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Abstract
This study investigates the role of the government in economic growth by extending the neoclassical production function to incorporate two dimensions of the government - the size and the quality dimensions. The government size- and quality-augmented model, where size is measured by government expenditure and quality by governance, is tested on a cross section of 71 economies. Estimation is also carried out on the sample by income distribution. The empirical results indicate that both the size and quality of the government are important for economic growth. It is argued that investing in the capacity for enhanced governance is a priority for the improved growth performance of the countries examined.

Keywords
growth, governance, government, economic, expenditure

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GOVERNMENT EXPENDITURE, GOVERNANCE AND ECONOMIC GROWTH

Abstract: This study investigates the role of the government in economic growth by extending the neo classical production function to incorporate two dimensions of the government – a *size* and a *quality* dimension. The government size and quality augmented model, where size is measured by government expenditure and quality by governance, is tested on a cross section of 71 economies. Estimation is also carried out on the sample by income distribution. The empirical results indicate that both the size and quality of the government are important for economic growth. It is argued that investing in the capacity for enhanced governance is a priority for the improved growth performance of the countries examined.

Keywords: economic growth, government size, government expenditure, government quality, governance

JEL Code: O43, H11

1 Introduction

There is no government in the standard neo classical production function. A government however, plays an important role in the distribution and allocation of resources. Moreover, the government is crucial for social organization, laws and political stability. Certain goods such as education, health and defense that the private sector finds difficult to provide, are made available by the government. This study investigates the role of the government in economic growth by extending the neo classical production function to incorporate two dimensions of the government – a *size* dimension and *quality* dimension. The size dimension as measured by public expenditure, has been incorporated in the work of Barro (1991), Barro and Sala-i-Martin (1992), Easterly and Rebelo (1993), Devarajan, Swaroop and Zou (1996), Hulton (1996), Pritchett (1996), Aschauer (2000).

Much less attention has been paid to the quality dimension which underpins the efficient provision of public goods. The studies of Acemoglu *et al*. (2008), Barro (1999) and Torsten and Tabellini (2007) examine the relationship between democracy and economic growth. There is also a literature that investigates the laws governing investor protection. La Porta *et al*. (1997, 1998) examine the effects of investor protection on the financial system. They conclude that countries in which legal systems provide proper protection to investors against expropriation by entrepreneurs, are likely to have larger and better developed financial markets. This in turn implies that countries with well developed financial markets exhibit faster economic growth – see King and Levine (1993), Levine and Zervos (1998), Rousseau and Wachtel (2000) among others. As in the case of financial markets, it can be argued that a well

developed legal system contributes to the more efficient provision of public goods which in turn leads to increased economic growth.

The empirical evidence on the relation between economic growth and government investment has been mixed. Barro (1991) in a study of 98 developed and developing economies finds a positive but insignificant relation between public investment and economic growth over the 1960-1985 period. Easterly and Rebelo (1993) find a positive association between public investment and economic growth, in particular, transport and communication. Devarajan *et al.* (1996) find a negative relation between the capital component of public investment and economic growth for a group of developing economies. They attribute this to the misallocation of public capital expenditure by developing countries causing them to be unproductive at the margin.

The studies of Hulton (1996), Pritchett (1996) and Aschauer (2000) examine the effectiveness of public capital in economic growth. Pritchett argues that public investment may not create productive capital in the developing countries due to inappropriate use. His argument is based on estimates of an implied relative effectiveness coefficient on public capital investment which is defined as the ratio of government investment that passes into public capital growth if the returns to capital on private and public capital are equal. Hulton constructs an index of government capital effectiveness by aggregating mainline telephone faults per 100 telephone calls, electricity generation losses as a percent of total output, the percentage of paved roads in good condition and diesel locomotive availability as a percent of the total. Assigning each of these indicators quartile rankings and then averaging across these rankings to obtain an aggregate infrastructure effectiveness index, he finds that

infrastructure effectiveness is the single most important variable explaining growth differentials between countries. Aschauer, uses the same indicators as Hulton, however, normalizes each indicator rather than assigning it a quartile ranking and averages the normalized indicators to construct a public capital effectiveness index. Examining both the effects of the quantity and effectiveness of public capital on economic growth, Aschauer concludes that both these factors lead to increases in output per head.

The present study differs from the studies of Hulton, Pritchett and Aschauer in that it uses the governance indicators complied by Kaufmann, Kraay and Mastruzzi (2006) to construct a composite governance index which is then used to identify four levels of governance – very high, high, low, very low. Ranking the governance indicators this way enables examining the differential impact of each level of governance (government quality) on economic growth[1]. While poor governance can be regressive to sustained growth, good governance acts to improve the efficiency of the stock of public capital.

Public investment can lead to enhanced growth. However, certain countries already allocate a large proportion of public resources to the provision of social services and further increases in government spending may or may not improve economic growth. The purpose of the present study is to address the question of how government *quality* as measured by governance and government *size* as measured by public expenditure underpins the growth process in a cross section of countries. What distinguishes this paper from previous studies that have examined the role of the

[1] This was suggested to me by the Editor of the journal, Paul Wachtel.

government in economic growth is that it introduces a governance variable into the Solow augmented Mankiw-Romer-Weil (MRW) structural model for estimation[2].

Using cross sectional data for 71 countries, developed, developing and transition, over the 1996-2003 period, the study finds a positive relation between government expenditure, governance and economic growth. Quah (1996) shows that cross country studies, by grouping countries at different levels of development together could omit the thresholds of development. In order to account for the heterogeneity of countries in the sample, the countries are also grouped by income distribution.

The rest of the paper is structured as follows. Section 2 presents the model. Section 3 describes the data. Section 4 evaluates the empirical results and Section 5 summarizes the conclusions.

2 The Cobb-Douglas Specification

The Solow augmented Mankiw-Romer-Weil (MRW) model is used as a basis for this study. The production function incorporating the size and quality of the government is of the Cobb-Douglas form:

$$y(t) = Ak(t)^{\alpha} h(t)^{\beta} (g(t)e^{\mu\theta})^{\gamma} \qquad (1)$$

where $y(t)$ is output per worker; $k(t)$ is the stock of private capital per worker; and $h(t)$ is the stock of human capital per worker. The size dimension of the government $g(t)$, is measured by the stock of government capital per worker, and θ measures the quality dimension of the government. The exponential form is assumed for the

[2] This is different to the Hulton (1996), Pritchett (1996) and Aschauer (2000) studies which incorporate a government effectiveness variable as proxy for government quality. In the empirical estimation, governance is entered as a series of dummy variables ranging from very high to very low in the current study which also distinguishes it from the Hulton, Pritchett and Aschauer studies.

quality variable as good governance is not a direct factor input but serves to improve the efficiency of the stock of government capital.

In steady state equilibrium, there is an exogenous rate of technological progress ϖ and growth rate of the labour force n. The stock of capital depreciates at a rate δ. If the fraction of income devoted to private capital, human capital and public capital are respectively, s_K, s_H and s_G, the steady state level of per capita output is reached when the addition to the stock of each type of capital is just sufficient to meet the growth rate of the labour force and to replace capital which depreciates at a rate of δ. The steady state level of output per capita in log linear form can be expressed:

$$\ln\left[\frac{Y(t)}{L(t)}\right]^* = a_0 + a_1 \ln\left[\frac{s_K}{n+\varpi+\delta}\right] + a_2 \ln\left[\frac{s_H}{n+\varpi+\delta}\right] + a_3 \ln\left[\frac{s_G}{n+\varpi+\delta}\right] + a_4\theta \quad (2)$$

where $a_4 = \mu\gamma$.

The growth rate of output per worker in the transition to steady state can be expressed:

$$\ln y(t) - \ln y(0) = (1 - e^{-\lambda t})\left[\ln(y^*) - \ln y(0)\right] \quad (3)$$

where $y(0)$ is the initial level of output per worker and y^* is the steady state level of income per worker. The λ is the speed of convergence and $\lambda = (1-\alpha-\beta-\gamma)(n+\varpi+\delta)$ (see Barrro and Sala-i-Martin 1992). Subtracting $y(0)$ from both sides of the equation and substituting for y^* yields the transitional model that can be estimated:

$$\ln y(t) - \ln y(0) = a_0 + a_1 \ln\left[\frac{s_K}{n+\varpi+\delta}\right] + a_2 \ln\left[\frac{s_H}{n+\varpi+\delta}\right] + a_3 \ln\left[\frac{s_G}{n+\varpi+\delta}\right] + a_4\theta + a_5 \ln y(0) + \varepsilon \quad (4)$$

According to equation (4), the growth rate of income per capita depends on the accumulation of private capital, human capital, public capital and good governance. Applying the same reasoning as Hulton (1996), a country with better governance will converge to a higher level of steady state income per capita than a country with poor governance. If they start at the same level of income per capita, the country with better governance will experience a faster rate of growth. Equation (4) is estimated in Section 4 for the full sample and by groups of countries based on income distribution.

3 Data

The sample comprises a cross section of 71 countries, developed, developing and transition (see Appendix). The reason for the choice of countries is twofold. One, data for all the governance variables are available for this group of countries. Two, the sample is chosen so as to capture countries at all four levels of governance (see below). As the earliest for which the governance indicators are available is 1996, the data used for the estimation covers the period 1996-2003 and are annual. The data in this study have been obtained from the following sources:

GDP Per Capita (Y/L): World Development Reports and Human Development Reports.

Government Expenditure to GDP (s_G): The size of the government is measured by the share of government expenditure to GDP. This variable is used in Rousseau and Wachtel (2005), Devarajan *et al.* (1996) as proxy for the government. This data are from the World Development Indicators.

Share of Private Investment to GDP (s_K) : The private investment series is constructed as in Easterly and Rebelo (1996) by subtracting the public investment series from total investment.

Net Secondary Enrolment Ratio (s_H): is used as proxy for human capital (s_H) as in MRW. The data are from the Human Development Reports.

$\varpi + \delta$: The sum of the growth rate of technology, ϖ, and the rate of depreciation, δ, are assumed to be 0.05 as in MRW. While this assumption may not seem appropriate for all countries in the sample, it provides an useful benchmark for testing the model in question. This assumption has been used in the work of Aschauer (2000), Hulton (1996), among others for both the developed and developing economies.

Credit/GDP: is used to measure the role of the financial sector in economic growth. Rousseau and Wachtel (2005), Levine and Zervos (1998), Beck *et al*. (1999), among others highlight the importance of the role of finance in economic growth. Gerhard *et al.* (2008) show that European Union (EU) accession economies in which financial market segments – credit, bond and stock markets – have links to the public sector exhibit growth and stability. Similarly, Arritabel *et al*. (2007), examine economic growth focusing on aspects related to the labour market, investment and financial markets in the Central and Eastern European EU member states. To control for the potential impact of the financial sector on economic growth therefore, the credit/GDP ratio is used as a regressor in the ensuing empirical analysis. This data are from the World Development Indicators.

Share of Public Investment to GDP: World Development Indicators.

Government Education Expenditure as percentage of GDP, Government Health Expenditure as percentage of GDP, Government Military Expenditure as percentage of GDP, population growth rate: Human Development Reports

Governance Dummy Variables: The governance dummy variables are based on the governance database compiled by Kaufmann, Kraay and Mastruzzi (2006). Kaufmann *et al.* have constructed six indicators of governance – (1) voice and accountability: the degree to which a country's citizens are able to participate in the political decision making process (2) political stability and absence of violence: measures the stability of a government to political violence and terrorism (3) government effectiveness measures the capability of a government to implement effective policies and maintain credibility (4) regulatory quality is the ability of the government to formulate and implement sound policies that encourage private sector participation (5) rule of law is the existence of a good legal system including property rights and enforcement of contracts (6) control of corruption measures the degree to which public power is diverted from private gain. These indicators range from a value of -2.5 to +2.5 with higher values corresponding to better governance.

The governance dummy variables in the present study are constructed as follows. The individual indicators for the initial year are averaged to construct an overall composite governance index (quality index). This composite governance index ranges from a value of -2.5 to +2.5. To distinguish between the different levels of governance from very high to very low, four governance dummy variables are identified:

$$\begin{array}{ll} \theta \geq 1.5 & \textit{very high governance} \\ 1.5 > \theta > 0 & \textit{high governance} \\ 0 > \theta > -1.5 & \textit{low governance} \\ \leq -1.5 & \textit{very low governance} \end{array}$$

where θ is the composite governance index[3].

[3] The composite governance indicator does not take on a value of above 2 for any of the countries in the sample in 1996. Many of the developed countries have composite governance indicators in the

4 Empirical Results

I Results for the Transition Model

Panel A of Table 1 presents results for the transition model. The dependent variable is the change in income per capita between 2003 – 1996. This growth rate is related to the initial values of all the independent variables and the governance dummy variables. Equations (1) and (2) are estimated without the government. Equation (2) incorporates the financial sector as measured by credit/GDP. The inclusion of credit/GDP in equation (2) significantly increases the explanatory power of the model and is therefore maintained as a regressor in equations (3)-(7). Equation (3) incorporate government size and equation (4) government quality. Three dummy variables are defined for 'very high' governance, 'high' governance and 'low' governance with 'very low' governance as the reference group. The model is estimated with regional dummies in equation (5). Selecting the high income developed country group as the base group, five regional dummies are defined for: (1) Asia and the Pacific, (2) South America and the West Indies, (3) Eastern Europe and Central Asia (4) the Middle East and (5) Africa.

The coefficients of key interest are government expenditure/GDP and the governance dummy variables. The estimated coefficients on government expenditure and the governance dummy variables are significant in all equations. The inclusion of the governance dummy variables increase the explanatory power of the models from 0.40 to 0.63 – 0.67. The effect of the governance dummy variables can be interpreted as follows. In equation (4) for example, the estimated coefficients on the governance dummy variables suggest that, countries with 'very high' governance grow

range of 1.5 and 2. Hence, a composite governance index of over 1.5 it is labeled as very high governance.

$[100(e^{0.080} -1)] \approx$ 8.33% faster than countries with 'very low' governance, and those with 'high' governance grow 8.11% faster, and countries with 'low' governance grow 5.65% faster than countries with 'very low' governance.

The estimated coefficients on private capital indicate a positive effect on growth, however, these estimates are significant only in equations (2), (6) and (7) and at the 10% level. The estimates for human capital and the financial sector are statistically significant in all equations.

In order to see if the effect of government expenditure varies across countries according to the level of governance, the model is estimated with interaction terms for government size and the level of governance, see equation (6). The purpose of incorporating the interaction terms for government size and quality are to see if countries with good governance make more effective use of public expenditure and/or if increased public expenditure leads to improved governance. Only the interaction term for the 'very high' governance group is significant suggesting that government expenditure is used more effectively in this group leading to higher growth.

The equations are also estimated with interaction terms for credit/GDP and the governance dummy variables to examine the differential effect of credit on countries with different levels of governance. The interaction terms for the 'very high' and 'high' governance groups are significant at the 10% level suggesting that good governance is a pre-condition for growth enhancing finance or alternatively that growth enhancing finance leads to good governance.

[Table 1, about here]

The coefficients on the initial level of income are negative and statistically significant in all equations suggesting convergence between the countries. The rate of convergence in the equations are in the range of 0.016 and 0.033 which are close to the Hulton (1996) Table 3 convergence estimates. The rate of convergence is higher in the equations with the governance dummy variables.

11 Robustness Tests

The problem of endogeneity in growth models is widely documented in the literature. In order to correct for endogeneity and ensure that the results are robust, dummy variables (see equation (5) Table 1) and the generalised method of moments (GMM) are used. Estimation is also carried out by dividing the sample by income distribution.

Dummy Variables

The use of dummy variables is justified in the work of Temple (1998) and Koop, Osiewalski and Steel (1995) who point out that differences in technology are more likely to arise between different regions rather then within them. Similarly, differences in governance are likely to be greater between regions than within them. Hence, the governance augmented model is also estimated with regional dummies in Table 1 - see equation (5). All of the regional dummy variables are positive. Only the regional dummy for Asia and the Pacific is significantly marginally different from the mean growth rate. The inclusion of the regional dummies however, do not change the overall results.

GMM Estimation

The GMM method is used to correct for any potential endegeneity bias. Two diagnostic tests are carried out on the GMM estimates. A Durbin-Wu-Hausman test (1954, 1973, 1978) and the J statistic of Hansen, Heaton and Yaron (1996). The equations are estimated using voice and accountability, government effectiveness and political stability as instruments[4]. The GMM estimates are reported on Table 2. The estimated coefficients on physical capital are significant at the 5% and 10% levels. This however, does not change the estimated effect of government size and quality on economic growth. Government expenditure is significant at the 5% and 10% levels as in Table 1. The p value for the Durbin-Wu-Hausman test statistics indicate that the null hypothesis of exogenity cannot be rejected and the p value for the J statistic suggests that over-identifying restrictions are not rejected.

[Table 2, about here]

Dividing the Sample by Income Distribution

In order to see if poorer countries are growing at a faster rate than richer ones, the estimation is also carried out by dividing the sample into three groups – low income, middle income and high income (see Quah 1996, Temple 1998)[5]. The seemingly unrelated (SUR) regression technique is used for estimation to take into account the contemporaneous cross equation error correlation. Table 3 reports SUR estimates for the transition model by income distribution.

[Table 3, about here]

[4] The instruments are selected on the basis of the partial correlation coefficient of Shea (1997).
[5] Income groups are selected according to the World Bank classification.

In equation (1), two dummy variables are defined for low and very low governance with other (very high, and high governance) as the omitted group; in equation (2), two dummy variables are defined for high and low governance with other (very high and very low) as the omitted group; and in equation (3), two dummy variables are defined for very high and high governance with other (low and very low) as the omitted group. The estimates of the variables of interest which are the governance dummy variables and public expenditure/GDP are statistically significant. In equation (1) for example, the growth rate in the low income group with low governance is 1.98% lower than in the benchmark group and the growth rate in the low income group with very low governance is 2.98% lower than in the base group.

The convergence rates suggest that the low income group is growing at a faster rate than the middle and high income groups. The results are consistent with those of Quah and Temple who find that the poorest income group grows at a faster rate than the rest of the countries. They also find that the growth rate of the middle income group is relatively stagnant. The results of the present study suggest that the middle income group also grows, however, at a lower pace. The explanatory power of the three income groups are in the range of 41%-43%.

III The Disaggregated Model

Results for the Full Sample

In this section government size is disaggregated into: government investment and government consumption (as in Barro 1991), and into health, education and military expenditure (see Easterly and Rebelo and 1993 and Devarajan *et al*. 1996 for a sectoral analysis of government size). The results are reported on Table 4.

Government consumption has a positive and insignificant impact on economic growth while government investment has a positive and significant effect on economic growth. Equation (1) shows that a 10% increase in public investment will lead to a 2.6% increase in output per head over 7 years. The governance dummy variables in equations (3) and (4) are significant at the 1%, 5% and 10% levels.

The estimated coefficients on human capital are positive and significant in all equations and the coefficients on private capital are significant at the 10% level in equations (2) and (3). In contrast to the findings of Devarajan *et al*. and Hulton (1996), health has a positive and significant impact on economic growth. Education also has a positive significant effect on growth while military expenditure is not significant.

[Table 4, about here]

Results for the Disaggregated Model by Income Distribution

The disaggregated models are re-estimated by income distribution. Table 5 reports results for the government expenditure disaggregated models by global income distribution.

[Table 5, about here]

The estimated negative coefficients on the initial levels of per capita income are consistent with convergence. The estimated coefficient on government investment is positive and significant at the 10% level in all three income groups. The coefficient on government consumption is insignificant and positive in the middle and high income groups and negative in the low income group. Health and education have a positive significant impact on growth. The governance dummy variables are entered in the

same manner as they are in Table 3 for the three income groups. The estimated coefficients on these variables are all significant suggesting that good governance promotes economic growth.

5 Conclusion

This study examines the effects of government size and quality on economic growth in 71 economies. The model is also estimated by grouping the countries by income distribution. The results indicate that both increased public spending and good governance can improve growth outcomes. There is also evidence of an interaction between government expenditure and governance which suggests that countries with good governance make more effective use of public expenditure and/or that increased public expenditure leads to improved governance. Similarly there is evidence of an interaction between good governance and credit suggesting that good governance is a pre-condition for growth enhancing finance and/or vice versa. Human capital is also found to significantly and positively affect economic growth. The model restrictions hold up with evidence of convergence among the income groups. The results are consistent with those of Hulton, Aschauer and Prichett who show that improving the efficacy of public capital can lead to improved growth. In conclusion it can be stated that countries should promote good governance to accelerate their growth rates.

Appendix

Countries used in study:

Armenia, Australia, Austria, Bangladesh, Belarus, Botswana, Brazil, Burundi, Cameroon, Canada, Central African Republic, China, Colombia, Central African Republic, Denmark, Dominican Republic, Ecuador, El Salvador, Ethiopia, Fiji, Germany, Ghana, Guinea Bissau, Guyana, India, Indonesia, Iran, Jamaica, Kazakhstan, Kenya, Lesotho, Liberia, Lithuania, Latvia, Luxemburg, Madagascar, Malaysia, Maldives, Moldova, Mozambique, Myanmar, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Pakistan, Papua New Guinea, Paraguay, Peru, Philippines, Romania, Russia, Senegal, Singapore, Slovakia, Slovania, Somalia, South Africa, Sri Lanka, Sudan, Sweden, Tajikistan, Thailand, Tunisia, Turkey, Uganda, Ukraine, United Kingdom, United States, Viet Nam, Zambia.

Country Groups by Income Level:

Low Income – Armenia, Bangladesh, Burundi, Cameroon, Central African Republic, Ethiopia, Ghana, Guinea-Bissau, India, Indonesia, Kenya, Lesotho, Liberia, Madagascar, Moldova, Mozambique, Myanmar, Nepal, Nicaragua, Niger, Pakistan, Papua New Guinea, Senegal, Somalia, Sudan, Tajikistan, Uganda, Ukraine, Viet Nam, Zambia

Middle Income – Belarus, Botswana, Brazil, China, Columbia, Dominican Republic, Ecuador, El Salvador, Fiji, Guyana, Iran, Jamaica, Kazakhstan, Lithuania, Latvia, Malaysia, Maldives, Paraguay, Peru, Philippines, Romania, Russia, Slovakia, South Africa, Sri Lanka, Thailand, Tunisia, Turkey

High Income – Australia, Austria, Canada, Denmark, Germany, Luxemburg, Netherlands, New Zealand, Singapore, Slovania, Sweden, United Kingdom, United States

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Table 1: Transition to Steady State OLS Estimation

Dependent Variable: $\ln(Y/L)_{2003} - \ln(Y/L)_{1996}$

	Without Govt.		With Govt. Size	With Govt. Size and Quality			
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Private Capital	0.21	0.21	0.24	0.30	0.11	0.29	0.28
	(0.16)	(0.17)*	(0.18)	(0.19)	(0.22)	(0.16)*	(0.16)*
Human Capital	0.39	0.39	0.35	0.30	0.32	0.20	0.18
	(0.11)***	(0.19)**	(0.18)**	(0.12)**	(0.15)**	(0.10)*	(0..09)*
Govt. Exp/GDP	-	-	0.23	0.10	0.10	0.30	0.17
			(0.11)**	(0.05)*	(0.03)**	(0.12)**	(0.09)*
Credit/GDP	-	0.30	0.28	0.14	0.11	0.14	0.10
		(0.08)***	(0.07)***	(0.07)**	(0.05)**	(0.03)***	(0.03)**
Initial GDP	-0.30	-0.44	-0.49	-0.64	-0.69	-0.60	-0.58
	(0.07)***	(0.10)***	(0.19)**	(0.23)***	(0.19)***	(0.09)***	(0.09)***
Very High Governance Dummy	-	-	-	0.08	0.08	0.08	0.07
				(0.02)***	(0.02)***	(0.03)**	(0.03)**
High Governance Dummy				0.078	0.073	0.07	0.06
	-	-	-	(0.05)*	(0.02)***	(0.03)**	(0.03)*
Low Governance Dummy				0.055	0.068	0.04	0.03
	-	-	-	(0.02)**	(0.029)**	(0.02)*	(0.01)***
Very High Governance Dummy * Govt. Exp/GDP	-	-	-	-	-	0.07 (0.03)**	-
High Governance Dummy * Govt. Exp/GDP	-	-	-	-	-	0.03 (0.02)	-
Low Governance Dummy * Govt. Exp/GDP	-	-	-	-	-	0.02 (0.01)	-
Very High Governance Dummy * Credit/GDP	-	-	-	-	-	-	0.06 (0.03)*
High Governance Dummy * Credit/GDP	-	-	-	-	-	-	0.04 (0.02)*
Low Governance Dummy * Govt. Exp/GDP	-	-	-	-	-	-	0.04 (0.04)
Asia and the Pacific	-	-	-	-	0.31 (0.17)**	-	-
South America and the West Indies	-	-	-	-	0.18 (0.25)	-	-
Eastern Europe and Central Asia	-	-	-	-	0.29 (0.35)	-	-
Middle East	-	-	-	-	0.24 (0.23)	-	-
Africa	-	-	-	-	0.13 (0.25)	-	-
Constant	0.64	1.86	1.01	1.22	1.21	2.38	1.21
	(0.45)	(1.10)*	(1.21)	(1.18)	(1.12)	(1.99)	(1.23)
Convergence Rate λ	0.017	0.017	0.016	0.022	0.033	0.020	0.022
$\overline{R^2}$	0.23	0.40	0.40	0.63	0.67	0.53	0.54

Note: Standard errors reported within parenthesis. ***, **, *, significant at the 10%, 5% and 1% levels respectively.

Table 2: Transition to Steady State GMM Estimation

Dependent Variable: $\ln(Y/L)_{2003} - \ln(Y/L)_{1996}$

	Without Government		With Govt. Size	With Govt. Size and Quality
Variable	(1)	(2)	(3)	(4)
Private Capital	0.18	0.36	0.34	0.22
	(0.10)*	(0.15)**	(0.15)**	(0.13)*
Human Capital	0.20	0.28	0.34	0.50
	(0.12)*	(0.14)**	(0.16)**	(0.18)***
Govt. Exp/GDP	-	-	0.17	0.19
			(0.10)*	(0.08)**
Credit/GDP	-	0.09	0.08	0.07
		(0.04)**	(0.05)*	(0.02)***
Initial GDP	-0.55	-0.40	-0.40	-0.57
	(0.10)***	(0.20)**	(0.20)**	(0.19)***
Very High Governance Dummy	-	-	-	0.07
				(0.03)**
High Governance Dummy	-	-	-	0.06
				(0.02)***
Low Governance Dummy	-	-	-	0.03
				(0.01)***
Constant	1.84	0.88	0.39	1.28
	(0.64)	(0.84)	(1.04)	(1.17)
$\overline{R^2}$	0.43	0.55	0.54	0.59
Durbin-Wu-Hausman Test: p value	0.23	0.20	0.17	0.16
J statistic: p value	0.14	0.15	0.12	0.50

Note: Standard errors reported within parenthesis. *, **, ***, significant at the 10%, 5% and 1% levels. Instruments used for GMM estimation voice and accountability, political stability and government effectiveness.

Table 3: Transition to Steady State by Global Income Distribution: SUR Estimation

Dependent Variable: $\ln(Y/L)_{2003} - \ln(Y/L)_{1996}$

	Low Income	Middle Income	High Income
Variable	(1)	(2)	(3)
Initial GDP	-0.37	-0.44	-0.45
	(0.07)***	(0.07)***	(0.07)***
Private Capital	0.13	0.13	0.14
	(0.10)	(0.14)	(0.14)
Human Capital	0.29	0.29	0.30
	(0.10)***	(0.09)***	(0.08)***
Govt. Exp/GDP	0.16	0.15	0.14
	(0.06)**	(0.05)***	(0.05)**
Credit/GDP	0.29	0.27	0.27
	(0.08)***	(0.07)***	(0.07)***
Very High Governance Dummy	-	-	0.04
			(0.01)***
High Governance Dummy	-	0.03	0.02
		(0.01)***	(0.01)**
Low Governance Dummy	-0.02	-0.02	-
	(0.01)***	(0.01)**	
Very Low Governance Dummy	- 0.03	-	-
	(0.01)**		
Constant	1.11	1.17	1.11
	(0.73)	(0.62)*	(0.57)**
Convergence Rate			
λ	0.015	0.011	0.010
$\bar{R}^2$	0.41	0.42	0.43

Note: Standard errors reported within parenthesis. *, **, ***, significant at the 10%, 5% and 1% levels respectively.

Table 4: Transition to Steady State Model in the Disaggregated Model

Dependent Variable: $\ln(Y/L)_{2003} - \ln(Y/L)_{1996}$

	With Govt. Size		With Govt. Size and Quality	
Variable	(1)	(2)	(3)	(4)
Initial GDP	-0.41	-0.53	-0.64	-0.76
	(0.19)**	(0.18)**	(0.21)***	(0.13)***
Private Capital	0.16	0.14	0.15	0.08
	(0.14)	(0.07)*	(0.07)*	(0.12)
Human Capital	0.58	0.67	0.64	0.78
	(0.25)**	(0.23)***	(0.21)***	(0.18)***
Credit/GDP	0.23	0.21	0.10	0.09
	(0.07)***	(0.07)***	(0.05)**	(0.02)**
Public Investment	0.26	-	0.10	-
	(0.08)***		(0.04)**	
Public Consumption	0.23	-	0.10	-
	(0.20)		(0.28)	
Health	-	0.69	-	0.45
		(0.20)***		(0.12)***
Education	-	0.22	-	0.28
		(0.10)**		(0.18)*
Military Expenditure	-	0.01	-	0.02
		(0.10)		(0.10)
Very High Governance Dummy	-	-	0.08	0.07
			(0.03)**	(0.02)***
High Governance Dummy	-	-	0.06	0.07
			(0.03)*	(0.03)**
Low Governance Dummy	-	-	0.02	0.04
			(0.01)*	(0.01)**
Constant	-0.53	0.80	1.13	1.85
	(0.63)	(0.55)	(1.06)	(1.05)*
$\bar{R}^2$	0.45	0.64	0.64	0.82

Note: Standard errors reported within parenthesis. *, **, ***, significant at the 10%, 5% and 1% levels.

Table 5: Transition to Steady State by Global Income Distribution in the Disaggregated Models: SUR Estimation

Dependent Variable: $\ln(Y/L)_{2003} - \ln(Y/L)_{1996}$

	With Government Size and Quality					
	(1)		(2)		(3)	
Variable	Low Income Group		Middle Income Group		High Income Group	
Initial GDP	-0.41	-0.53	-0.41	-0.54	-0.42	-0.53
	(0.07)***	(0.06)***	(0.07)***	(0.05)***	(0.06)***	(0.06)***
Private Capital	0.12	0.21	0.12	0.21	0.12	0.21
	(0.15)	(0.10)*	(0.14)	(0.11)*	(0.13)	(0.11)*
Human Capital	0.27	0.24	0.26	0.23	0.26	0.23
	(0.10)***	(0.09)***	(0.09)***	(0.08)***	(0.09)***	(0.08)***
Credit/GDP	0.30	0.23	0.30	0.20	0.28	0.15
	(0.08)***	(0.07)***	(0.07)***	(0.05)***	(0.07)***	(0.06)***
Public Investment	0.16	-	0.17	-	0.15	-
	(0.10)*		(0.10)*		(0.09)*	
Public Consumption	-0.04	-	0.05	-	0.06	-
	(0.24)		(0.23)		(0.22)	
Health		0.75		0.72		0.69
		(0.13)***		(0.12)***		(0.13)***
Education		0.61		0.59		0.57
		(0.13)***		(0.18)***		(0.18)***
Military Expenditure		0.10		0.11		0.12
		(0.09)		(0.08)		(0.08)*
Very High Governance Dummy	-	-	-	-	0.09	0.08
					(0.05)**	(0.03)**
High Governance Dummy	-	-	0.04	0.07	0.04	0.05
			(0.02)*	(0.03)**	(0.02)*	(0.02)**
Low Governance Dummy	-0.08	-0.08	-0.03	-0.04	-	-
	(0.03)**	(0.04)*	(0.01)***	(0.02)*		
Very Low Governance Dummy	-0.08	-0.07	-	-	-	-
	(0.03)**	(0.04)*				
Constant	0.92	2.33	1.03	2.50	1.01	2.20
	(0.76)	(0.52)***	(0.65)*	(0.45)***	(0.62)*	(0.39)***
$\bar{R}^2$	0.43	0.46	0.44	0.46	0.46	0.46

Notes: Standard errors reported within parenthesis. *, **, ***, significant at the 10%, 5% and 1% levels.