatization method and capital market development, though the direction of the relationship is unclear. For example, privatization by sale would encourage stock market development if it took the form of IPOs, but might discourage it if most sales were to private individuals or foreign corporations.

Similarly, mass privatization could be designed to encourage the development of a stock market, as in Poland, or in effect to restrict its development, as in the Czech Republic. Mixed privatization seems likely to restrict the development of the capital market because of the possibility of entrenchment by workers and managers or former owners, though even in this case the outcome depends on the evolution of the secondary market. Hence, we do not predict *a priori* any specific relationship between privatization methods and capital market development. Though one might predict a relationship between privatization method and private sector share, there is no evidence of this in practice (see EBRD (2003)), perhaps because the share of the private sector is actually by the pace of *de novo* development. We do not explore this relationship in our empirical work.

We also recognize that the economic growth record of a country may affect its institutional variables, such as its choice of privatization method. For example, if faster growth has raised the value of firms and the wealth of potential buyers, a government may choose privatization by sale, rather than mass privatization, because of the revenue it raises. However, in practice, the choice and timing of method of privatization does not appear to bear any simple relation to economic variables. Thus, we find that mass privatization was the chosen method both in relatively successful economies like the Czech Republic and Lithuania, and in more difficult environments like Russia and Ukraine. Direct sale was employed in rapidly transforming environments like Hungary and Estonia, but also in more problematic ones like Bulgaria and Kazakhstan. Moreover, the timing does not appear to be closely related to economic performance. To take some better-performing economies, privati-

zation was early in Hungary and the Czech Republic, but later in Slovenia; and among the weaker performers, privatization was early in Bulgaria, but later in Azerbaijan. In our empirical work, we assume the choice and timing of privatization methods to be exogenous.

3 Specification and Data

We estimate a cross-country growth model along the lines of Barro (1991) and Mankiw, Romer, and Weil (1992). However, we use equation (1) to supplement the model with indicators of privatization method, private sector development, capital market development, and their interactions. In this section, we specify our estimating equations before presenting the data used in our empirical work.

For ease of estimation, we assume that y, L, K, H in (1) can be represented in logarithmic form. Hence, denoting i for country and t for year,

$$\ln y_{i,t} = a_1 + a_2 \ln K_{i,t} + a_3 \ln L_{i,t} + a_4 \ln H_{i,t} + a_5 M_{i,t} + a_6 S_{i,t} + a_7 P_{i,t} + \varepsilon_{i,t}. \quad (2)$$

We henceforth denote $\ln K_{i,t}$, the real change in the logarithm of the capital stock, by $INV_{i,t}$; and we denote $\ln L_{i,t}$, the real change in the logarithm of employment, by $EMP_{i,t}$. As a proxy for the change in human capital $H_{i,t}$, we use the logarithm of gross enrolment in tertiary education, denoted by $IHC_{i,t}$. This variable has been adjusting considerably in our sample countries during the years of transition. We employ three time-specific dummy variables $SALE$, $MASS$ and $MIXED$, each taking the value of zero in the years prior to privatization and the value of unity post-privatization in countries

that adopted sale, mass, and mixed privatization, respectively. Our proxy for the development of the capital market is the capitalization of the stock markets as a proportion of GDP, which we denote as $STOCKMC_{it}$. We measure private sector development by the share of private sector output in gross domestic product, denoted $PRIV_{it}$.

The equation is estimated using panel data methods (within-groups estimators) to exploit both time series and cross-section (country-specific) effects in each regression. The data are also transformed into first differences further to filter out any country-specific effects. Finally, we include interactive effects to test for the hypothesis that $\partial^2 y / \partial P \partial S > 0$, and for interactions between P and S , and M and S . One of the advantages of panel data is that they allow modeling of the dynamics of the adjustment underlying the economic relationship of interest, which, given that in our case this is the impact of institutions on growth, are unlikely to be instantaneous. Thus, we estimate a dynamic equation which includes the lagged endogenous variable:

$$\begin{aligned}
\ln y_{i,t} = & a_1 + a_2 INV_{i,t} + a_3 EMP_{i,t} + a_4 IHC_{i,t} + a_5^S SALE_{i,t} + \\
& a_5^{Ma} MASS_{i,t} + a_5^{Mi} MIXED_{i,t} + a_6 STOCKMC_{i,t} + \\
& a_7 PRIV_{i,t} + a_8 PRIV_{i,t} * STOCKMC_{i,t} + a_9^S STOCKMC_{i,t} * SALE_{i,t} \\
& + a_9^{Ma} STOCKMC_{i,t} * MASS_{i,t} + a_9^{Mi} STOCKMC_{i,t} * MIXED_{i,t} \\
& + \textit{time dummies} + \textit{country dummies} \\
& + a_{10} \ln y_{i,t-1} + \varepsilon_{i,t}.
\end{aligned} \tag{3}$$

The method of privatization variables each have a cross-section and a

time-series dimension. We identify the chosen method of privatization in each country and the date at which this privatization method was introduced. We have explored the effects of using three different ways of classifying privatization methods. The first was based on official reports available on government websites. The second used 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.⁵

The classification of privatization method by year and country is presented in Table 1. The columns on the right report the EBRD's classification of primary privatization methods, which we relabel as follows. When the EBRD identifies the primary method as voucher, we use the more conventional term, 'mass' privatization. When the EBRD's primary method is direct sales we classify privatization as by 'sale'. In other cases we call privatization 'mixed.'

[Table 1]

Equation (3) is estimated for the 14 years from 1990 to 2003 across 23 transition economies. Our data set covers all the transition countries listed by EBRD (2004), except for Bosnia and Herzegovina, Yugoslavia, Tajikistan, and Turkmenistan, for which data are not consistently 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.

⁵The equations were estimated using all three approaches, and the findings with respect to method of privatization were not affected.

Taking the date of privatization in country i to be as specified in Table 1, we find that prior to privatization, average real GDP growth rates were -5.26% , -7.33% , and -8.95% in sale, mass, and mixed privatization countries, respectively. The corresponding growth performance post-privatization was 1.82% , 2.13% , and 2.82% , respectively. Thus, in the raw data, there is no evidence that countries that used privatization by sale grew faster after privatization, or that privatization by sale was associated with a greater turnaround in growth rates between the pre- and post-privatization periods. However, the pre-privatization recession was least in countries that used privatization by sale, and post-privatization growth was fastest in countries that used mixed privatization.

4 Results

We first estimate OLS versions of equation (3) in a variety of specifications, before addressing issues of dynamics and endogeneity using GMM methods. We conclude the section with some sensitivity tests. In all equations we use White's correction for robust standard errors.

In Table 2 we report four versions of equation (3). Column (1) represents the simplest possible formulation, with no interactions ($a_8 = a_9^S = a_9^{Ma} = a_9^{Mi} = 0$). In column (2) we include a term for the interaction between stock market development and private sector development ($a_8 \neq 0$). As none of the coefficients on the interactions between methods of privatization and stock market development are found to be significant in any specification, in column (3) we merely report a representative regression - that for the interaction between mass privatization and stock market development ($a_9^{Ma} \neq 0$). Fi-

nally, in column (4) we include both interactive terms simultaneously ($a_8 \neq 0$ and $a_9^{Ma} \neq 0$).

[Table 2]

All four formulations of the static OLS model in Table 2 yield good fits, with $\bar{R}^2 > .6$ and joint Wald tests ranging from 190.3 in column (1) to 247.6 in column (4). 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 show that autocorrelation is not present. The Wald tests indicate that country fixed effects represent a particularly important element in the explanation.

The coefficients on the factor inputs are stable and significant across the four specifications and conform to expectations from equation (1). The coefficient on capital is estimated to be around .08 and that on employment to be positive and significant, but lower than typically obtains in the West, perhaps because of labor hoarding during transition (see Svejnar (2002)). Additionally, we identify a significant impact from the change in human capital to GDP growth in all the regressions.

Private sector and stock market development are not found to be independently significant in column (1), even in static OLS equations. However, once the 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. The growth-enhancing effect of stock market development appears to rely on the growth of the private sector, but to tail off as an economy approaches a Western ownership and capital market structure. As noted above, the interaction of stock market development with mass

privatization (column (3)) is not significant in any of the four reported specifications, and the same was found to hold in numerous unreported regressions containing the other possible stock market development-privatization methods interactions. Column (4), our most general specification, including both types of interaction, has the best fit. This regression confirms the stock market and private sector share results from column (2) and also isolates a weakly significant direct positive association between economic growth and private sector share. Hence, the static OLS equation suggests that stock market development, the private sector share, and their interaction, may have a positive impact on growth.

Our findings regarding the main concern of our analysis, the impact of privatization methods on GDP growth, are consistent across the four specifications of Table 2. Neither sale nor mixed privatization is found to exert a significant influence on GDP growth, but the coefficient on mass privatization is always positive and significant, and changes only slightly in value between specifications. This indicates that the introduction of a mass privatization program is associated with a positive structural break in the growth process. In contrast, we could not identify any structural break around the time of privatization in the countries that used either of the other privatization methods.

This specification assumes instantaneous adjustment of output to factor supply and institutional changes, which may be very restrictive, especially in the transition context. We therefore explore the implications of allowing dynamic adjustment, re-estimating the OLS regressions with the inclusion of a lagged endogenous variable.

In Table 3 we report the results for the same four specifications as in Table 2. The table indicates that a dynamic specification is appropriate: the lagged endogenous variable is significant in all four columns, and the R^2 is higher in each specification than in the associated nested static model in Table 2. The dynamic specification does not alter our conclusions with respect to factor inputs and methods of privatization. In particular, the coefficient on mass privatization is positive and significant in all four specifications, but neither of the other method-of-privatization variables is even weakly significant in any specification, reported or unreported. Nonetheless, the dynamic specification does widen the standard error around employment, though the variable remains weakly significant in all four specifications. The dynamic specification eliminates most of our results with respect to stock market and private sector development, especially in the most general formulation, column (4). The private sector share, and its interaction with the stock market development variable, is no longer significant. Moreover, in the only significant finding for the a_9 -coefficients in our set of regressions, in column (4) we find a negative significant interaction term between stock market development and the method of mass privatization.

However, there are indications of endogeneity in these results, and the findings in Table 3 are biased by correlation between the error term and the lagged endogenous variable. We address these problems by adopting GMM estimation (see Arellano and Bond (1991)). This deals with potential problems of endogeneity of the explanatory variables by instrumenting on their lagged values, and controls for the correlation between the error term and lagged endogenous variable.

[Table 3]

The GMM estimates for the four specifications, with factor inputs (*INV*, *EMP*, and *IHC*) all instrumented on lagged values, are reported in Table 4. The regressions replicate the results of Tables 2 and 3 with respect to the lagged endogenous variable, most of the factor inputs and the methods of privatization. The lagged endogenous variable is positive and significant in all four specifications, as are the coefficients on investment and the change in employment. However the coefficient on the change in human capital, though still positive, is not significant in any of the GMM specifications. Moreover, neither the private sector share, stock market development, nor their interactions are significant using this estimation method, showing that our previous findings concerning the impact of private sector and stock market development are not robust.

In contrast, the findings concerning method of privatization, and in particular the positive significant impact of mass privatization on growth, are confirmed in all four specifications of Table 4. Our earlier finding about the impact of different privatization methods on growth is therefore shown to be remarkably robust, in that the specification and estimation methods in Table 4 address issues of country- and time-specific heterogeneity in the data as well as endogeneity and dynamics. While this exacting specification includes a first-difference transformation, fixed-effects estimation methods, instrumentation on lagged values, and a dynamic specification, we are still able to identify a significant impact of mass privatization, but not the other privatization methods, on growth rates.

[Table 4]

We report one further exercise to test the robustness of the results with respect to mass privatization and which yield some insights into the factors determining them. It will be noted from Table 1 that the method of mass privatization was used somewhat more frequently in the countries of the FSU than in CEE. It might therefore be argued that the correlation between the method of mass privatization and growth is spurious because these economies often privatized quite late, and their improved performance in recent years might in fact have arisen because some of them are oil rich, the oil price having been very high in the later years of our sample period. A more general argument for spurious correlation might be that we have failed to control for exchange-rate effects, which could have been relevant in both CEE and the FSU. For example, there was a significant devaluation in Russia and much of the FSU after the 1998 crisis, representing a second potential important omitted variable in our growth equations.

[Table 5]

We address this issue in Table 5, which reports regressions based on the formulations in Tables 2-4, but also includes the exchange rate and the oil price. We report four versions of our most general specification (column (4) of Tables 2-4). In column (1) of Table 5, we report the static OLS version of the growth equation, augmented to include the exchange rate, and in column (2) we augment the equation with both the oil price and the exchange rate. We repeat the two exercises in columns (3) and (4) respectively, but this time using GMM estimation methods. The comparable results are similar in most respects to those in Table 2 and 4. Thus, as in all previous specifications, we observe positive and significant effects from capital investment and the

change in employment in the four columns, and, as before, the coefficient on the change in human capital is only significant in the static OLS specification (column (1)). Also as before, the coefficients on stock market development and its interaction with the private sector share are significant in the OLS regressions, but not the GMM ones.

Nonetheless, there are a few differences. In columns (2) and (4), we identify a positive significant impact from the private sector share on growth in both the static OLS and GMM estimations. The method of mass privatization continues to exert a positive and significant effect on growth in all the reported regressions, but, now, in column (3) only, we also identify a positive and weakly significant effect of mixed privatization on growth. However, the exchange rate is not significant in any of the columns; the oil price is significant in column (2) - using static OLS - but it is also not significant when GMM methodology is applied. It is in fact possible that oil-price and exchange-rate effects are picked up by the first differencing and by the country-specific fixed effects.

This exercise has established that the conclusions from the previous tables with respect to privatization methods, notably the positive significant impact of mass privatization on growth, are not a consequence of omitted variables that disproportionately affect the countries of the FSU.⁶

⁶The literature (for example, Djankov and Murrell (2002)) also leads us to expect that the impact of mass privatization on economic performance may be different in economies of CEE from those of the Commonwealth of Independent States (CIS) (that is, the FSU excluding the Baltic states Estonia, Latvia and Lithuania, which have gone on to join the European Union). In particular, the method of privatization by sale might be expected to have had a greater and more significant impact on growth in CEE, where market-supporting institutions were more developed and the heritage of communist planning was less burdensome. For the same reasons, the negative effects of mass privatization discussed in Section 2 might have emerged more clearly in the more advanced economies of CEE, but the weaknesses of the institutional environment might have affected all privatization

5 Conclusions

In this paper we have been the first to exploit the increasing quantity and quality of data over time and across countries to study the impact of privatization methods on the growth process in transition economies. We have modelled economic growth in terms of changes in long-run factor supplies, with the equations augmented by proxies for inter-country differences in privatization methods, capital market evolution, and private sector development. Capital market and private sector development, and their interaction, appear to affect growth in static first-differenced OLS estimations, but the result does not hold when GMM methods are employed. Thus, we are not able to confirm that capital market development or private sector development exert a significant independent influence on growth.

However, we obtain clear, consistent, and unambiguous results with respect to methods of privatization and growth. We find that the sale privatization method does not exert a significant influence on growth, and the method of mixed privatization also never has a statistically significant effect. In contrast, the method of mass privatization is shown to be associated with a structural break in the growth process at the time of its introduction, and its impact is positive. This result is robust to alternative specifications and estimation methods.

We have discussed in Section 2 the factors that may explain these findings.

If privatization by sale had proved to have a significant impact on growth,

methods equally, and therefore have prevented any single effect from being identified in our equations for the CIS. The dataset could therefore be broken into two sub-samples, for the CIS and non-CIS economies respectively. However, this could not be satisfactorily tested on our data because it leads to a significant loss of degrees of freedom and a resulting decline in the quality and interpretation of the results.

that would imply that the matching of buyers with firms had been efficient, and that concentrated ownership was a key factor in restructuring former state-owned firms. The insignificance of the coefficient is consistent with the view that in the early years of transition the financial ability to purchase firms was imperfectly correlated with the skills required to run them efficiently. Moreover, while capital markets remain underdeveloped, the ‘wrong’ owners will tend to persist far longer, especially when their ownership stake is concentrated. The positive impact of mass privatization on growth suggests that speed in severing the links between the state and the enterprise sector, facilitating rapid hardening of budget constraints and forcing management to respond to signals and incentives from the recently-liberalized product and factor markets, was an important element accelerating growth in transition economies.⁷

It should not be concluded from this discussion that mass privatization is an appropriate policy tool in contexts other than the special circumstances pertaining at the start of transition. The heritage from communism included very limited domestic savings, an all-encompassing state sector, widespread soft budget constraints, and wealth concentrated in the hands of black marketers and the *nomenklatura*. In such circumstances, mass privatization appears to have proved more effective in enhancing growth than the more conventional alternatives. However, this situation is not likely to recur.

⁷This is consistent with evidence from China, which suggests that market incentives, combined with a strict separation between the state as owners, and as the management of state-owned enterprises, were sufficient to generate rapid economic development without privatization (see Qian (2003)).

Data Appendix

Gross Domestic Product. The early years for the GDP series were sourced from the *World Bank's Historically Planned Economies: A Guide to the Data*, taking the 1988 figure, measured in constant 1987 market prices. Figures were converted into US dollars using the 1987 exchange rate. In the case of Albania, 1988 GDP is provided in constant 1986 market prices, and was converted into US dollars using the 1986 exchange rate. For each country that later disintegrated (Czechoslovakia, Yugoslavia and the USSR), we broke the total GDP into constituent parts using information provided by UN, World Bank and national sources on the constituent countries' share in total GDP. 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 into separate data for Slovenia, Macedonia and Croatia. The total figure for Czechoslovakia was divided to obtain separate data on Slovakia and the Czech Republic. To extend the series, real GDP growth data provided by the EBRD were used.

Fixed Capital Investment. Fixed capital investment figures were obtained from the EBRD (various years) 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 the IMF and EBRD. This ratio was applied to our GDP levels data to obtain fixed capital investment levels figures. The annual percentage change in fixed capital investment was calculated from the levels figures. We also used GDP

level figures to calculate fixed capital investment growth in the early 1990s in the few cases when information on the 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 1989-2003.

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 the *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 unconvincingly high growth of enrolment rates for several countries.

Private Sector Share in GDP. Data were taken from EBRD (various years).

Stock Market Capitalization as a Proportion of GDP. Data were taken from EBRD (various years) and the *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.

Privatization. This was sourced from the EBRD (various years), which classifies privatization methods into voucher, direct sale, and MEBO, and identifies the first year in which the primary type of privatization was imple-

mented.

Exchange Rate. This is derived from EBRD (various years), denominated for year t as E_t , foreign currency per US dollar. Exchange rate variation is $[E_t - E_{t-1}]/E_{t-1}$.

Oil Price. The source was the World Bank commodity tables; Crude Oil (Brent), US dollars per barrel.

References

- [1] Arellano, Manuel, and Steve, Bond, 1991, Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations, *Review of Economic Studies*, 58, 277-297.
- [2] Barro, Robert, 1991, Economic growth in a cross section of countries, *Quarterly Journal of Economics*, 106, 407-443.
- [3] Beck, Thorsten, Ross Levine, and Norman Loayza, 2000, Finance and the sources of economic growth, *Journal of Financial Economics*, 58, 261-301.
- [4] Bekaert, Geert, and Campbell R. Harvey, 2000, Foreign speculators and emerging equity markets, *Journal of Finance* 55, 565-613.
- [5] Bennett, John, Saul Estrin, and James Maw, 2005, Mass privatization and partial state ownership of firms in transition economies, *Journal of the European Economic Association Papers and Proceedings*, forthcoming.
- [6] Biais, Bruno, and Enrico Perotti, 2002, Machiavellian privatization, *American Economic Review* 92, 240-258.
- [7] Blanchard, Olivier, Rudiger Dornbusch, Paul Krugman, Richard Layard, and Lawrence Summers, 1990, *Reform in Eastern Europe* (MIT Press, Cambridge, MA).
- [8] Boycko, Maxim, Andrei Shleifer, and Robert W. Vishny, 1994, Voucher privatization, *Journal of Financial Economics* 35, 249-267.

- [9] Boycko, Maxim, Andrei Shleifer, and Robert W. Vishny, 1995, *Privatizing Russia* (MIT Press, Cambridge MA).
- [10] Claessens, Stijn, and Simeon Djankov, 1999, Ownership concentration and corporate performance in the Czech Republic, *Journal of Comparative Economics* 27, 498-513.
- [11] Coffee, John C., 1996, Institutional investors in transitional economies: lessons from the Czech experience; in Roman Frydman, Cheryl Gray, and Andrej Rapaczynski, eds. *Corporate Governance in Central Europe and Russia* (Central European University Press, Budapest), 111-186.
- [12] Dewatripont, Mathias and Eric Maskin, 1995, Credit and efficiency in centralized and decentralized economies, *Review of Economic Studies* 62, 541-555.
- [13] Djankov, Simeon, and Peter Murrell, 2002, Enterprise restructuring in transition: a quantitative survey, *Journal of Economic Literature* 40, 739-792.
- [14] Durnev, Art, Kan Li, Randall Morck, and Bernard Yeung, 2004, Capital markets and capital allocation: implications for economies in transition, *Economics of Transition* 12, 593-634.
- [15] Ericson, Richard E., 1991, The classical Soviet-type economy: nature of the system and implications for reform, *Journal of Economic Perspectives* 5, 4, 11-27.
- [16] European Bank for Reconstruction and Development (EBRD), various years, *Transition Report* (EBRD, London).

- [17] Fernandes, Raquel, and Jordi J. Gali, 1999, To each according to...? Markets, tournaments, and the matching problem with borrowing constraints, *Review of Economic Studies* 66, 799-824.
- [18] Frydman, Roman, Cheryl Gray, Marek Hessel, and Andrej Rapaczynski, 1999, When does privatization work? The impact of private ownership on corporate performance in the transition economies, *Quarterly Journal of Economics* 114, 1153-1192.
- [19] Henry, Peter B., 2000, Stock market liberalization, economic reform, and emerging equity prices, *Journal of Finance* 55, 529-564.
- [20] Johnson, Simon, Rafael La Porta, Florencio Lopez-De-Silanes, and Andrei Shleifer, 2000, Tunneling, *American Economic Review* 90, 22-27.
- [21] La Porta, Rafael, and Florencio Lopez-De-Silanes, 1999, The benefits of privatization: evidence from Mexico, *Quarterly Journal of Economics* 114, 1193-1243.
- [22] Ledeneva, Alena, 1998, *Russia's Economy of Favours: Blat, Networking and Informal Exchange* (Cambridge University Press, Cambridge, UK).
- [23] Levine, Ross, 1997, Financial development and economic growth: views and agenda, *Journal of Economic Literature* 35, 688-727.
- [24] Mankiw Gregory, David Romer, and David Weil, 1992, A contribution to the empirics of economic growth, *Quarterly Journal of Economics* 107, 407-438.
- [25] Megginson, William L., 2005, *The Financial Economics of Privatization* (Oxford University Press, Oxford).

- [26] Megginson, William L., Robert C. Nash, Jeffrey M. Netter, and Annette B. Poulsen, 2004, The choice of private versus public capital markets: evidence from privatizations, *Journal of Finance* 59, 2835-2871.
- [27] Megginson, William L., and Jeffrey M. Netter, 2001, From state to market: a survey of empirical studies of privatization, *Journal of Economic Literature* 39, 321-89.
- [28] Morck, Randall, Daniel Wolfenzon, and Bernard Yeung, 2005, Corporate governance, economic entrenchment and growth, forthcoming, *Journal of Economic Literature*.
- [29] Qian, Yingyi, 2003, How reform worked in China; in Dani Rodrik, ed. *In Search of Prosperity* (Princeton University Press, Princeton), 297-333.
- [30] Rajan, Raghuram G. and Luigi Zingales, 1998, Financial dependence and growth, *American Economic Review* 88, 559-587.
- [31] Roland, Gerard, 2000, *Transition and Economics: Politics, Markets and Firms* (MIT Press, Cambridge, MA).
- [32] Stiglitz, Joseph E., 2000, Whither reform? Ten years of transition; in Boris Pleskovic and Joseph E. Stiglitz, eds. *Annual World Bank Conference on Economic Development* (World Bank, Washington).
- [33] Svejnar, Jan, 2002, Transition economies: performance and challenges, *Journal of Economic Perspectives* 16, 3-29.
- [34] United Nations Conference on Trade and Development (UNCTAD), 2003, *World Investment Report* (United Nations, Geneva).

- [35] World Bank Report, 1996, *World Development Report 1996: From Plan to Market* (Oxford University Press, Oxford, UK, for the World Bank).

Table 1: Country Privatization Table

	(1)	(2)	(3)
Country	Classification of privatization	Year of privatization	Privatization method
Albania	Mixed	1995	MEBO
Armenia	Mass	1994	vouchers
Azerbaijan	Mass	1997	vouchers
Belarus	Mixed	1994	MEBO
Bulgaria	Sale	1993	direct sales
Croatia	Mixed	1992	MEBO
Czech Republic	Mass	1992	vouchers
Estonia	Sale	1993	direct sales
FYR Macedonia	Mixed	1993	MEBO
Georgia	Mass	1995	vouchers
Hungary	Sale	1990	direct sales
Kazakhstan	Sale	1994	direct sales
Kyrgyzstan	Mass	1996	vouchers
Latvia	Full	1992	direct sales
Lithuania	Mass	1991	vouchers
Moldova	Mass	1995	vouchers
Poland	Sale	1990	direct sales
Romania	Mixed	1992	MEBO
Russia	Mass	1993	vouchers
Slovakia	Sale	1995	direct sales
Slovenia	Mixed	1998	MEBO
Ukraine	Mass	1995	vouchers
Uzbekistan	Mixed	1995	MEBO

Source: EBRD (1998).

Table 2: Growth Equations, 1990-2003, Interacting Private Sector Share and Mass Privatization with Stock Market Capitalization

Variable	(1)		(2)		(3)		(4)	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
<i>INV</i>	0.086	0.024***	0.082	0.024***	0.086	0.024***	0.082	0.023***
<i>EMP</i>	0.168	0.073**	0.178	0.072**	0.169	0.073**	0.174	0.072**
<i>IHC</i>	0.076	0.032**	0.073	0.031**	0.076	0.032**	0.072	0.031**
<i>SALE</i>	-1.288	2.246	-1.716	2.174	-1.264	2.225	-1.918	2.165
<i>MASS</i>	6.642	2.402***	5.965	2.519**	6.579	2.614**	6.270	2.648**
<i>MIXED</i>	2.685	1.996	2.097	1.948	2.683	1.994	2.043	1.973
<i>PRIV</i>	0.075	0.061	0.101	0.061	0.075	0.061	0.106	0.063*
<i>STOCKM</i>	-0.040	0.049	0.589	0.234**	-0.047	0.060	0.703	0.271**
<i>PRIV * STOCKM</i>	-	-	-0.009	0.003***	-	-	-0.010	0.003***
<i>MASS * STOCKM</i>	-	-	-	-	0.012	0.078	-0.073	0.101
Constant	-2.856	2.049	-3.263	2.013	-2.867	2.058	-3.243	2.034
Time Dummies	Yes***		Yes***		Yes***		Yes***	
Country Dummies	Yes***		Yes***		Yes***		Yes***	
Σ	5.982		5.940		5.992		5.946	
R^2	0.637		0.643		0.637		0.644	
$T \times N$	322		322		322		322	
N	23		23		23		23	
k	44		45		45		46	
$W(\text{joint})$	$\chi^2(8)[0.00]$		$\chi^2(9)[0.00]$		$\chi^2(9)[0.00]$		$\chi^2(10)[0.00]$	
$W(\text{dummy})$	$\chi^2(36)[0.00]$		$\chi^2(36)[0.00]$		$\chi^2(36)[0.00]$		$\chi^2(36)[0.00]$	
$W(\text{time})$	$\chi^2(13)[0.00]$		$\chi^2(13)[0.00]$		$\chi^2(13)[0.00]$		$\chi^2(13)[0.00]$	
$AR(1)$	$N(0,1)[0.21]$		$N(0,1)[0.25]$		$N(0,1)[0.22]$		$N(0,1)[0.25]$	
$AR(2)$	$N(0,1)[0.47]$		$N(0,1)[0.65]$		$N(0,1)[0.48]$		$N(0,1)[0.66]$	

Notes: (a) Significance levels: ***: 1% or less; **: less than 5%; *: less than 10%; (b) Σ = equation standard error, R^2 = determination coefficient; total $T \times N$ =number of observations, N =number of countries and k =number of parameters; (c) $W(\text{joint})$ = Wald tests the significance on all regressors except the dummies; $W(\text{dummy})$ = Wald tests the significance of all dummies; and $W(\text{time})$ = Wald tests the significance of the time dummies and the constant. All these statistics are asymptotically distributed as $\chi^2_{(n)}$ under the null of no relationship, where n represents the degree of freedom; (d) $AR(1)$ and $AR(2)$ statistics test for the first- and second-order serial correlation respectively in the residuals. The statistics are asymptotically distributed as standard normal under the null of no serial correlation.

Table 3: Growth Equations, 1990-2003, OLS Dynamic Models, Interacting Private Sector Share and Mass Privatization with Stock Market Capitalization

Variable	(1)		(2)		(3)		(4)	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
<i>GDP</i> (-1)	0.192	0.075**	0.178	0.075**	0.190	0.075**	0.178	0.075**
<i>INV</i>	0.087	0.023***	0.084	0.022***	0.087	0.023***	0.084	0.022***
<i>EMP</i>	0.122	0.070*	0.133	0.070*	0.125	0.070*	0.132	0.071*
<i>IHC</i>	0.071	0.031**	0.069	0.031**	0.071	0.031**	0.069	0.031**
<i>SALE</i>	0.026	1.846	-0.381	1.698	0.126	1.820	-0.475	1.751
<i>MASS</i>	7.586	1.993***	7.022	2.025***	7.389	2.106***	7.132	2.126***
<i>MIXED</i>	2.488	1.862	1.988	1.834	2.493	1.829	7.958	1.847
<i>PRIV</i>	0.054	0.056	0.076	0.056	0.052	0.056	0.079	0.057
<i>STOCKM</i>	-0.020	0.039	0.535	0.171***	-0.044	0.051	0.582	0.213***
<i>PRIV * STOCKM</i>	-	-	-0.008	0.002***	-	-	-0.008	0.003
<i>MASS * STOCKM</i>	-	-	-	-	0.042	0.064	-0.029	0.087***
Constant	-7.335	2.686***	-7.877	2.689***	-7.355	2.675***	-7.893	2.709
Time Dummies	Yes***		Yes***		Yes***		Yes***	
Country Dummies	Yes ***		Yes***		Yes***		Yes***	
Σ	5.750		5.717		5.759		5.727	
R^2	0.680		0.685		0.680		0.685	
$T \times N$	299		299		299		299	
N	23		23		23		23	
k	44		45		45		46	
W (joint)	$\chi^2(9)[0.00]$		$\chi^2(10)[0.00]$		$\chi^2(10)[0.00]$		$\chi^2(11)[0.00]$	
W (dummy)	$\chi^2(35)[0.00]$		$\chi^2(35)[0.00]$		$\chi^2(35)[0.00]$		$\chi^2(35)[0.00]$	
W (time)	$\chi^2(12)[0.00]$		$\chi^2(12)[0.00]$		$\chi^2(12)[0.00]$		$\chi^2(12)[0.00]$	
$AR(1)$	$N(0,1)[0.19]$		$N(0,1)[0.23]$		$N(0,1)[0.19]$		$N(0,1)[0.24]$	
$AR(2)$	$N(0,1)[0.41]$		$N(0,1)[0.48]$		$N(0,1)[0.42]$		$N(0,1)[0.48]$	

Notes: For explanation see notes to Table 2.

Table 4: Growth Equation, 1990-2003, GMM Dynamic Models, Interacting Private Sector Share and Mass Privatization with Stock Market Capitalization

Variable	(1)		(2)		(3)		(4)	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
<i>GDP</i> (-1)	-0.364	0.090***	-0.367	0.092***	-0.365	0.090***	-0.367	0.092***
<i>INV</i>	0.044	0.021**	0.043	0.021**	0.044	0.021**	0.043	0.021**
<i>EMP</i>	0.179	0.089**	0.185	0.085**	0.180	0.090**	0.185	0.087**
<i>IHC</i>	0.025	0.020	0.022	0.019	0.026	0.020	0.022	0.019
<i>SALE</i>	9.434	7.228	9.305	7.043	9.454	7.266	9.316	7.077
<i>MASS</i>	12.923	3.332***	12.665	3.180***	12.769	3.350***	12.594	3.176***
<i>MIXED</i>	-0.573	3.391	-0.705	3.457	-0.658	3.431	-0.744	3.501
<i>PRIV</i>	0.231	0.251	0.216	0.249	0.227	0.259	0.214	0.259
<i>STOCKM</i>	-0.061	0.190	1.141	0.864	-0.138	0.334	1.091	0.824
<i>PRIV * STOCKM</i>	-	-	-0.018	0.011	-	-	-0.018	0.011
<i>MASS * STOCKM</i>	-	-	-	-	0.100	0.311	0.048	0.358
Constant	-3.579	4.488	-3.833	4.455	-3.573	4.490	-3.828	4.468
Time Dummies	Yes***		Yes***		Yes***		Yes***	
Country Dummies	Yes***		Yes***		Yes***		Yes***	
Σ	7.504		7.529		7.531		7.449	
R^2	-		-		-		-	
$T \times N$	298		298		298		298	
N	23		23		23		23	
k	44		45		45		46	
W (joint)	$\chi^2(9)[0.00]$		$\chi^2(11)[0.00]$		$\chi^2(12)[0.00]$		$\chi^2(12)[0.00]$	
W (dummy)	$\chi^2(35)[0.00]$		$\chi^2(13)[0.00]$		$\chi^2(33)[0.00]$		$\chi^2(33)[0.00]$	
W (time)	$\chi^2(12)[0.00]$		$\chi^2(10)[0.00]$		$\chi^2(10)[0.00]$		$\chi^2(10)[0.00]$	
<i>Sargan test</i>	$\chi^2(91)[0.01]$		$\chi^2(94)[0.01]$		$\chi^2(94)[0.01]$		$\chi^2(93)[0.01]$	
$AR(1)$	$N(0,1)[0.88]$		$N(0,1)[0.99]$		$N(0,1)[0.88]$		$N(0,1)[0.99]$	
$AR(2)$	$N(0,1)[0.01]$		$N(0,1)[0.01]$		$N(0,1)[0.01]$		$N(0,1)[0.01]$	

Notes: For explanation see notes to Table 2. In addition: **(a)** GMM model instrumenting *GDP*, *INV*, *EMP* and *IHC*; **(b)** Transformation used: first differences; **(c)** Level instruments: dummies, GMM (*GDP*,1,2), GMM (*INV*,1,2), GMM (*EMP*,1,2), GMM (*IHC*,1,2); **(d)** The Sargan statistic is a test for the over-identifying restrictions (k), asymptotically distributed as $\chi^2(k)$ under the null of instruments validity.

Table 5: Growth Equation, 1990-2003, Including Exchange Rate and Oil Price, OLS Static Model and GMM Dynamic Model

Variable	(1)		(2)		(3)		(4)	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
<i>GDP</i> (-1)	-	-	-	-	-0.142	0.105	-0.136	0.087
<i>INV</i>	0.811	0.024***	0.088	0.028***	0.086	0.026***	0.080	0.022***
<i>EMP</i>	0.178	0.075**	0.220	0.074***	0.289	0.084***	0.268	0.090***
<i>IHC</i>	0.071	0.031**	-0.011	0.019	0.015	0.031	0.002	0.021
<i>SALE</i>	-1.934	2.167	-2.381	2.386	-6.342	5.789	-0.092	7.613
<i>MASS</i>	6.191	2.656**	6.277	3.009**	23.792	5.451***	20.280	4.887***
<i>MIXED</i>	1.776	1.977	2.352	1.659	12.344	6.627*	0.755	7.129
<i>PRIV</i>	0.098	0.062	0.180	0.044***	0.153	0.167	0.316	0.157**
<i>STOCKM</i>	0.714	0.271***	0.840	0.262***	1.801	1.474	1.445	1.719
<i>PRIV</i> * <i>STOCKM</i>	-0.010	0.003***	-0.011	0.003***	-0.026	0.020	-0.026	0.025
<i>MASS</i> * <i>STOCKM</i>	-0.077	0.101	-0.119	0.101	0.123	0.322	0.590	0.418
<i>EXCH.RATE</i>	-0.001	0.001	-0.001	0.001	-0.000	0.001	-0.001	0.001
<i>OIL PRICE</i>	-	-	0.030	0.010***	-	-	-0.023	0.020
Constant	-3.000	2.035	-9.749	1.706***	-4.643	3.240	0.590	0.686
Time Dummies	Yes***		Yes***		Yes***		Yes***	
Country Dummies	Yes***		No		Yes***		No	
Σ	5.951		6.283		8.440		8.383	
R^2	0.645		0.587		-		-	
$T \times N$	322		322		322		322	
N	23		23		23		23	
k	47		35		46		36	
W (joint)	$\chi^2(11)[0.00]$		$\chi^2(12)[0.00]$		$\chi^2(12)[0.00]$		$\chi^2(13)[0.00]$	
W (dummy)	$\chi^2(36)[0.00]$		$\chi^2(23)[0.00]$		$\chi^2(34)[0.00]$		$\chi^2(23)[0.00]$	
W (time)	$\chi^2(13)[0.00]$		-		$\chi^2(12)[0.00]$		-	
<i>Sargan test</i>	-		-		$\chi^2(84)[0.05]$		$\chi^2(83)[0.26]$	
$AR(1)$	$N(0,1)[0.25]$		$N(0,1)[0.31]$		$N(0,1)[0.00]$		$N(0,1)[0.01]$	
$AR(2)$	$N(0,1)[0.75]$		$N(0,1)[0.94]$		$N(0,1)[0.31]$		$N(0,1)[0.59]$	

Notes: For explanation see notes to Table 2 and 4. In addition: EXCH. RATE: exchange rate; in column (1): OLS static model with exchange rates variation; in column (2): OLS static model with exchange rate and oil price (no time dummies); in column (3): GMM dynamic model with exchange rate; in column (4): GMM dynamic model with exchange rate and oil price (no time dummies).