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Good Governance, Economic Growth and Development: Insights from a 22-Year Econometric Analysis in Rwanda

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Preface

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Abstract

This paper uses two techniques -- scatter and line plots and ordinary least squares -- to investigate how governance is related to economic growth and development. It simulates Benhabib and Spiegel's (1994) alternative model for growth and calibrates it with the estimated shock in human capital development to investigate the spillover effects of lack of good governance on economic growth and development. This paper demonstrates the existence of a pro-cyclic relationship between governance and economic growth and development. It uncovers the existence of a counter-cyclic relationship between a shock in human capital development and growth. It suggests that, ceteris paribus, the level of economic development and growth not only depends on fixed capital formation and the labour force, but also on good governance. Thus, this paper demonstrates that significantly good economic performance, further economic growth and development in Rwanda will be driven by good governance in the country. It argues that the most important pre-requisites for sustainable growth and development are strong politico-socio-economic policies and strategies to develop appropriate 'home grown solutions' and channelizing them. It also suggests that taking lessons from Rwanda's good governance system and replicating it in other African countries can lead to political stability and sustainable growth and development elsewhere on the continent, which is the most pressing issue in Africa.

Keywords: Governance, economic growth and development, econometric analysis, Rwanda.

JEL Classification Codes: C32; E24; G38; H11; O11; O47;

1. Introduction

Rwanda has progressively experienced improvements in a durable security apparatus and sustainable economic performance since 2000. This is related to the good governance practices that have been implemented since then (the National Institute of Statistics of Rwanda [NISR] 2015; Rwanda Governance Board [RGB], 2016a, 2016b, 2016c). The period 1994-2000 was characterized by reconstruction, during which time the country was highly dependent on humanitarian aid to provide assistance to people in need and for restoring internal security, strengthening the justice system and repatriating and resettling refugees and displaced persons (International Monetary Fund [IMF], 2000; United Nations [UN], 2004). However, since 2000 the country's vision has changed and it now wants to become a self-sustained and middle-income country by 2020. Good governance and a capable state are the first pillars of this vision (Ministry of Finance and Economic Planning [MINECOFIN], 2012, 2013). To position good governance at the centre of economic growth and development, the institutionalization of the ombudsman has helped in strengthening the national justice system and in the creation of different institutions including the Rwanda Development Board and Rwanda Government Board. These institutions have helped in developing and evaluating solutions appropriate for achieving economic growth and development in the country and have led to many achievements across all economic sectors 'that among others include agriculture and livestock, education, health, local administration, hygiene and sanitation, social protection, justice, respect of governance principles and trust in governance institutions, security and citizen participation' (RGB, 2016a, 2016b).

Some studies have been done to investigate Rwanda's economic performance. Although the results of these works vary, their general conclusion seems to be similar. They all demonstrate that after the genocide against the Tutsi in 1994 and the period of reconstruction in 2000, Rwanda's economy has grown consistently. From 1994 to 2016, Rwanda demonstrated that a good governance approach was an apt approach for creating a capable and efficient state with an enabling environment for curbing unemployment, reducing poverty, improving health conditions and ensuring households' food security for durable economic growth and development (RGB, 2016b; Ministry of Agriculture and Animal Resources [MINAGRI] et al., 2016; NISR, 2015). Even though the period 1994 to 2000 was dominated by humanitarian aid offered by different international institutions and characterized by the country reconstruction's (IMF, 2000; UN, 2004), consistent growth started in early 2003, three years after the implementation of vision 2020 (NISR, 2002, 2006, 2012, 2015).

In addition, since 2004 the country has progressively become self-sufficient in terms of food availability; both health status and social welfare too have improved remarkably which has resulted in independence from humanitarian aid (MINAGRI et al., 2016). Even though previous studies do not provide a clear empirical link between good governance and economic growth and development, the growth and development attained in Rwanda is linked to aspects of good governance and national security (NISR, 2015; RGB, 2016a, 2016b, 2016c). Rwanda's GDP (current US$) increased from US$ 1.8 billion in 2003 to US$ 8.1 billion in 2015. GDP per capita (current US$) grew from US$ 210 in 2003 to about US$ 700 in 2014 or nearly 3.3 times that of 2003 and about 4.6 times that of 1994 (World Bank [WB], 2016). The poverty rate decreased from 58.9 per cent in 2000 to 39.1 per cent in 2014 and extreme poverty declined from 40.0 per cent to 16.3 per cent (NISR, 2015). The unemployment rate was curbed significantly

and it shrunk from 2.2 per cent in 2010 to 2.0 per cent in 2014 (NISR, 2015). These figures show that Rwanda's growth accelerated during 2003-2014, which corresponds to the enforcement of good governance and the establishment of different institutions to promote good governance practices, decentralization and ensuring national security. Therefore, aspects of good governance are critical and strategically important factors for economic growth and development.

Hence, it becomes important to examine the impact of 22 years of good governance on economic growth and development in Rwanda. This paper uses six worldwide governance indicators (WGIs) -- control of corruption; government effectiveness; political stability and absence of violence/terrorism; regulatory quality; rule of law; and voice and accountability to find out how trends in these indicators affected growth and development. It also finds out how these indicators can influence growth and development through shocks in human capital development as a result of lack of good governance.

2. Governance, human capital development, economic growth and development

The process by which governments are selected, monitored and replaced, the capacity of the government to effectively formulate and implement sound policies and earn the respect of the citizens and the state for the instaurations that govern economic and social interactions among them is referred to as governance (Kaufmann et al., 2009). From this definition, Kaufmann et al., (2009) differentiate six WGIs: (i) Control of corruption which captures perceptions of the extent to which public power is exercised for private gains including both petty and grand forms of corruption and the 'capture' of the state by elites and private interests. It also measures the strength and effectiveness of a country's policy and institutional framework to prevent and combat corruption. (ii) Government effectiveness which captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulations and implementation and the credibility of the government's commitment to such policies. (iii) Regulatory quality which captures perceptions about the government's ability to formulate and implement sound policies and regulations that permit and promote the development of the private sector. (iv) Rule of law which measures the extent to which individuals and firms have confidence in and abide by the rules of society. In particular, it measures the functioning and independence of the judiciary, including the police, the protection of property rights, the quality of contract enforcement and the likelihood of crime and violence. (v) Voice and accountability which captures perceptions about the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association and a free media. (vi) Political stability and absence of violence/terrorism which measures perceptions about the likelihood of political instability and/or politically motivated violence including terrorism.

Literature shows the importance of measuring these indicators by relating them to growth and socio well-being. First, corruption impedes growth and development by increasing costs, lowering productivity, discouraging investments, reducing confidence in public institutions, limiting the development of small and medium-sized enterprises, weakening systems of public financial management and undermining investments in health and education (Fisman and Svensson, 2007; Olken, 2006). Second, countries with more

effective governments tend to achieve higher levels of economic growth by obtaining better credit ratings and attracting more investments, offering higher quality public services and encouraging higher levels of human capital accumulation. They also succeed in putting foreign aid resources to better use, accelerating technological innovations, increasing the productivity of government spending, improving health and education and curbing environmental degradation and repressing corruption (Easterly et al., 2006; Lewis, 2006; WB, 2006a). Third, improved regulatory quality can promote economic growth by creating effective and efficient incentives for the private sector and also by helping the poor by creating opportunities for entrepreneurship. Improved regulatory quality can also help in reducing opportunities for corruption, increasing the quality of public services and improving the functioning of the housing, service and labour markets on which they rely (Djankov et al., 2006; Dollar et al., 2006; Jalilian et al., 2007; Loayza et al., 2006; WB, 2006b). Fourth, by the rule of law judicial independence promotes a stable investment environment that leads to higher levels of investment and growth and thus helps in reducing poverty through efficient legal systems (Easterly et al., 2006; WB, 2006b).

3. Methodology and data

3.1. Modelling relationship between governance and economic growth/development

To observe trends in WGIs, this paper used a line plot (Figure 1), in which the vertical axis gives the estimates of the six selected governance indicators and the horizontal axis gives the timeline covering the period 1996-2015. Our paper used scatter plots to investigate the evolution of growth and development in Rwanda as a function of the level of good governance and a shock in human capital development. In the scatter plots in Figures 2 and 3, the horizontal axes are estimates of the six selected good governance indicators and the vertical axes are the log of GDP and log of GDP per capita respectively. In the scatter plots in Figures 4 and 5, the horizontal axes are the arithmetic mean of the six WGIs and the vertical axes are the log of GDP and log of GDP per capita respectively. We used the log GDP and log GDP per capita as they allow characterization of the pattern of each selected governance indicator and the pattern of shock in human capital development with growth and development. In the scatter plot in Figure 7, the horizontal axis gives estimates of the six selected good governance indicators and the vertical axis gives the log of the estimated shock in human capital development. In the scatter plots in Figures 8 and 9, the horizontal axes are the log of the estimated shocks in human capital development and the vertical axes are the log of GDP and log of GDP per capita respectively.

Insert Figure 1 about here

Insert Figure 2 about here

Insert Figure 3 about here

Insert Figure 4 about here

Insert Figure 5 about here

In the line plot in Figure 6, the vertical axis is the log of the estimated shock in human capital development and the horizontal axis is the timeline covering the period 1996-2015.

Insert Figure 6 about here

3.2. Modelling shock in human capital development and growth/development

The model used in our paper is based on Benhabib and Spiegel's (1994) 'alternative model for growth accounting.' To specify this model, Benhabib and Spiegel departed from the standard Cobb-Douglas (1928) technology in which per capita income, Y, is function of labour *L*, physical capital *K* and human capital *H*. It is from the relationship in Equation 1 that, in Equation 2, Benhabib and Spiegel take log differences to express the relationship for long-term growth:

(1) $$Y_t = A_t K_t^{\alpha} L_t^{\beta} H_t^{\gamma}$$

(2) $$(logY_T - logY_0) = (logA_T - logA_0) + \alpha(logK_T - logK_0) + \beta(logL_T - logL_0) + \gamma(logH_T - logH_0) + (log\varepsilon_T - log\varepsilon_0)$$

However, from Equation 2, Benhabib and Spiegel (1994) show that it can result in biased estimates because physical and human capital are accumulated factors, they are correlated with the error term, ε,. Because of the accumulation effect they also show that α and γ estimates are likely to be upward biased coefficients while the β estimate is likely to be a downward biased coefficient. It was because of these criticisms that they developed an 'alternative model for growth accounting':

(3) $$(logI_T - logI_0) = (logA_T - logA_0) + \alpha(logK_T - logK_0) + \beta(logL_T - logL_0) + \gamma(1/T \sum_0^T logH_t) + (log\varepsilon_T - log\varepsilon_0)$$

However, as our paper uses yearly data and *H* is proxied by government expenditure on education, we found that using $1/T \sum_0^T logH_t$ as in Equation 3 by Benhabib and Spiegel (1994) can result in biasing estimates α, β and γ for a number of reasons. First, using this formula will result in forcing *H* to be constant over the sample period, *t = 1* to *t = n*, where *n* is the total number of years covered by this study. Second, as the formula is an arithmetic mean in its nature, growth in recent years is attributed to technological progress in these recent years and also to that in earlier years and vice-versa. To handle this issue, we estimated the cumulated *H* noted as H^c, and considering shock in human capital development we also estimated growth in H^c as in Equation 4 where we estimate shock in human capital development noted by H_t^{c*}as:

(4) $$H_t^{c*} = \frac{1}{\mathrm{logH}_{(t)}^{c} - \mathrm{logH}_{(t-1)}^{c}}$$

Therefore, we modified the model in Benhabib and Spiegel (1994) and specify the models for economic growth and development respectively as:

(5) $$\left(logY_{(t)} - logY_{(t-1)}\right) = \left(logA_{(t)} - logA_{(t-1)}\right) + \alpha\left(logK_{(t)} - logK_{(t-1)}\right) + \beta\left(logL_{(t)} - logL_{(t-1)}\right) + \gamma\left(\frac{1}{\mathrm{logH}_{(t)}^{c} - \mathrm{logH}_{(t-1)}^{c}}\right) + (log\varepsilon_{(t)} - log\varepsilon_{(t-1)})$$

$$(6) \qquad \left(logI_{(t)} - logI_{(t-1)}\right) = \left(logA_{(t)} - logA_{(t-1)}\right) + \alpha\left(logK_{(t)} - logK_{(t-1)}\right) + \beta\left(logL_{(t)} - logL_{(t-1)}\right) + \gamma\left(\frac{1}{logH^{c}_{(t)} - logH^{c}_{(t-1)}}\right) + \left(log\varepsilon_{(t)} - log\varepsilon_{(t-1)}\right)$$

We use growth, *Y*, proxied by GDP growth; development, *I*, proxied by income per capita growth; physical capital, *K*, proxied by gross fixed capital formation; labour force, *L*; and a shock in human capital development, H_t^{c*}, proxied by inverse of growth in cumulated government expenditure on education.

4. Empirical findings and discussion

4.1. Trends in selected good governance indicators

Estimates of WGIs over 1996-2015 show that there were successful and consistent improvements in governance in Rwanda. The most successful achievements were in controlling corruption, followed by regulatory quality, rule of law, government effectiveness and political stability and absence of violence/terrorism. The least successful achievements were in voice and accountability. These achievements created an enabling environment for promoting the private sector and a business environment, increasing domestic productivity, ensuring economic efficiency and welfare and developing small and medium-sized enterprises and cross-border trade promotion (RGB, 2016a). Moreover, good governance is one of the most important tools for increasing the viability of public and private institutions and promoting safety net programs for reducing poverty and ensuring food security in the country (RGB, 2016b; NISR, 2015; MINECOFIN, 2012; MINAGRI et al., 2016). Although these successful attempts might tempt one to conclude that good governance is an important determinant of economic growth and development and human capital development, we do not want to jump too quickly to this general conclusion for Rwanda because there is a need of an empirical analysis.

4.2. The pro-cyclic relation between good governance and growth/development

The results of this sub-section show that both the level of growth and the level of development showed an increasing trend with improvements in governance indicators. Therefore, Figures 2 and 3 demonstrate that there exists a positive correlation between growth and development and all the selected governance indicators. This predicts that deterioration in governance indicators will lead to a decline in growth and development. Among the six selected governance indicators, control of corruption had the most pro-cyclic relationship with growth and development, followed by government effectiveness, regulatory quality, rule of law and political stability and absence of violence/terrorism. The indicator with the least pro-cyclic relation with growth and development was voice and accountability. In Figures 4 and 5, trends of growth and development plotted against governance, measured as the arithmetic mean of the six WGIs, verify the existence of a strong pro-cyclic relationship between governance and economic growth and development in Rwanda. Figure 4 also reveals that economic growth increases the level of improvement in governance when contrasted with economic development in Figure 5.

The observed trends highlight that significant economic performance, further economic growth and economic development in Rwanda will primarily be driven by good governance in the country.

Because of the strong and positive relationship that exists between governance and the level of growth (R^2 = 0.93) and level of economic development (R^2=0.86), good governance is one of the most important pillars in different strategic documents developed in Rwanda to attain sustainable economic growth and development. The improvements in governance that occurred during 1996-2015 show that Rwanda's economic growth and development was based on creating effective and efficient incentives for the private sector, helping the poor by creating opportunities for entrepreneurship, reducing opportunities for corruption, increasing the quality of public services and service delivery and increasing opportunities for job creation (NISR, 2015; RGB, 2016a). In addition to this, good governance brings a stable environment for investments, an enabling environment for undertaking research for creativity and innovations and improvements in developing, adopting and/or imitating new technologies to increase domestic productivity (Republic of Rwanda, 2006). Further, improvements in all these were led by the development of a number of 'home grown solutions' appropriate for solving different problems that Rwandans faced after the genocide against the Tutsi in 1994 and the period of the country's reconstruction in 2000 in a sustained manner.

Among others, the home grown solutions have helped Rwanda offer higher quality public services and encouraged higher levels of human capital development and accumulation, appropriate use of foreign aid resources, accelerated technological innovations, increased the productivity of government spending, increased social safety net programs and social protection mechanisms, improved health and education, curbed environmental degradation and repressed corruption. All this led Rwanda to achieve high levels of economic growth and development. Hence, the home grown solutions have strengthened systems of public financial management leading to efficient use of public investments in health and education, efficient allocation of public investments to productive projects and widening the development of small and medium-sized enterprises.

Different home grown solutions which have contributed to these achievements are grouped into four clusters: Umwiherero, Umushyikirano, Governance Month, National Forum Political Parties, Itorero and Imihigo grouped in the governance cluster; Girinka , Ubudehe, Vision Umurenge Program, Universal Health Insurance Scheme and 9 & 12 Years Basic Education grouped under the social cluster; Umuganda, Agaciro Development Fund and Land Use Consolidation grouped under the economic cluster; and Gacaca, Abunzi and Maisond'Accès à la Justice grouped under the justice cluster (RGB, 2016d).

The predictions in Figures 1, 4 and 5 suggest that in the long-term and very long-term the sustainability of Rwanda's economic performance will be based on good governance. Given the positive impact of the home grown solutions on good governance, the most important pre-requisite for sustainable economic performance will be political stability and strong politico-economic policies and strategies for developing appropriate home grown solutions and channelizing them for better implementation.

4.3. Trend of the estimated shock in human capital development

In this sub-section we analyse the trend in shocks in human capital development, estimated using Equation 4. To understand the trend of an estimated shock in human capital development, let us start by explaining its association with economic growth and development. Figure 6 shows that a period of maximum shocks in human capital development corresponds with a period of minimum growth and development and a period of minimum shocks in human capital development corresponds with a period of maximum growth and development. In Figure 6, we observe two critical points, one in 1994 and the other in 2000. The 1994 situation is explained by a dramatic decline in education, health and human capital development and accumulation resulting from the 1994 genocide against the Tutsi. Therefore, the observed situation in 1994 was highly associated with a period of lack of good governance in Rwanda. However, as 2000 corresponds to the period during which the vision of the country changed to becoming a self-sustained and middle-income country, the observed situation may be explained by the fact that during the period of policy reforms, indicators of economic performance were subjected to measurable variations. These can be attributed to sequencing implementation problems and intermittent economic adjustments. As our focus is on governance and not on variations in the indicators of economic performance as a result of economic reforms, we conclude that lack of good governance is the most important factor leading to a significant shock in human capital development and accumulation.

4.4. Counter-cyclic relation between good governance and shock in human capital development

This sub-section demonstrates that the estimated shock in human capital development declines with improvements in governance indicators. This reflects a counter-cyclic relation that exists between a shock in human capital development and good governance. Figure 7 suggests that improvements in good governance go with improvements in human capital development, whereas lack of good governance leads to a high shock in human capital development. Taking two governance indicators, political stability and absence of violence/terrorism and voice and accountability, which are the most and least significant governance indicators negatively related to the estimated shock in human capital development, ceteris paribus, a decline in the estimated shock in human capital development is explained by improvements in political stability and absence of violence/terrorism by 46 per cent and by voice and accountability by 25 per cent. When the arithmetic mean of the six WGIs used in our paper is plotted against the estimated shock in human capital development, Figure 7 demonstrates that a decline in the estimated shock in human capital development is explained by good governance by 42 per cent. Different factors explain why the lack of good governance can negatively affect human capital development and accumulation. Lack of good governance incapacitates the government economically by rendering public and private institutions ineffective, undermining investments in health and education leading to inefficient allocation of government budgets, weakening government revenues and tax collection systems and enfeebling the saving and investment system. It further leads to increasing labour market inefficiencies, rendering the business environment vulnerable and inappropriate and hindering public and private willingness to develop safety net programs and social protection mechanisms. All these factors lead to lower levels of human capital

development and accumulation which may result in a drop in researches for creativity and innovations and decline in developing, adopting and/ or imitating the capacity for new technologies, thus creating economic inefficiencies and lowering production capacity.

Insert Figure 7 about here

Figures 8 and 9 demonstrate that, ceteris paribus, there exists a moderate counter-cyclic relationship between a shock in human capital development and economic growth and development. The negative impact of a shock in human capital development is higher on economic growth than on economic development. A shock in human capital development negatively affects economic growth through productivity deficiency and economic inefficiencies while it affects economic development through lack of functioning public and private institutions and lack of public systems to promote welfare and create safety net program channels. On the one hand, productivity deficiency and economic inefficiencies arise from the fact that lack of good governance leads to a decline in absorption capacity, which is accompanied by a fall in researches for creativity and innovations, a decline in the capacity to develop, adopt and/ or imitate new technologies and high domestic market inefficiencies resulting from corruption and political instability distorting the labor market, the goods and services market and the financial market. On the other hand, lack of functioning public and private institutions and lack of public systems to promote welfare and create safety net programs arises from the fact that lack of good governance makes the implementation of inclusive development where people take part in formulating policies relevant to the socioeconomic problems that they are facing complex. However, improvements in good governance and 'home growth solutions' have proved that they can be efficient remedies for all these challenges. They can curb shocks in human capital development and create an enabling environment for higher human capital development and accumulation whilst increasing domestic productivity, ensuring economic efficiency and welfare, ensuring the viability of public and private institutions and promoting safety net programs for poverty reduction and food security (RGB, 2016a, 2016b, 2016c, RGB, 2016; NISR, 2015; MINAGRI et al., 2016; MINECOFIN, 2012).

Insert Figure 8 about here

Insert Figure 9 about here

4.5. Effect of a shock in human capital development on economic growth and development

Although the analysis so far shows a negative relationship between growth/development and a shock in human capital development, it does not show if that relationship is still negative and significant enough to negatively affect growth and development in Rwanda when calibrated in the production function. This sub-section discusses the spillover effect of lack of good governance on economic growth and development. We assume a shock in human capital development to be one of the channels through which lack of good governance negatively affects economic performance.

The results in Table 1 show that all the series are stationary at their log and differenced levels. As the estimated F statistics for the Breusch-Godfrey LM test in Models 1 and 2 are not statistically significant and the estimated Durbin-Watson d-statistics in these two

models are approaching 2, these results strongly accept the null hypothesis of 'no serial correlation.' In addition to this, the estimated statistics, Adjusted R-square, root MSE, TSS and TMS, for model-fit demonstrate that the used variables fit the two mobilized models well. Ceteris paribus, the Adjusted R-square in Model 1 demonstrates that 98 per cent growth in Rwanda is likely explained by gross fixed capital formation, labour force and shock in human capital development, whereas in Model 2, development in Rwanda is likely explained by 92 per cent by these three variables.

The results in Table 1 agree with the results obtained in section 4.4, which show that there is a negative relationship between a shock in human capital development and growth and development. More importantly, this section demonstrates that this negative relationship is statistically significant at the 5 per cent and 10 per cent levels in Model 1 and Model 2 respectively. Our empirical findings suggest that a 1 per cent increase in a shock in human capital development will result in decreasing growth and development by 0.28 per cent and 0.31 per cent respectively. Our findings also show that the uncovered negative effect of a shock in human capital development reverberates more in economic development as compared to economic growth. This is explained by the fact that the estimated elasticity of a shock in human capital development on development in Model 2 is greater than the estimated growth in Model 1. This reminds us how home grown solutions have contributed significantly to reducing poverty, curbing the unemployment rate, reducing households' vulnerability and exposure to natural hazards, ensuring national security, increasing productivity and ensuring food security, among others (RGB, 2016a, 2016b, 2016c, 2016d; NISR, 2015; MINAGRI et al., 2016; MINECOFIN, 2012). Therefore, the positive impact that good governance has on improving human capital development and accumulation leading to an improvement in growth and development, reveals that the level of development and growth in Rwanda not only depends on fixed capital formation and labour force but also on improvements in controlling corruption, government effectiveness, political stability and absence of violence/terrorism, regulatory quality, rule of law and voice and accountability. These are the indicators of governance used in our paper. Therefore, it can be concluded that good governance is one of the key factors determining the success of economic reforms for attaining economic growth and development.

Indicators of good governance also provide important insights to investors to decide on where, when and how to invest as an improvement in good governance increases inclusive development and leads not only investors in general but also risk averse investors to be more confident about the future and potentially invest more as their investments are safe and secure with expectations of positive returns. Inclusive development and an increase in investments depend on the economy's capacity to absorb human capital to increase productivity and ensure economic efficiency. Moreover, human capital development is a determining factor in an economy's capacity to invent new technologies and adopt or imitate technologies developed in other economies that may include world leaders in terms of technological progress (Başak and Sevinç, 2013; Bilas et al., 2016; Coe and Helpman, 1995; Guellec and Van, 2001; Lai et al., 2006). In contrast, a shock in human capital development slows down technological progress, catch-up and technological diffusion. On the one hand, the more an economy's human capital development gets better the more its ability to adopt and imitate new technology from abroad. As a result the economy steps towards high and efficient production capacity which in turn stimulates growth and development. On the other hand, the more

an economy's human capital development shrinks, the more its production capacity gets worse thus hampering growth and development.

Insert Table 1 about here

5. Conclusion and policy implications

We used two techniques, scatter and line plots and OLS, to investigate how governance is related to economic growth and development. In OLS, we simulated Benhabib and Spiegel's (1994) alternative model for growth accounting and calibrated it with the estimated shock in human capital development to investigate the spillover effects of lack of good governance on growth and development. Our paper shows that there exists a pro-cyclic relationship between governance and economic growth and development. It also shows that the spillover effect of lack of good governance on economic growth and development is a counter-cyclic relation between a shock in human capital development and growth and development. It suggests that this may be a result of the fact that lack of governance leads to a decline in absorption capacity; slows down technological progress, catch-up and technological diffusion; leads to high domestic market inefficiencies; and makes the implementation of inclusive development more complex. It also demonstrates that the uncovered negative effects of a shock in human capital development reverberate in development when compared to growth. Finally, it reveals that the level of development and growth in Rwanda not only depends on fixed capital formation and labour force, but also on good governance. It suggests that 'home growth solutions' have been efficient remedies in curbing shocks in human capital development and creating an enabling environment for higher human capital development and accumulation whilst increasing domestic productivity, ensuring economic efficiency and welfare, ensuring the viability of public and private institutions and promoting safety net programs and social protection mechanisms for poverty reduction.

A significant economic performance, further economic growth and economic development in Rwanda will be driven by good governance in the country. Given the positive impact of the home grown solutions on good governance, the most important pre-requisite for sustainable economic performance is political stability and strong politicoeconomic policies and strategies to develop more such home grown solutions and channelizing them so that they are better implemented.

Finally, given the results of our study which demonstrates how good governance has been a key driving factor in growth and development and which show how a shock in human capital development emanating from lack of good governance can significantly impede both growth and development, our paper suggests that there is still room for improvement in growth and development in all other African countries through good governance. Our study suggests that drawing lessons from Rwanda's good governance system and replicating it in other countries in Africa will lead to political stability and sustainable economic growth and development which are the most pressing issues on the continent.

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Figure 1: Trends in selected governance indicators (1996-2015)

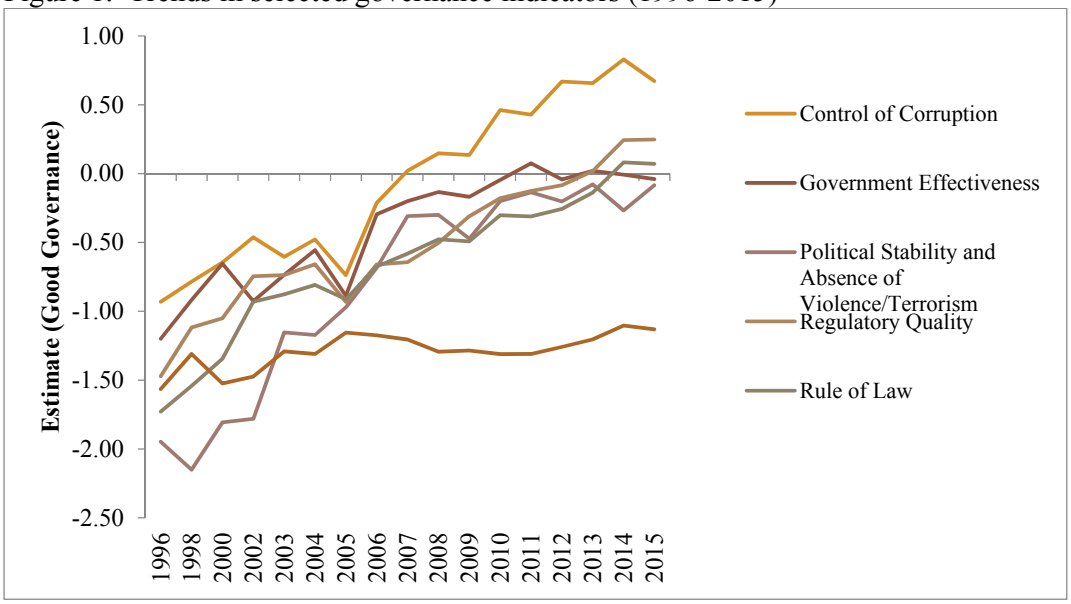
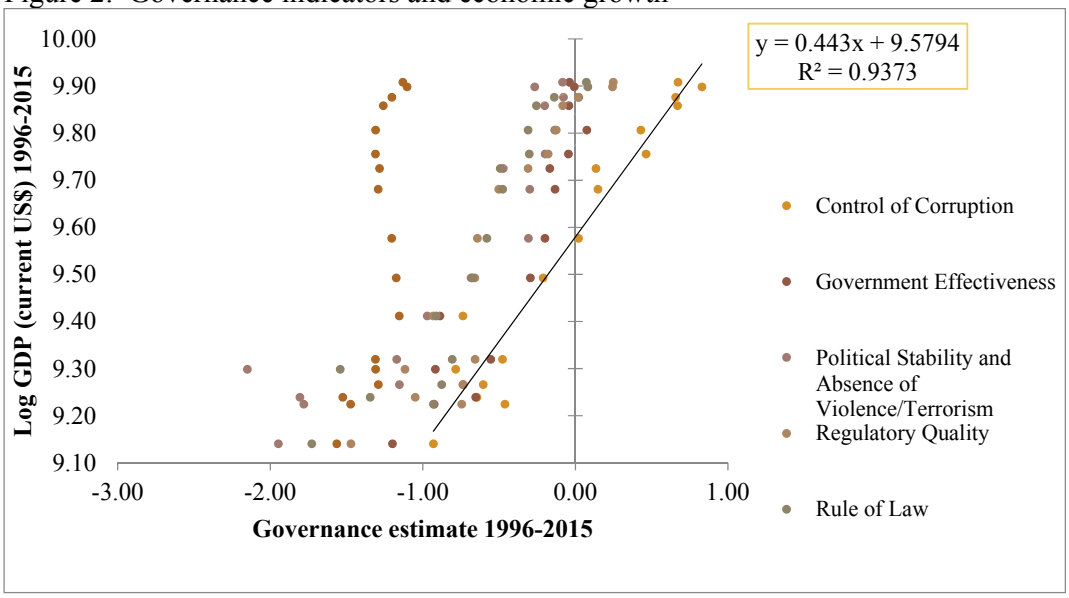
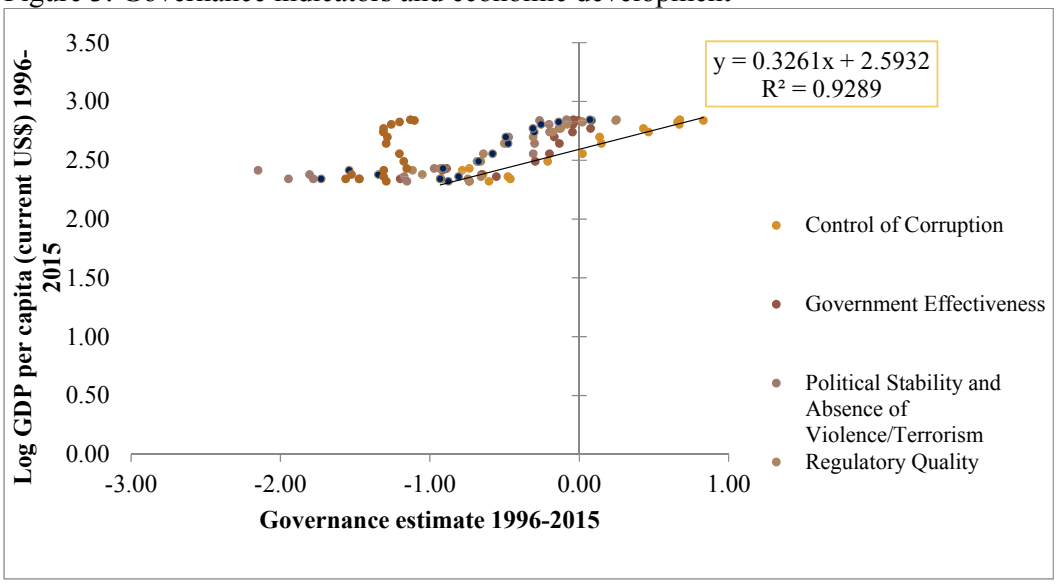


Figure 2: Governance indicators and economic growth



Note: Ceteris paribus, the estimated coefficient of determination demonstrates that improvements in economic growth can be explained by control of corruption (94%), government effectiveness (87%), regulatory quality (86.7%), rule of law (85%), political stability and absence of violence/terrorism (85%) and voice and accountability (45%0.

Figure 3: Governance indicators and economic development



Note: Ceteris paribus, the estimated coefficient of determination demonstrates that changes in economic growth can be explained by control of corruption (93%), government effectiveness (81%), regulatory quality (82%), rule of law (76%), political stability and absence of violence/terrorism (75%) and voice and accountability (33%).

Figure 4: Good governance and development

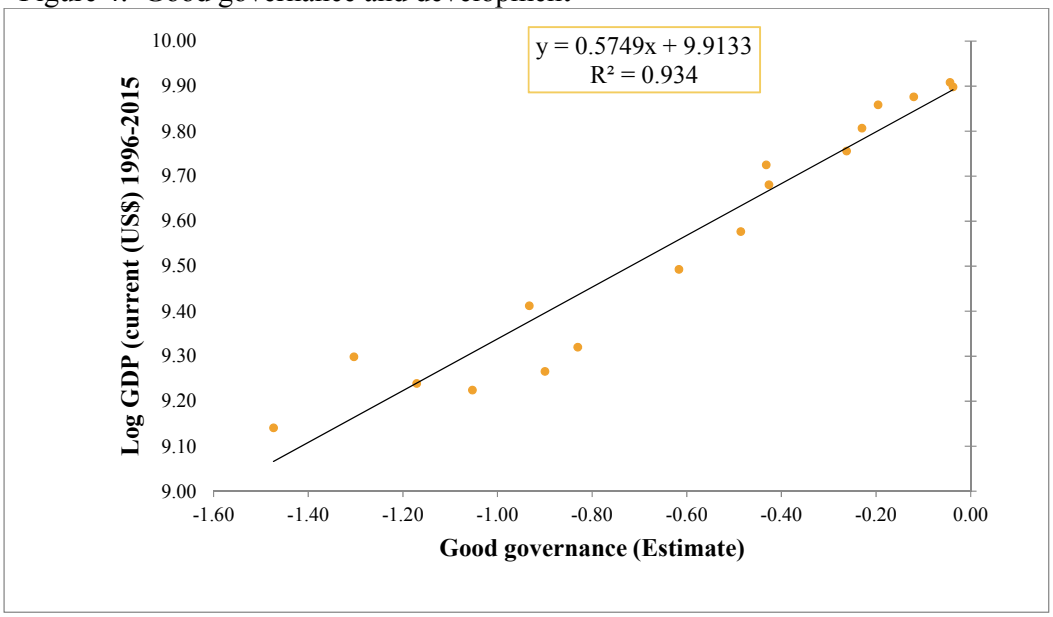


Figure 5: Good governance and development

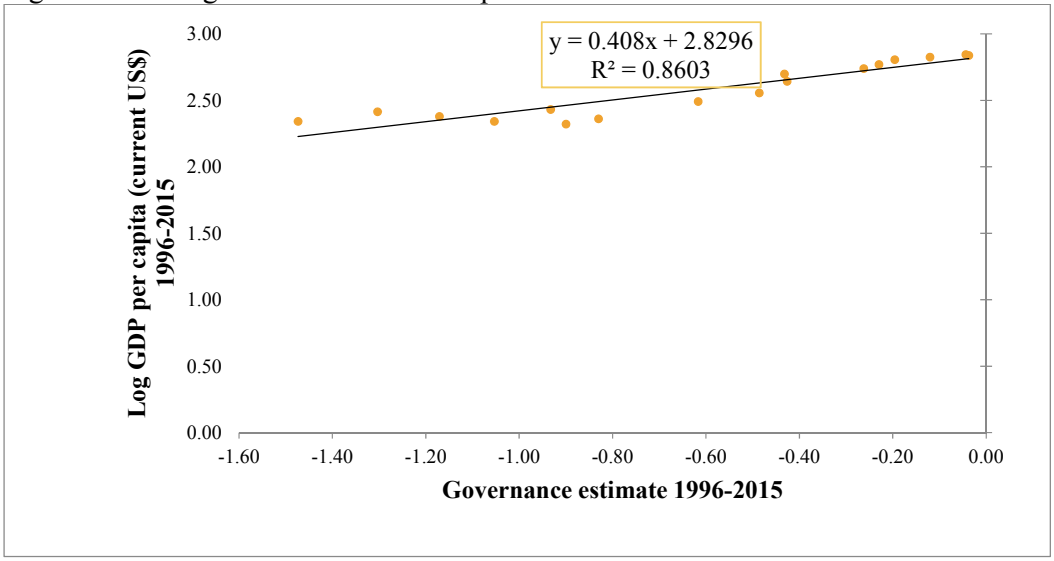


Figure 6. Log of estimated shock in human capital development

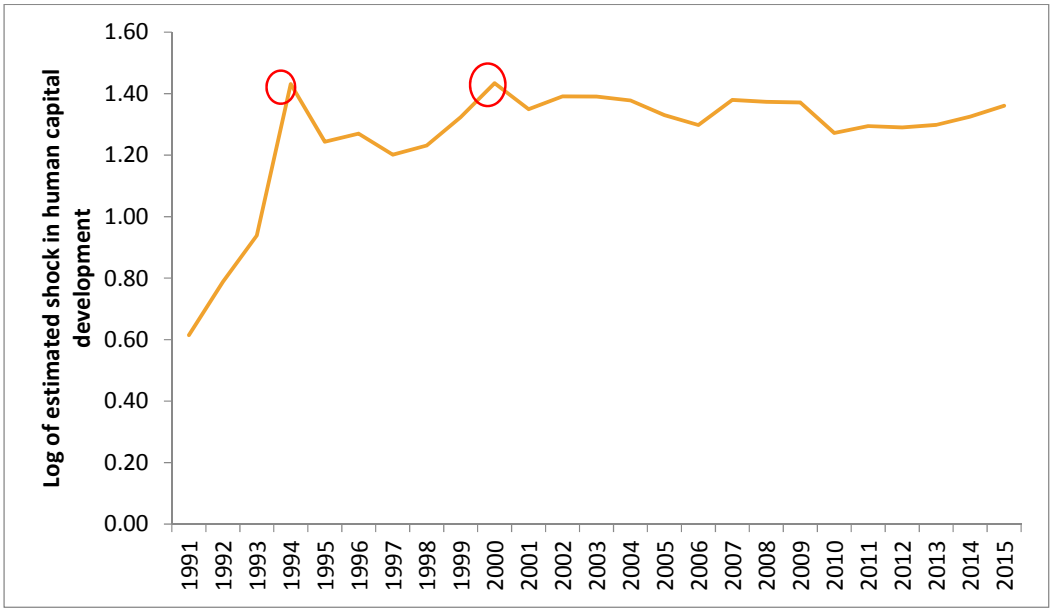
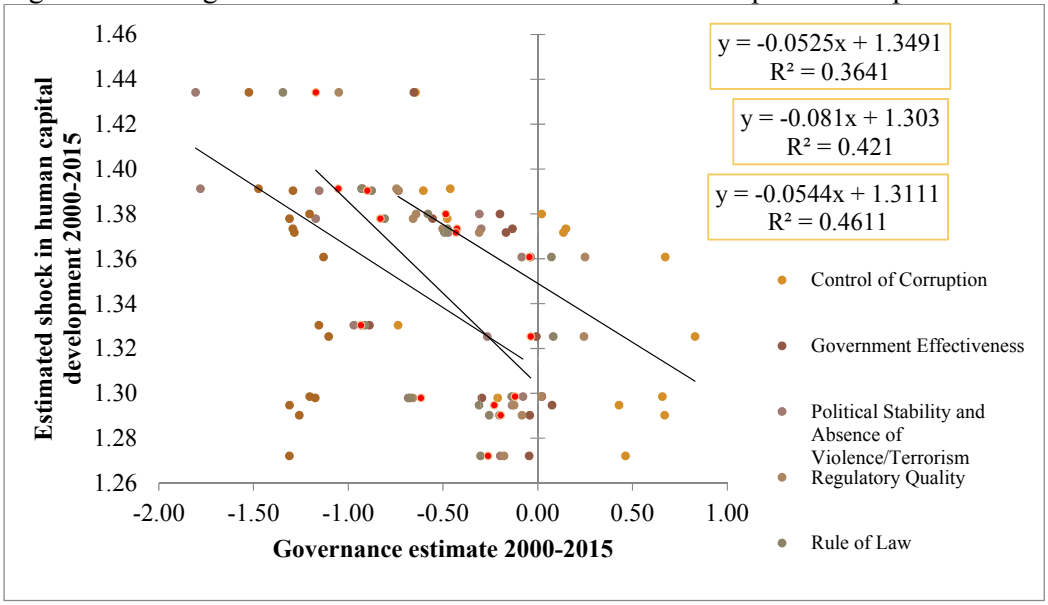


Figure 7: Good governance indicators and shock in human capital development



Note: Ceteris paribus, the estimated coefficient of determination demonstrates that decline in a shock in human capital development can be explained by improvement in governance (average six WGIs) by 42%, political stability and absence of violence/terrorism by 46%, rule of law by 38%, control of corruption by 36%, government efficiency by 34%, regulatory quality by 32%, and voice and accountability by 25%.

Figure 8.Human capital shock and growth

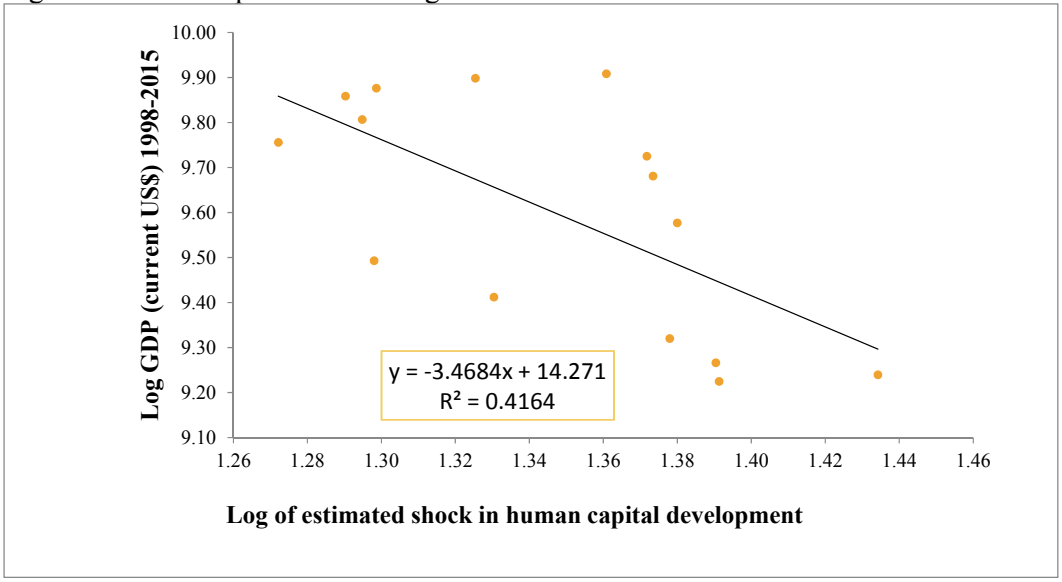


Figure 9. Human capital shock and economic development

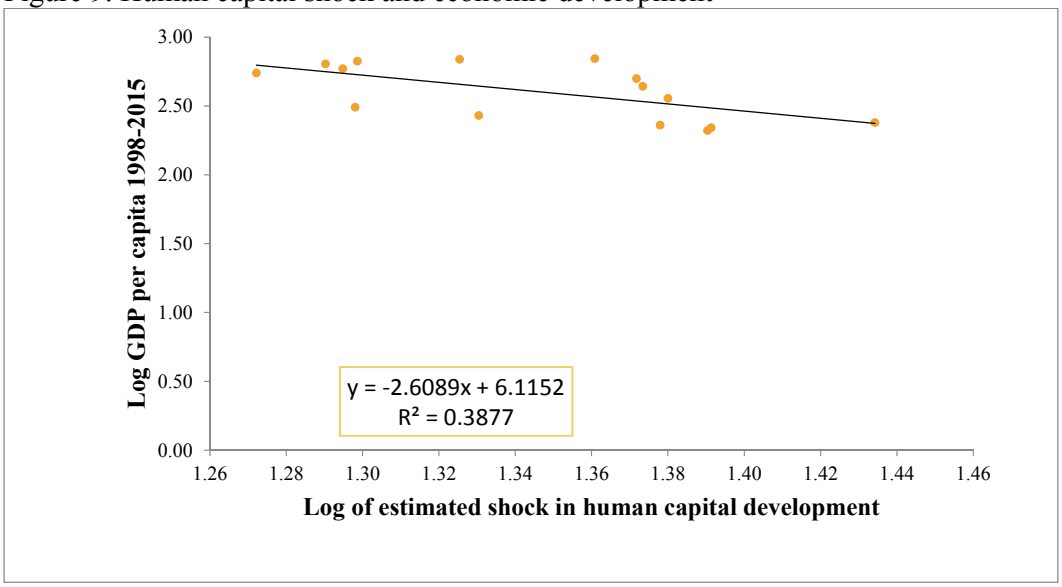


Table 1: OLS summary results

	DF Unit-root test Test Statistic	Model1		Model2	
		Coef.	Std.Err.	Coef.	Std.Err.
GDP (Log, $1^{st}\Delta$)	-5.548***				
GDP per capita (Log, $1^{st}\Delta$)	-4.797***				
Capital (Log, $1^{st}\Delta$)	-5.875***	0.581*** [0.022]***	(0.031)	0.398*** [0.014]***	(0.044)
Labor Force (Log, $1^{st}\Delta$)	-2.837*	0.574** [0.006]**	(0.227)	0.323 [0.004]	(0.331)
Shock in HCD (Log, $1^{st}\Delta$)	-4.999***	-0.090** [-0.0028]**	(0.039)	-0.100* [-0.0031]*	(0.057)
Obs.		24		24	
F(3, 21)		363.73***		87.93***	
Adj R-square		0.978		0.916	
Root MSE		0.016		0.024	
TSS		0.297		0.161	
TMS		0.012		0.007	
Breusch-Godfrey LM test (1, 20)		1.763	[0.199]	0.035	[0.854]
Durbin-Watson d-statistic(3, 24)		2.503		2.040	

Note: ***, **, * denote statistical significance at 1%, 5% and 10%. Figures in parenthesis are standard errors. Figures in [] are elasticities. Model 1: GDP is taken as the dependent variable; Model 2: GDP per capital is taken as the dependent variable. Coef and Std.Err. stand for coefficient and standard error respectively. MSE, TSS and TMS stand for mean square error, total sum square and total mean square. (Log, $1^{st}\Delta$) denotes logged and first differenced time series. Shock in HCD stands for estimated shock in human capital development. DF stands for Dickey-Fuller.