

Privatization Dynamics and Economic Growth

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This paper analyses the impact of privatization on economic growth for a sample of 56 developed and developing countries over the period 1980-2004. Our findings suggest that privatization, in terms of volume and method of divestiture (public share issues as opposed to private sales to strategic investors), plays an important role in stimulating economic growth. We also find that population growth, government consumption and inflation negatively influence economic growth. Moreover, saving ratio, stock market development, and foreign direct investment are positively related to economic growth. Further, the development of institutions of governance is a key determinant of economic growth. Indeed, high levels of development of institutions of governance positively influence the effect of privatization through share issues on economic growth.

1. Introduction

Since its introduction in the United Kingdom in the early 80ies (and earlier still in Chile where the first massive privatization wave took place between 1974 and 1978), privatization has spread worldwide, first in industrialized economies and then to Asia, Latin America, Africa and Central and Eastern Europe. During the last two decades, more than 100 countries privatized some or most of their state-owned enterprises (Megginson and Netter, 2001). Theoretical arguments supporting privatization relate to microeconomic theories explaining the superior performance of privately-owned firms. Change from public to private ownership improves profitability and efficiency as a result of changes in the incentives and management structure (the management view) and improvements in corporate governance (the political view).

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Empirical studies that focused on the micro economic impact of privatization are numerous and masterly reviewed in Megginson and Netter (2001). Overall, cross country evidence suggests that privatization leads to improvements in operating performance (Boubakri and Cosset, 1998; Boubakri et al., 2005; Megginson, Nash and van Randenborgh, 1994; D'Souza, Megginson and Nash, 2005). Megginson and Netter (2001) conclude their survey on empirical studies on privatization by writing that "in most settings, privatization "works" in that the firms become more efficient, more profitable, and financially healthier, and reward investors".

Surprisingly, despite more than two decades of privatization, the literature addressing the macroeconomic effects of privatization and particularly its implications on growth is still limited. Most available evidence is descriptive and anecdotal. For example, the World Bank states that "countries which had firmly committed themselves to privatization, such as Chile and Mexico, had experienced higher rates of growth than countries in Sub-Saharan Africa where progress with respect to divestment was slow" (World Economic Outlook, 1994, p.50). These observations lead us to conjecture that if privatization tends to improve firm level performance, then we should expect this effect to be reflected in macroeconomic indicators, generating and sustaining long-term economic growth.

In this paper, we provide an empirical investigation of this particular issue. Precisely, we examine for a large panel of 56 developed and developing countries that implemented privatization between 1980 and 2004, whether the reform has had an impact on economic growth. Our analysis allows us to answer the following questions: (1) did privatization promote economic growth? (2) Does the effect of privatization on economic growth depend on the method of privatization?

These issues are of particular importance for developing countries that are yet to implement large-scale privatization programs over the next ten years, as reported by the World Bank, in areas as diverse as Latin America, Africa and the Middle-East, as well as in South East Asia, and the remaining Eastern Europe.

Our hypothesis that privatization should have an impact on economic growth stems from the following observations and findings in the existent literature. For instance, if privatization has a positive and significant impact on the efficiency and performance of former state-owned firms as evidenced by several previous empirical studies, we expect it to ultimately generate a better resource allocation, boost productivity, and hence to have an impact on long-term sustainable economic growth as well.

Second, Boubakri et al. (2005) study the post privatization corporate governance of firms and show that performance gains are associated with the type of dominant owners. The post privatization corporate governance itself results from the method of divestiture: for instance, private sales to strategic investors yield an immediate concentrated ownership, while share issued privatizations on the stock market generally result in a more diffuse ownership, at least at the time of privatizations. These corporate governance issues related to the privatization method suggest that the way the issue is allocated is of primary importance since a more concentrated ownership is more likely to lead to drastic improvements in efficiency and productivity, and

ultimately more likely to boost economic growth, than more diffused ownership structures.

Third, several studies sustain that privatization through share issues on the stock market contributes to stock market development (Boutchkova and Megginson, 2001) and generates a resolution of policy risk (Perotti and van Oijen, 2001, Leaven and Perotti, 2002), which induces and boosts stock market development. Since stock market development has been shown in the literature to have a positive effect of economic growth (Levine, Demirgüç and Maksimovic, 1998, among others), we expect that the method of privatization contributes to economic growth through its positive impact on stock market growth, and hence on economic growth.

Fourth, studies on postprivatization performance also suggest that newly privatized firms (NPFs here after) significantly increase their investment expenditures, which in turn is likely to boost national investment spending, an additional channel through which privatization may positively affect growth.

Finally, additional revenues to the government from privatization proceeds (and reduced subsidies) induce an increase in investments on infrastructure, a reduction in budget deficits, and generally, a positive feedback on aggregate productivity.

In light of this discussion on the potential micro level channels through which privatization may have a positive macro economic effect on economic growth, we characterize privatization along two specific aspects of the process. (1) its extent (size of the program, and (2) its method of sale.

Our results show that privatization, in terms of volume and method of divestiture (public share issues as opposed to private sales to strategic investors), plays an important role in stimulating economic growth. We also find that population growth, government consumption and inflation negatively influence economic growth. Moreover, saving ratio, stock market development, and foreign direct investment are positively related to economic growth. Further, the development of institutions of governance is a key determinant of economic growth. Indeed, high levels of development of institutions of governance positively influence the effect of privatization through share issues on economic growth

The remainder of the paper is structured as follows: Section 2 presents a brief survey of the empirical literature on the link between privatization and economic growth. Section 3 describes our sample and variables. Section 4 describes our methodology, while section 5 presents and discusses our empirical findings. We conclude in section 6.

2. Literature Review

Governments undertaking privatization have pursued a variety of objectives: to improve micro economic efficiency, to promote sustainable economic growth, to improve the fiscal position (to reduce the budgetary burden caused by inefficient state enterprises), to attract foreign direct investment, to create revenues for the government, to help develop domestic capital markets. In some developing countries, governments have embraced privatization as part of the structural conditions attaches to adjustment programs adopted under the supervision of the World Bank and the International Monetary Fund.

Privatization has emerged in the mid 1980ies as an important component of structural adjustment programs (the World Bank, 1995, p 56) and the Bretton Woods institutions increasingly made financial support, development assistance and debt relief contingent upon progress towards privatization. For countries with IMF supported programs,¹ excluding transition countries, the average number of privatization conditions in total structural conditions increased from 4.7% for the period 87 -90 to 16.5% for the period 97-99 (IMF, 2001, p 26).

There are to our knowledge only few studies that empirically assess the macro economic impacts of privatization for a relatively large number of developing countries. The lack of empirical studies is due to data constraints related to the time period elapsed since privatization, and to the difficulty to isolate the effect of privatization from that of other concomitant contemporary policy changes. Indeed, privatization, especially in developing countries (DCs) is often implement simultaneously with other structural reforms such as price deregulation, external trade liberalization, financial liberalization and financial sector reform.

In the growth literature, very few studies incorporate a privatization variable among policy variables that encompass monetary and fiscal discipline, price and trade liberalization and deregulation.

There is a body of literature addressing this issue in a context of transition to a market economy. Havrylyshyn, Izvorski and van Rooden (1998), analysing growth performance for 25 transition countries between 1990 and 1997, use an index of structural reforms with a subcomponent an index for private entry in markets that includes privatization, enterprise reform and financial sector reform (indices for the year 1990-93 are due to de Melo, Deninzer and Gelb, 1996, and are updated to 1997 using the transition indicators from the EBRD transition reports. Bennett et al. (2004) analyse the role of the method of privatization in economic growth for 23 transition countries over the period 1991-2001. However, the political and economic backgrounds of transition countries are quite different from those of developing markets economies.

Recently there have been a few attempts to empirically investigate the relation between privatization and economic growth in the context of developing countries. A first study, by Plane (1997) uses data for 35 developing countries over the period 1984-1992. Plane first analyses and tests the determinants of privatization by means of cross sectional probit and tobit models. Then he examines the relationship between the average GDP growth rate and a set of explanatory variables including the implementation of privatization programs. Plane finds that privatization positively affected GDP growth and that the effect was more significant for activities of a public goods type than for other sectors. He finds that on average, reform increased economic growth from 0.8% to 1.5% between the sub periods 1984-1988 and 1988-92.

Barnett (2000) uses country level panel data of 18 countries including only 10 developing countries. The rest are transition economies. This study explores the impact of privatization on fiscal variables, growth, unemployment and

¹ These are the structural adjustment facility SAF established in March 1986, the Enhances Structural Adjustment facility ESAF set up in December 1987, and the poverty reduction and growth facility PRGF which replaced the ESAF in 1999.

investment. The empirical evidence indicates that privatization is positively correlated with real GDP growth rates. The estimate suggests that privatization of 1% of GDP would be associated with an increase on the real GDP growth rate of 0.5% in the year of privatization and 0.4% in the following year. For the non transition sample, the effect would be a 1.1% increase in real GDP growth rate in the year of privatization and 0.8% in the following year. However, as acknowledged by the author himself, the results of this study are based on a select sample of countries and for a limited period for which data is available. For each country, the sample corresponds to the period of active privatization for data are available, but the author does not specify the precise span of years for the study. Furthermore, Barnett (2000) warns that the privatization variable is likely to serve as a proxy in the regressions for one or more omitted variables measuring other policy reforms. Cook and Uchida (2003) apply a cross country growth regression analysis using the framework of the extreme bounds analysis. They use data for 63 developing countries between 88 and 97, and find that privatization has contributed negatively to economic growth.

Palia and Phelps (2003) include in a growth regression model a private ownership variable capturing the scope of private enterprise and control of commercial enterprises. They use a sample of 43 countries over the period 60-85. Their private ownership variable is from Milanovic (1989) who compiled for a set of countries the percentage of GDP produced by state owned firms engaged in commercial activities hence state production net of government services. Palia and Phelps (2003) adopted the negative of this percentage as their private ownership variable. Their main findings is that after controlling for education, initial per capital GDP growth and economic system economic growth is positively related to private ownership and control. Aside from acknowledging their "data set excludes countries that Milanovic regarded as socialist, in the 1970s and the 1980s such as China and the Soviet Union" they do not give any description of their country sample.

A recent study investigates the relationship between privatization and macroeconomic variables in the context of developing countries. Katsoulakos and Likoyanni (2002) use country level panel data of 23 OCDE countries for the period 1990-2000. Their study investigates the relationship between privatization receipts and budget deficit, public debt, output growth and unemployment rate. The estimation results indicate that there is no statistically significant relation between GDP growth rates and privatization proceeds of the previous period. This conclusion is drawn from a model where the dependent variable is the GDP growth rate and the only explanatory variable is the privatization receipts (as a percentage of GDP of the previous period. One concern with this specification is that it suffers from omitted variables bias.

Growth theory provides no guidance as to the choice of variables to include in the growth regression. However, the empirical growth literature suggests a wide range of growth determinants. "Over 50 variables have been found to be significantly correlated with growth in at least one regression" (Levine and Renelt, 1992).

The list includes among others, initial conditions, policy variables and institutional variables. Most models include: investment, population growth, initial per capita GDP, and initial human capital.

With these caveats in mind, and noting that most studies focused on developing countries, we propose to examine in this paper, the potential impact of privatization on economic growth using a cross country sample of both developing and developed countries. Next, we describe our sample and the variables used in the analysis.

3. Sample and Variables

a) The Sample

We analyse the relationship between privatization and economic growth using a panel of 56 developed and developing countries between 1980 and 2004. To be included in our sample, a country needs at list three consecutive privatization data over the study period. This is to ensure a time-series dimension to our data. The list of countries appears in Table 1. We average the data over five non-overlapping 5-year periods² in order to remove the business cycle effects and to focus more on the long-run impact of privatization on economic growth (Beck and Levine, 2004).

Table 1: List of Countries

Argentina	India	Peru
Australia	Indonesia	Philippines
Austria	Ireland	Portugal
Bahrain	Italy	Singapore
Belgium	Jamaica	South Africa
Brazil	Japan	Spain
Canada	Jordan	Sri Lanka
Chile	Korea, South	Sweden
Colombia	Kuwait	Switzerland
Cote d'Ivoire	Malaysia	Thailand
Denmark	Mexico	Tunisia
Egypt	Morocco	Turkey
Finland	Netherlands	Uganda
France	New Zealand	United Kingdom
Germany	Nicaragua	United States
Ghana	Nigeria	Venezuela
Greece	Norway	Zambia
Guatemala	Pakistan	Zimbabwe
Hong Kong	Panama	

b) Description of Variables

Economic Growth

As it is standard in the economic growth literature, we measure economic growth by the difference of the log of real per capita GDP (Barro, 1991). The per capita GDP series were drawn from the World Bank's World Development Indicators 2005. The figures are measured in 2000 constant prices and converted into US dollars using the exchange rates prevailing on the international currency markets.

Privatization

To measure privatization, we use total proceeds from privatization as a percentage of GDP (PRIV). Cook and Uchida (2003) and Barnett (2000)

² Hence, the first period covers the years 1980-1984; the second period covers the years 1985-1989; the third period covers the years 1990-1991 and so on.

argue that total amount of privatization proceeds is a good measure of the magnitude of the privatization and provides an adequate measure of the change from public to private ownership. Besides, it captures the level of political commitment towards better economic policies (Barnett, 2000; Davis et al., 2000). Moreover, to control for the method of privatization, we use the ratio of proceeds from Share Issue Privatizations to total privatization proceeds (SIP).

Initial Level of Development

We examine the link between privatization and economic growth while controlling for the initial level of development using the log of initial real per capita GDP (LGDPC). The inclusion of this variable is based on the idea that poor countries tend to grow more rapidly than rich industrialized countries (Barro, 1991). Hence, the initial level of per capita Income tends to be negatively related to the country's economic growth rate. The coefficient of LGDPC is expected to be negative.

Government Consumption

The economic growth literature suggests that a measure of government spending serves as a proxy for the level of political corruption in the country and for the negative impact of non-productive government expenditure and taxation (Cook and Uchida, 2003; Filipovic, 2005). We control for the level of government consumption with the ratio of government consumption to GDP (GOVC). We expect a negative relationship between GOVC and economic growth.

Population Growth

Bornschieer et al.(1978) argue that a higher growth rate of a country's population may dilute the benefits of an economic policy. Moreover, the findings of Savvides (1995) and Adams (2006) indicate that a country's high population growth rate slows down economic growth. To control for this effect, we include in our growth model the growth rate of the population (POP). We expect a negative relation between POP and economic growth.

Saving Ratio

It is well accepted in the economic growth literature that the saving ratio is a major determinant of economic growth (Solow, 1956; Koopmans, 1965; Ramsey, 1928; Frankel, 1962; Romer, 1986; etc.). Higher saving rates imply higher capital accumulation, which is a major source of economic growth. We measure the saving ratio with the gross domestic saving to GDP (SAVE). The coefficient of SAVE is expected to be positive.

Investment in human capital

The theory and evidence suggest an important relation between investment in human capital and economic growth (Solow, 1956; Lucas, 1988; Barro and Sala-i-Martin, 1995). To measure the investment in human capital, we use the literacy rate³ (LITERACY). Human capital theories argue that higher literacy

³ Due to the lack of data, we were unable to use the secondary enrollment rate as a measure of investment in human capital.

rate of a country is a major determinant of economic growth (Fuller, Edwards and Gorman, 1986). Besides, many studies claim that literacy rate is a useful proxy of investment in human capital (Romer, 1989; Barro, 1991; Tallman and Wang, 1992; Bashir and Darrat, 1994). Indeed, it is argued that literate persons could be trained less expensively than illiterate people, typically possess a higher socio-economic status, and enjoy a better quality of life in terms of health and employment opportunities. We expect a positive relation between this variable and economic growth.

Inflation

We include a measure of inflation because economic theory and empirical evidence suggest a negative relation between macroeconomic instability and economic growth (Fischer, 1993; Bruno and Easterly, 1998). As noted by Fischer (1993) inflation serves as "an indicator of the overall ability of the government to manage the economy". We control for inflation using the annual inflation rate (INF). The coefficient of INF is expected to be negative.

Trade Openness

In the economic growth literature, openness to international trade has been identified as an important determinant of economic growth (Gossman and Helpman, 1992; Harrison, 1996; Sachs and Warner, 1997). Indeed, it is argued that openness to international trade stimulates the growth of exports and increases the availability of imports of inputs and machinery, thereby accelerating the economy's technological development and hence fosters economic growth (Dollar, 1992). Our proxy for trade openness is the ratio of the sum of exports and imports over GDP (OPEN). We expect a positive relationship between OPEN and economic growth.

Stock Market and Bank Development

The empirical growth literature has shown that markets and banks are important determinants of economic growth (King and Levine, 1993; Bencivenga and Smith, 1991; Beck et al., 2000). Indeed, well-functioning stock markets and financial intermediaries ameliorate information and transaction costs, thereby contributing to better resource allocation and economic growth (Beck and Levine, 2004). We measure stock market development with market capitalization, which equals the total value of the country's listed stocks divided by GDP (MCAP) (Levine and Zervos, 1998; Bennett et al., 2004). Following Beck and Levine (2004), we measure bank development with the ratio of the domestic credit provided by the banking sector divided by GDP (BCREDIT). The coefficients of MCAP and BCREDIT in the growth regressions are expected to be positive.

Foreign Direct Investment

We control for the level of Foreign Direct Investment using the ratio of Foreign Direct Investment to GDP (FDI). This variable is included on the grounds that higher FDI may play an important role in bringing new advanced technologies as well as marketing and management skills, hence contributing to the economic growth of the host country (Cook and Uchida, 2003). We expect a positive relationship between FDI and economic growth.

Quality of Institutions

The recent empirical evidence has now reached a consensus that developed institutions of governance cause economic growth (Knack and Keefer, 1995; Mauro, 1995; Hall and Jones, 1999; Easterly and Levine, 2003; Dollar and Kraay, 2003; Acemoglu et al., 2001). These studies argue that institutions matter for economic growth because they shape the structure of economic incentives in society, facilitate investment in human and physical capital, and contribute to the efficient allocation of resources in the economy. Following Knack and Keefer (1995), we measure the quality of a country's institutions with an equally weighted index of the following governance indicators: Government Stability, Corruption, Law and Order, Bureaucratic Quality, and Democratic Accountability. The privatization data is derived from SDC Platinum (Thomson Financial). The data on the governance indicators comes from the International Country Risk Guide (ICRG). All remaining data are drawn from the World Bank's World Development Indicators (WDI) 2005. Table 2 shows the variables used in our study and the data sources.

Table 2: Definitions, Proxies and Data sources

Variable	Proxy	Label	Expected sign	Source
Economic Growth	Difference of the log of real per capita GDP	Y		<i>DI 2005</i>
Privatization	Annual privatization proceeds to GDP.	PRIV	+	<i>SDC Platinum, Thomson Financial</i>
Method of Privatization	Annual SIP proceeds to Total Proceeds	SIP	+	
Initial Income Level	Log of initial real per capita GDP	LGDP	-	<i>WDI 2005</i>
Government Consumption	Ratio of government consumption to GDP	GOVC	-	<i>WDI 2005</i>
Population	Growth rate of the population	POP	-	<i>WDI 2005</i>
Saving Ratio	Gross domestic saving to GDP	SAVE	+	<i>WDI 2005</i>
Human Capital	Literacy Rate	LITERACY	+	<i>WDI 2005</i>
Inflation	Annual Inflation Rate	INF	-	<i>WDI 2005</i>
Trade Openness	Sum of exports and imports to GDP	OPEN	+	<i>WDI 2005</i>
Stock Market Development	Market capitalization	MCAP	+	<i>WDI 2005</i>
Foreign Direct Investment	Ratio of Foreign Direct Investment to GDP	FDI	+	<i>WDI 2005</i>
Bank Development	Domestic credit provided by the banking sector divided by GDP	BCREDIT	+	<i>WDI 2005</i>
Institutions Quality	Equally weighted index of the following indicators: Government	INST	+	<i>International Country Risk Guide</i>

	Stability, Corruption, Law and Order, Bureaucratic Quality, and Democratic Accountability			
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4. The Methodology and Model

The purpose of this paper is to empirically investigate the impact of privatization on economic growth using a dynamic panel setting. The majority of previous studies employed cross-country growth regressions to examine the relationship between privatization and economic growth (Plane, 1997; Cook and Uchida, 2003; Barnett, 2000; Filipovic, 2005; and Adams, 2006). However, it has become apparent that Ordinary Least Squares (OLS) estimation of cross-country growth regressions potentially suffers a number of statistical problems. First, this methodology does not control for the unobserved country-specific effects. Second, cross-country growth regressions suffer from the omitted variable bias. Third, there may be a simultaneity bias arising from possible reverse causality running from economic growth to privatization. It is likely that governments can time privatization sales during periods of high economic growth in order to benefit from the favourable business climate and maximize privatization proceeds.

Further, some determinants of economic growth that are routinely included in cross-country regressions should not be treated as exogenous, particularly when unobserved country-specific effects are not controlled for. Specifically, stock market and bank development and FDI are endogenous to economic growth: higher economic growth stimulates the development of stock markets and financial intermediaries and boosts the flow of foreign direct investment. From the previous, it is obvious that OLS estimators of cross-country growth regressions are biased and inconsistent, and thus cast doubt on the results of previous literature on the link between privatization and economic growth that are based on this estimation procedure.

Unlike previous studies, Bennett et al.(2004) use a dynamic panel model and Generalized Method of Moments (GMM, henceforth) estimation to test the growth consequences of different methods of privatization. Their results show that the method of privatization fosters economic growth. However, their study is limited to a sample of 23 transition countries. It is well known that privatization in transition economies is a unique experience. Indeed, privatization was implemented in the absence of established stock markets or adequate legal institutions (Boubakri, Cosset and Smaoui, 2009). Consequently, the results of Bennett et al.(2004) cannot be generalized to developing and developed countries. Moreover, their use of annual data does not abstract from crises and business cycle effects.

This study uses new econometric techniques that reduce the statistical problems of cross-sectional growth regressions to investigate the relationship between economic growth and privatization. More specifically, we use a dynamic panel model that allows us to control for: (i) the unobserved country-specific effects that are theoretically important but too difficult to measure; (ii) the omitted variable bias; (iii) the inclusion of the lagged dependant variable

as a regressor; (iv) and the endogeneity and simultaneity problems of explanatory variables. Further, the use of a dynamic panel will allow us to incorporate both the time-series dimension and the cross-sectional information in the data, thus gaining a higher degree of freedom and more precise estimates. In addition, we use low frequency data to abstract from crises and business cycle phenomena and focus on longer-run economic growth.

To assess the relationship between privatization and economic growth in our dynamic panel, we use the System GMM estimator proposed by Arellano and Bover (1995) and Blundell and Bond (1998). We can write the traditional cross-section growth model as follows:

$$y_{i,t} - y_{i,t-1} = \alpha y_{i,t-1} + \beta' x_{i,t} + \mu_i + \varepsilon_{i,t} \quad (1)$$

Where $y_{i,t}$ is the log of real per capita GDP, $y_{i,t-1}$ represents the log of the level of real per capita GDP at the beginning of each period, $x_{i,t}$ is the vector of the explanatory described in the previous section; μ_i is an unobserved country-specific effect; $\varepsilon_{i,t}$ is the error term; i holds for the country ($i=1, \dots, N$); and t stands for the 5-year period ($t=1, 2, 3, 4, 5$).

We can rewrite model (1) in dynamic form:

$$y_{i,t} = \alpha^* y_{i,t-1} + \beta' x_{i,t} + \mu_i + \varepsilon_{i,t} \quad (2)$$

Where $\alpha^* = (1 + \alpha)$

Most of previous empirical growth studies ignored the country-specific effect μ_i , relegating it to the error term, $\varepsilon_{i,t}$. Hence, they estimated the following model:

$$y_{i,t} = \alpha^* y_{i,t-1} + \beta' x_{i,t} + \varepsilon_{i,t}^* \quad (3)$$

Where $\varepsilon_{i,t}^* = \mu_i + \varepsilon_{i,t}$

Since $y_{i,t-1}$ is, by construction, correlated with μ_i ⁴, $y_{i,t-1}$ will also be correlated with the new error term, $\varepsilon_{i,t}^*$. This makes the OLS parameter estimates biased and inconsistent.⁵ Therefore, we should be extremely cautious before drawing inferences based on OLS parameter estimates of cross-country growth regressions.

Anderson and Hsiao (1982) propose to first-difference equation (2) in order to eliminate the unobserved country-specific factor, μ_i :

$$y_{i,t} - y_{i,t-1} = \alpha^* (y_{i,t-1} - y_{i,t-2}) + \beta' (x_{i,t} - x_{i,t-1}) + (\varepsilon_{i,t} - \varepsilon_{i,t-1}) \quad (4)$$

or

⁴To see this, simply lag equation (2) by one period.

⁵ Furthermore, even standard panel data estimators with fixed or random effects are not appropriate for estimating models like equation (3). For example, fixed effects panel data regressions yield biased estimates since correlation between the transformed lagged dependent variable and the transformed error term is still there (Baltagi, 2001).

$$\Delta y_{i,t} = \alpha * \Delta y_{i,t-1} + \beta' \Delta x_{i,t} + \Delta \varepsilon_{i,t} \quad (5)$$

where Δ denotes the difference operator.

However, first-differencing equation (2) introduces a new bias since, by construction, $y_{i,t-1}$ in $\Delta y_{i,t-1}$ is correlated with $\varepsilon_{i,t-1}$ in $\Delta \varepsilon_{i,t}$. The use of instrumental variables is required to purge this correlation. The Generalized Method of Moments (GMM) estimation technique employ orthogonality conditions to derive valid instruments. The key intuition behind GMM is to establish the population moment conditions and then to use their sample analogs to compute parameter estimates.

By setting the two following conditions: (a) the error term, $\varepsilon_{i,t}$ is not serially correlated; and (b) the independent variables, $x_{i,t}$ are weakly exogenous (i.e. they can be correlated with past and current realizations of the dependant variable but not with its future realizations, thus allowing for the possibility of simultaneity and reverse causality), Arellano and Bond (1991) propose the following moment conditions:

$$E[y_{i,t-s}(\Delta \varepsilon_{i,t})] = 0 \quad \text{for } s \geq 2; t = 3, \dots, T. \quad (6)$$

$$E[x_{i,t-s}(\Delta \varepsilon_{i,t})] = 0 \quad \text{for } s \geq 2; t = 3, \dots, T. \quad (7)$$

The moment conditions (6) and (7) imply that $\Delta \varepsilon_{i,t}$ have a null covariance with all $y_{i,t}$ and $x_{i,t}$ dated t-2 and earlier. Consequently, it is possible, starting from t-2, to go back through the panel to obtain appropriate instruments in order to eliminate the correlation between $\Delta y_{i,t-1}$ and $\Delta \varepsilon_{i,t}$.

Using conditions (6) and (7), Arellano and Bond (1991) propose a two-step GMM estimator, commonly called difference GMM. Although asymptotically consistent, Monte Carlo simulations suggest that the difference GMM estimator displays large finite sample biases and very low precision in the estimation of the autoregressive parameter, especially when it is close to unity (Blundell and Bond, 1998; Alonso-Borrego and Arellano, 1999).

Blundell and Bond (1998) address these shortcomings of the difference GMM estimator by introducing a new estimator called system GMM, which we shall use in our analysis.

This estimator combines, within a system, the regression in differences (4) and the regression in levels (2), each with its specific set of instruments. For the equation in levels, the country-specific effect is not eliminated but must be controlled for with the use of instrumental variables. The instruments for the regression in differences remain as described above (i.e. lagged endogenous and exogenous variables previous or equal to t-2). For the regression in levels, the instruments are the lagged differences of the endogenous and exogenous variables. For these exogenous variables to be considered appropriate instruments, Blundell and Bond (1998) and Arellano and Bover (1995) set the following additional moment conditions:

$$E[(y_{i,t-s} - y_{i,t-s-1}) * (\mu_i + \varepsilon_{i,t})] = 0 \quad \text{for } s = 1 \quad (8)$$

$$E[(x_{i,t-s} - x_{i,t-s-1}) * (\mu_i + \varepsilon_{i,t})] = 0 \quad \text{for } s = 1 \quad (9)$$

The levels of the independent variables $x_{i,t}$ may be correlated with the country-specific effect, μ_i , but there should be no correlation between the differences of the independent variables $\Delta x_{i,t}$ and the country-specific effect μ_i . Furthermore, only the most recent difference is used as an instrument in the regression in levels since the lags in levels are already used as instruments in the regression in differences.

It is worth noting that the consistency of the system GMM estimator depends on the assumption that the instruments are valid and that the error terms are not serially correlated. To test both hypotheses, we run two specification tests proposed by Arellano and Bond (1991) and Arellano and Bover (1995). The first is a Hansen test of over-identifying restrictions which tests the overall validity of the instruments. Our model specification is adequate if we cannot reject the null hypothesis of over-identifying restrictions. The second tests the null hypothesis that the difference error term, $\Delta \varepsilon_{i,t}$ has no second order serial autocorrelation⁶. The non-rejection of the null hypothesis gives support to our model.

Although superior to the difference GMM estimator, Blundell and Bond (1998) show that the standard errors of the two-step system GMM estimator are severely downwardly biased in finite samples. We address this problem as follows. First, as a minimally rule of thumb, we consider a lesser number of instruments than the number of cross-sectional units to reduce the over-fitting problem of the endogenous variables and improve the efficiency of the two-step estimator (Roodman, 2009; Beck and Levine, 2004). Second, we use the Windmeijer (2005) correction of the estimated variance. In a Monte-Carlo study, Windmeijer (2005) shows that the corrected variance closely approximates the finite sample variance of the two-step system GMM estimator.

5. The findings

Table 3 reports the descriptive statistics of our variables for our sample of 56 countries for the period 1980-2004.

Table 3: Descriptive Statistics

This table reports the descriptive statistics of our main variables for the sample of 56 countries between 1980 and 2004.

⁶ Arellano and Bond (1991) note that when the error term, $\varepsilon_{i,t}$ is not serially correlated, then the differenced error term, $\Delta \varepsilon_{i,t}$, should display first order autocorrelation but no second order autocorrelation.

Variable	N	Mean	Median	Standard Deviation	Min	Max
Y	222	0.946	0.959	1.397	-3.262	5.778
PRIV	180	0.623	0.347	0.764	0.003	4.211
SIP	280	0.290	0	0.388	0.000	1.000
LGDP	223	8.321	8.545	1.508	5.111	10.507
GOVC	279	16.029	15.769	5.949	4.510	48.062
POP	280	1.477	1.457	1.690	-20.359	5.686
SAVE	280	21.437	21.714	9.021	-10.520	51.108
LITERACY	182	76.777	83.171	17.942	29.257	98.484
INF	277	54.640	6.359	285.404	-2.744	3357.607
OPEN	276	70.883	59.061	48.969	12.876	390.063
MCAP	207	52.635	33.771	53.749	0.907	366.896
FDI	272	2.266	1.253	3.583	-3.883	38.704
BCREDIT	278	79.451	73.364	48.180	5.553	298.335
INST	280	4.352	4.250	1.282	0.000	6.600

a. Privatization Proceeds

Table 4 shows the empirical results of the regressions on the link between economic growth and privatization for our sample of 56 developed and developing countries between 1980 and 2004. In all our model specifications, the Hansen test cannot reject the null hypothesis that our instruments are valid. Moreover, the AR2 test fails to reject the null hypothesis that there is no second order autocorrelation in the differentiated residuals.

The results in Table 4 indicate that the coefficient of privatization (PRIV) is positively and significantly correlated with economic growth at the 5% in all the specifications except in models (5) and (7) where it is significant at the 10% level. This finding is consistent with Plane (1997) and Barnett (2000) and suggests that privatization, measured by annual proceeds over GDP, has contributed to the economic growth of our sample of developed and developing countries.

In all our models, the initial level of development (LGDP) is negatively and significantly correlated with growth. This result supports Barro's (1991) proposition that poor countries tend to grow more rapidly than rich countries.

The coefficients of the government consumption variable (GOVC) have an unexpected positive sign, but never significant in any of the model specifications. As expected, the coefficients of population growth (POP) are all negative, but only significant in models (2) and (3). This result is consistent with the findings of Savvides (1995), Adams (2006) and Cook and Uchida

(2003) and indicates that high population growth rate slows down economic growth and dilutes the benefits of economic policies.

With respect to the saving ratio (SAVE), the coefficients are positive and significantly correlated with economic growth at the 5% level in all our models, indicating that higher saving rates lead to higher capital accumulation and hence fosters economic growth (Solow, 1956; Koopmans, 1965; Ramsey, 1928; Frankel, 1962; Romer, 1986; etc.).

The results also suggest that the literacy rate measuring the investment in human capital is not a key determinant of economic growth, since the regression coefficient of this variable is not significant at the 5% whatever the specification.

In model specification (3), we control for inflation using the annual inflation rate (INF). The evidence shows that inflation is negatively and significantly related to economic growth at the 1% level. Indeed, an increase by 1% in the annual inflation rate will lead to a decrease in the growth rate by 0.1%, everything else being constant. One possible explanation for this result is that inflation serves as an indicator of macroeconomic instability and therefore should be negatively related to economic growth.

In model specifications (3) to (6), we control respectively for: Trade Openness (OPEN), Stock Market Development (MCAP), Foreign Direct Investment (FDI), and Bank Development (BCREDIT). The results show that these variables are not significantly related to economic growth.

A striking result in Table 4 is the positive and significant coefficient at the 5% level of the Quality of Institutions variable (INST). This finding provides evidence to the various studies that argue that developed institutions of governance are important for economic growth since they shape the structure of incentives and contribute to the efficient allocation of resources in the economy (Knack and Keefer, 1995; Mauro, 1995; Hall and Jones, 1999; Easterly and Levine, 2003; Dollar and Kraay, 2003; Acemoglu et al., 2001).

Table 4: Privatization Proceeds

This table shows the results of the regressions estimated with the GMM in system procedure of Blundell and Bond (1998) for our sample of 56 countries for the period 1980-2004. The dependent variable is economic growth measured by the first difference of the log of real per capita GDP. The measure of privatization is privatization proceeds to GDP. The definitions of our variables appear in Table 2. The p-values appear in parentheses below the estimated coefficients. The Hansen (1982) j statistic tests the validity of our instruments, while m2 is the Arellano and Bond (1991) test of the absence of second order autocorrelation in the differentiated residuals. ***, **, * refer to the 1, 5 and 10% levels of significance respectively. Two-step system GMM estimator is used. Windmeijer (2005) finite-sample correction to the two-step covariance matrix. Robust standard errors consistent in the presence of heteroskedasticity and autocorrelation within the panel are reported.

Explanatory Variables	Expected Sign	(1)	(2)	(3)	(4)	(5)	(6)	(7)
CONSTANT	+	0.399 (0.307)	0.755* (0.062)	0.579** (0.042)	0.505 (0.133)	0.197 (0.668)	0.464 (0.106)	0.100 (0.734)
LGDP	-	-0.126** (0.015)	-0.115** (0.036)	-0.082** (0.048)	-0.125*** (0.005)	-0.071 (0.234)	-0.122*** (0.009)	-0.085** (0.015)
GOVC	-	0.005 (0.357)	0.003 (0.431)	0.005 (0.354)	0.003 (0.447)	0.007 (0.294)	0.002 (0.650)	-0.003 (0.445)
POP	-	-0.043 (0.448)	-0.125*** (0.007)	-0.100*** (0.007)	-0.061 (0.219)	-0.060 (0.217)	-0.057 (0.281)	-0.029 (0.440)
SAVE	+	0.010*** (0.004)	0.009*** (0.005)	0.007** (0.048)	0.010*** (0.004)	0.010** (0.014)	0.008*** (0.001)	0.006*** (0.001)
LITERACY	+	0.004 (0.133)	0.001 (0.455)	0.001 (0.884)	0.003* (0.062)	0.001 (0.520)	0.004 (0.171)	0.002* (0.073)
PRIV	+	0.039*** (0.006)	0.023*** (0.004)	0.031** (0.019)	0.035** (0.030)	0.029* (0.059)	0.032** (0.017)	0.022* (0.059)
INF	-		-0.001** (0.021)					
OPEN	+			-0.000 (0.975)				
MCAP	+				0.001 (0.230)			
FDI	+					0.011 (0.409)		
BCREDIT	+						0.001 (0.564)	
INST	+							0.091** (0.023)
Hansen Test		0.508	0.478	0.499	0.556	0.567	0.579	0.516
AR2 Test		0.411	0.593	0.540	0.892	0.790	0.707	0.099*
N		108	106	106	102	106	108	108
Nbr of intruments		31	35	36	34	35	36	36

b. Privatization Method

We control for the method of privatization using the ratio of the proceeds from Share Issue Privatizations to total privatization proceeds (SIP) as an explanatory variable in the growth regressions. The results appear in Table 5. All our specifications pass the diagnostic tests that our instruments are appropriate and that there is no second order autocorrelation in the differenced residuals.

We note from Table 5 that the majority of the coefficients of SIP have the expected positive sign (in 7 out of 8 models) and are significant at the 5% level in models (1), (2) and (3) and at the 10% level in model (5). This evidence suggests that the privatization through public offer on the stock market stimulates the development of the stock market and hence fosters economic growth.

As for the initial level of development, the regression coefficients in all the specifications have the expected negative sign but are no longer statistically different from zero, except in model (7).

As expected, the coefficients of GOVC, across specifications, are negative and significant at the 5% level in models (2) and (6) and at the 10% level in models (1) and (7). This finding is consistent with Cook and Uchida's (2003) argument that government consumption is a proxy for the level of government corruption and therefore should be negatively related to economic growth.

The results also suggest that the coefficients of Population Growth (POP) are consistently negative and significant at the 5% level, except for model (8) where POP is not significant at 5%. This result is consistent with the findings of Adams (2006) and Cook and Uchida (2003) that sustain that high population growth rates slow down economic growth.

The findings for the remaining explanatory variables are consistent with those previously reported in Table 4: SAVE is consistently positively and significantly correlated with economic growth across all specifications (except in model (2)), while LITERACY have no significant impact on economic growth.

We note also from Table 5 that regression coefficients of INF and OPEN are not statistically different from zero.

As for the coefficient of market capitalization (MCAP), it is consistently positive and significant at the 5% level. This result suggests that the development of the stock market is a key determinant of economic growth.

With respect to the Foreign Direct Investment (FDI), the coefficient of this variable is positive and significant at the 5% level. This finding is consistent with Cook and Uchida's (2003) argument that higher FDI contributes to economic growth by bringing new advanced technologies and management and marketing skills to the host country. The coefficient of the Quality of Institutions variable (INST) is the positive and significant at the 5% level. This finding provides further evidence that well functioning institutions of governance are key determinants of economic growth.

To assess the possibility that well developed institutions of governance may facilitate the effectiveness of privatization as a policy for economic growth, we include in model (8) an interaction term between our privatization variable SIP and INST (SIP*INST). The results, displayed in Table 5, indicate that the coefficient of SIP is positive but no longer significant at 5%. On the other hand, the coefficient of SIP*INST is positive and significant at the 5% level (0.006). This result suggests that high levels of development of institutions of governance positively influence the effect of privatization on economic growth.

Table 5: Privatization Method

This table shows the results of the regressions estimated with the GMM in system procedure of Blundell and Bond (1998) for our sample of 56 countries for the period 1980-2004. The dependent variable is economic growth measured by the first difference of the log of real per capita GDP. The measure of privatization is the ratio of proceeds SIP to total privatization proceeds. The definitions of our variables appear in Table 2. The p-values appear in parentheses below the estimated coefficients. The Hansen (1982) j statistic tests the validity of our instruments, while m2 is the Arellano and Bond (1991) test of the absence of second order autocorrelation in the differenced residuals. ***, **, * refer to the 1, 5 and 10% levels of significance respectively. Two-step system GMM estimator is used. Windmeijer (2005) finite-sample correction to the two-step covariance matrix. Robust standard errors consistent in the presence of heteroskedasticity and autocorrelation within the panel are reported.

Explanatory Variables	Expected Sign	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CONSTANT	+	0.265*** (0.004)	0.247* (0.066)	0.295** (0.042)	0.539** (0.011)	0.198 (0.139)	0.307** (0.020)	0.284** (0.015)	0.022 (0.911)
LGDP	-	-0.021 (0.365)	-0.014 (0.523)	-0.030 (0.362)	-0.059 (0.235)	-0.008 (0.750)	-0.027 (0.326)	-0.043** (0.026)	-0.005 (0.202)
GOVC	-	-0.009* (0.081)	-0.010** (0.021)	-0.007 (0.195)	-0.001 (0.933)	-0.003 (0.484)	-0.010** (0.034)	-0.008* (0.050)	-0.005 (0.202)
POP	-	-0.034*** (0.006)	-0.035** (0.017)	-0.034** (0.044)	-0.072*** (0.000)	-0.046*** (0.001)	-0.036** (0.024)	-0.037*** (0.007)	-0.014 (0.520)
SAVE	+	0.007** (0.019)	0.005 (0.103)	0.007* (0.075)	0.007** (0.012)	0.009*** (0.001)	0.008*** (0.001)	0.004** (0.032)	0.006*** (0.000)
LITERACY	+	-0.001 (0.872)	0.001 (0.899)	0.001 (0.799)	-0.001 (0.803)	-0.002 (0.109)	0.001 (0.878)	-0.000 (0.722)	0.001 (0.815)
SIP	+	0.109** (0.018)	0.109** (0.020)	0.111* (0.055)	-0.018 (0.657)	0.043* (0.092)	0.101** (0.032)	0.031 (0.424)	0.044 (0.387)
INF	-		-0.000 (0.406)						
OPEN	+			-0.000 (0.635)					
MCAP	+				0.001** (0.012)				
FDI	+					0.015*** (0.005)			
BCREDIT	+						-0.000 (0.995)		
INST	+							0.062** (0.002)	0.074*** (0.004)
INST * SIP	+								0.006** (0.045)
Hansen Test		0.580	0.433	0.310	0.310	0.537	0.622	0.165	0.360
AR2 Test		0.145	0.127	0.111	0.246	0.147	0.152	0.371	0.176
N		143	143	140	128	139	143	143	108
Nbr of instruments		28	28	28	30	33	32	32	36

6. Summary and Conclusions

The objective of this study is to investigate the impact of privatization on economic growth for a sample of 56 developed and developing countries over the period 1980-2004. We use a dynamic panel model in order to reduce the statistical problems of cross-sectional growth regressions estimated by OLS. Further, a dynamic panel setting allows us to control for the country-specific effects, the omitted variable bias and the endogeneity of explanatory variables.

Our results show that privatization measured by privatisation proceeds over GDP plays an important role in stimulating economic growth. Moreover, privatization through public offer on the stock market contributes to economic growth. These findings are consistent with the results obtained by Plane (1997) and Barnett (2000) but contradict with the results of Filipovic (2005) and Cook and Uchida (2003).

Further, our findings indicate that population growth, government consumption and inflation negatively influence economic growth. Whereas saving ratio, stock market development, and foreign direct investment are positively related to economic growth.

An interesting result is that the development of institutions of governance is a key determinant of economic growth. Moreover, high levels of development of institutions of governance positively influence the effect of privatization through share issues on economic growth. Indeed, the development of institutions of governance imply better investor protection, more respect for property rights, better regulation, less policy risk and more transparency, thereby encouraging investment and creating incentives which are crucial for economic growth.

One main policy implication of this study is that the implementation of a privatization through share issues on the stock market accompanied with a good institutional environment that protects property rights is a good solution to the quest of economic growth.

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