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Methods of Privatization and Economic Growth in Transition Economies

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Methods of Privatization and Economic Growth in Transition Economies[†]

Abstract

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Dynamic panel data methods are used to estimate a growth model using data from 23 transition countries for the period 1990 to 2003. The estimating equation is augmented with country- and time-specific variables for methods of privatization and other factors potentially relevant to growth in transition economies. It is found that ‘mass privatization’ is associated with faster growth, but the other privatization methods have no significant impact. The findings suggest that in the countries that used mass privatization the long-term growth process may have been accelerated by the evolution of ownership structure and the speed with which the links between the state and firms were severed.

Keywords: Privatization, transition economies, economic growth, panel data.

JEL Classification: L33, O40, P27, P31, C23, C33

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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 \$125,000b, and the cumulative proceeds of privatization by country represent 7.6% of GDP in developed economies and 3.0% of GDP in developing economies. A large body of literature 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 performance 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 (CEE). Indeed, along with price liberalization, privatization has been regarded as the defining component of the transition from communism to capitalism (Blanchard, Dornbusch, Krugman, Layard, and Summers, 1990; Roland, 2000). Yet, transition governments faced an unprecedented problem in implementing their privatization programs: how to transfer into private hands the ownership of most of the economy in an environment with little or no domestic private savings and a 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 empirically how different methods of privatization have influenced economic growth across countries in the first decade and more of transition.

We estimate a growth model, controlling for factor inputs, on 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 heterogeneous in terms of resource endowments, have followed a variety of policy mixes (World Bank, 1996; EBRD, 2002), and have exhibited a large variance in their growth rates (Svejnar, 2002). They therefore make an excellent laboratory for investigation of the effects of different policy choices on growth, especially now that enough years have passed to permit more reliable estimation. The expanded data period available allows us to experiment with different specifications, including dynamics, and to estimate our model using dynamic panel data methods that control for country and time fixed effects as well as potential endogeneity.

The central proposition that we test is that different methods of privatization have different effects on economic growth, though we argue below that the sign and significance of these effects is an empirical question. The impact of privatization methods on growth may also 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; Morck, Wolfenzon, and Yeung, 2005),¹ 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.

The literature on privatization has primarily used enterprise-level surveys, rather than developing a cross-country growth analysis (see, for example, Claessens and Djankov, 1999, and Frydman, Gray, Hessel, and Rapaczynski, 1999). In their overview of the literature, Djankov and Murrell (2002) identify a positive effect of privatization on enterprise performance in CEE, but not in the FSU.² They explain this difference in terms of two factors. First, they suggest that the institutional environment was weaker in the FSU than in CEE, which limited the effectiveness of privatization in improving corporate governance. Second, they argue that the privatization process in the FSU led to outcomes in which insider ownership predominated, and this was less conducive to improved enterprise performance.³ Additionally, Coffee (1996) and Johnson, La Porta, Lopez-De-Silanes, and Shleifer (2000), amongst others, have identified significant deficiencies in the Czech and the Russian approaches to mass privatization, highlighting problems of weak governance and tunneling.

However, this literature does not yield direct cross-country evidence of the long-run effects of different privatization methods on growth. The long-run impact of

¹Previous work on the effect of capital market development on growth includes Rajan and Zingales (1998), and Beck, Levine and Loayza (2000).

²Djankov and Murrell's survey contain 194 references and their meta-analysis of the effects of privatization on estimated performance is based on 37 studies.

³One could, however, question the robustness of the conclusions of this literature, which is based mainly on small cross-section surveys of enterprises. As noted by Djankov and Murrell, data limitations have made it hard in these studies to address the problem of reverse causality; namely, particular methods of privatization being chosen for particular firms.

each privatization method, including mass privatization, depends on the evolution of the ownership structure of firms, and on the resulting governance structures (see Shleifer and Vishny, 1998). Moreover, arguments about efficient methods of privatization formulated in the context of developed market economies might be questionable for transition economies, with underdeveloped capital markets, and for which there may be politico-economic benefits from speed in privatization. Thus, Katz and Owen (2005) suggest that, although ‘big bang’ reform policies initially leave gaps in the legal and regulatory framework, they also create their own demand for institutional development. With reference to mass privatization, this implies that ownership concentration and the institutions necessary for effective governance emerged despite initial deficiencies in the ownership structure and supporting institutional framework.

Our equations are found to provide a persuasive description of the long-run growth process in the transition economies and we show that growth was faster in countries which adopted the method of mass privatization. Because of the possibility that our results may be explained by endogeneity or omitted variables, we undertake a large number of experiments to control for potential alternative explanations. However, our findings prove to be robust across a variety of different estimation methods, data periods and specifications. These results suggest that the standard interpretation of the effects of privatization in transition economies may need to be re-examined.

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 Section 5 concludes. The data sources are reported in an appendix.

2 Conceptual Framework

Although every transition economy has used a variety of privatization methods, in each country one method can be identified as dominant, in the sense that it was used to transfer the bulk of state-owned enterprises into the private sector. We categorize methods of privatization into three - 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 (that is, for each firm, to agents other than its 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 annual change in real GDP in a given country. We assume that y depends on the method of privatization and a variety of other country-specific factors, including growth of the private sector and capital market development. Thus,

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

where \subset , K is the annual change in the capital stock, L is the annual change in employment, and H is the annual 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.

Despite the tenor of the literature, which is suspicious of mass privatization, we identify a number of contradictory hypotheses about the impact of different privatization methods on growth in transition economies. We seek to resolve this issue in our empirical work. Privatization by sale to the highest bidder has been the preferred method in developed economies because it leads to efficient matching of buyers and assets (see Megginson, Nash, Netter and Paulsen, 2004); but this 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 appropriate set of skills 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, the ‘bad’ owners may have used their ownership rights to pursue non-economic objectives – employment protection, their own status, and political power – so that privatization by sale, by concentrating ownership in the wrong hands and entrenching these owners, may have failed to

accelerate growth in transition economies.

Insofar as privatization by sale was in the form of the purchase of concentrated holdings by foreign owners, these issues may not have arisen. Indeed, Sabirianova, Svejnar and Terrell (2005) find foreign ownership an important factor in the productivity growth of Czech firms. However, foreign direct investment flows to the transition economies were very small in the early years of transition, and nowhere did privatization by sale to foreigners initially predominate as a privatization method (UNCTAD, 2003). Additionally, whether to foreign or to domestic agents, privatization by sale was likely to be slow, for the enterprises had to be prepared for sale singly and the potential privatization lists ran into the thousands or tens of thousands of firms. The slow pace of privatization by sale also presented existing managers with significant opportunities for tunneling assets (Canning and Hare, 1994).

Thus, as in developed economies, privatization by sale could have enhanced growth in transition economies. However, for this to happen, the distributions of private domestic wealth and of entrepreneurial talent would have had to be well correlated, or the ownership structure would have had to evolve rapidly, perhaps through foreign direct investment. Moreover, state-owned firms would have had to have been sufficiently strong to function in a market environment in the perhaps lengthy interim period before they could be transferred to the private sector.

Mass privatization leads initially to a highly dispersed ownership structure, in which there is likely to be weak corporate governance, also allowing managers to tunnel out assets (Johnson, La Porta, Lopez-De-Silanes, and Shleifer, 2000). This situation may not be addressed if the intermediaries that emerge to manage the numerous small shareholdings create long agency chains. Hence, the method of

mass privatization is widely criticized in the literature for failing to create ‘real owners’ from the outset (see Stiglitz, 2000). However, the long run impact of mass privatization, like that of the other privatization methods, will depend on how the ownership and institutional structures evolve over time.

Mass privatization did address the fundamental problem of transition economies in the early 1990s, 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 in principle be subjected to hard budget constraints and market competition 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. Moreover, Konings, Van Cayseele and Warzynski (2005) establish that competition was an important factor eroding price-cost margins in CEE economies. Third, since mass privatization was based on a very broad distribution of assets, it could potentially facilitate a rapid evolution of ownership structure in which more concentrated ownership could emerge without the dangers

of entrenchment by ‘bad’ owners (Boycko, Shleifer, and Vishny, 1995).⁴

We use the term mixed privatization as our final category of privatization method because it has many of the strengths and weaknesses of the two other methods, 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 was arbitrary, for 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. Once again, the effects on long run growth are likely to depend on the evolution of the ownership structure, and to the extent that mixed privatization leads to insider ownership in an environment where the need for restructuring threatens jobs, ownership evolution is likely to be gradual.

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

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.

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 therefore 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 method 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 governed by the pace of *de novo* development, and so 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, the data do not reveal a simple relationship between the choice of method of privatization, or its timing, and economic variables such as previous economic growth. 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, privatization 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 Model 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,

$$\begin{aligned} \ln y_{i,t} = & a_1 + a_2 \ln K_{i,t} + a_3 \ln L_{i,t} + a_4 \ln H_{i,t} + a_5 M_{i,t} + a_6 S_{i,t} + & (2) \\ & a_7 P_{i,t} + \textit{time dummies} + \textit{country dummies} + \varepsilon_{i,t}. \end{aligned}$$

We henceforth denote $\ln K_{it}$, the real change in the logarithm of the capital stock, by INV_{it} ; and we denote $\ln L_{it}$, the real change in the logarithm of employment, by EMP_{it} . As a proxy for the change in human capital H_{it} , we use the logarithm of gross enrolment in tertiary education, denoted by IHC_{it} . 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 market as a proportion of GDP, which we denote by $STOCKMC_{it}$. 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 control for any country-specific effects. This is an important difference between our analysis and the numerous enterprise-level studies surveyed in Djankov and Murrell (2002). These studies all focus on one or a few countries, with comparative results being inferred. The samples in these studies are usually small and many relate to the period immediately post-privatization, when privatization had had a relatively limited impact, and before ownership structures could to evolve. The data sets rarely contain appropriate instruments to control for endogeneity. In contrast, our approach considers the pre- and post-privatization period in all transition economies for which data are available, employs first differencing and fixed-effects methods to take out country-specific factors such as preconditions to reform, policy environments, and institutional arrangements, and it uses dynamic panel data methods which instrument the independent variables.

We also 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.

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' privatiza-

tion. 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.

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, despite the favorable account usually accorded privatization by sale in the literature, there is no evidence in the raw data that countries employing this method 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.

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 report a representative regression - that for the interaction between mass privatization and stock market development ($a_9^{Ma} \neq 0$). Finally, 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 $\bar{R}^2 > .6$. 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, suggesting the strong relevance of initial conditions and country-specific economic and institutional factors in explaining growth in transition economies.

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 unreported regressions containing the other possible stock market development-privatization method 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. In contrast, we do not observe significant coefficients for 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 country-specific effects, 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 are biased by correlation between the error term and the lagged endogenous variable, which may explain the estimated positive sign on 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 country-specific effects, the lagged endogenous variable, most of the factor inputs, and the methods of privatization. As before, the country-specific fixed effects provide much of the explanation. 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 yields 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, as well as significant country fixed effects 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.

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. In columns (2) and (4), we identify a significant positive impact from the private sector share on growth in both the static OLS and GMM estimations. 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 largely picked up by the first differencing and by the country-specific and time-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.⁵

⁵The literature 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 (see Djankov and Murrell, 2002). 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

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, controlling for country-specific fixed effects such as initial conditions. The equations are 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 never exerts a significant independent influence on growth, and the method of mixed privatization hardly ever has a statistically significant effect. In contrast, the method of mass privatization is shown to be positively associated with growth. This result is highly 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, that could have implied that the matching of buyers with firms had been efficient. But the

advanced economies of CEE, but the weaknesses of the institutional environment might have affected all privatization 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.

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 remained underdeveloped, the ‘wrong’ owners might have become entrenched, especially when their ownership stake was concentrated, restricting, rather than accelerating, the pace of restructuring.

The positive impact of mass privatization on growth that we have identified opens up an important research agenda at the enterprise level. Our findings are consistent with the view that speed in severing the links between the state and the enterprise sector might have been an important determinant of restructuring in firms. Moreover, it is consistent with the interpretation that the evolution of ownership structures in countries that chose mass privatization methods was toward concentrated outsider ownership. There is, as yet, little recent evidence on these matters, and our study suggests considerable further work is needed to identify the factors underlying our results.

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 marketeers 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.

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.

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 implemented.

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.

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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 | Sale | 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> | $\chi^2(134)[0.11]$ | | $\chi^2(134)[0.11]$ | | $\chi^2(134)[0.10]$ | | $\chi^2(134)[0.10]$ | |
| $AR(1)$ | $N(0,1)[0.88]$ | | $N(0,1)[0.99]$ | | $N(0,1)[0.88]$ | | $N(0,1)[0.99]$ | |
| $AR(2)$ | $N(0,1)[0.01]$ | | $N(0,1)[0.01]$ | | $N(0,1)[0.01]$ | | $N(0,1)[0.01]$ | |

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> | 0.081 | 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 * STOCKM</i> | -0.010 | 0.003*** | -0.011 | 0.003*** | -0.026 | 0.020 | -0.026 | 0.025 |
| <i>MASS * 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*** | | No | | Yes*** | | No | |
| Country Dummies | Yes*** | | Yes*** | | Yes*** | | Yes*** | |
| 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).