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Determinants of Growth in Fast Developing Countries: Evidence from Bundling and Unbundling Institutions

Simplice A. Asongu
African Governance and Development Institute,
Yaoundé, Cameroon.
E-mail: asongusimplice@yahoo.com

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Determinants of Growth in Fast Developing Countries: Evidence from Bundling and Unbundling Institutions

Simplice A. Asongu[1]

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Abstract

Purpose – We assess growth determinants in the BRICS (Brazil, Russia, India, China and South Africa) and MINT (Mexico, Indonesia, Nigeria and Turkey) fast-developing nations for the period 2001-2011. Particular emphasis is laid on the bundling and unbundling of ten governance dynamics.

Design/methodology/approach- Contemporary and non-contemporary Fixed- and Random-Effects regressions are employed as empirical strategies. GDP growth and real GDP output are used as dependent variables. The governance variables are bundled by means of principal component analysis.

Findings- The following are some findings. First, governance is more positively significant in non-contemporary specifications as opposed to contemporary regressions. Second, there is some interesting evidence on the heterogeneity of political governance as a driver. Political governance and its constituents (political stability and voice & accountability) are significantly positive in GDP growth but insignificant in real GDP output regressions. Third, the other governance dynamics are more significant determinants of real GDP output, as opposed to GDP growth. Accordingly, they are insignificant in contemporary regressions and negatively significant in non-contemporary regressions for GDP growth. Fourth, the constituents of economic governance have the highest magnitude in the positive effects of governance dynamics on real GDP output.

Practical implications- The following are some practical implications. First, lag determinants are necessary for growth targeting or timing of growth dynamics. Growth drivers for the most part are more significantly determined by past information. Second, political governance is the most important driver of economic growth, with the significance of effects more apparent in non-contemporary regressions. Third, economic governance and institutional governance are more positively predisposed to driving real GDP output than GDP growth.

Originality/value- As far as we have reviewed, it is the first study to investigate growth determinants in the BRICS and MINT nations. It has strong implications for other developing countries on the contemporary and non-contemporary dynamics of governance in driving economic prosperity.

[1] Simplice A. Asongu is Lead economist in the Research Department of the AGDI (asongus@afridev.org).

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1. Introduction

State and market failures have led to an evolving paradigm of post Washington Consensus (WC) development models (Fofack, 2014, p. 9). They include inter alia: the Liberal Institutional Pluralism (LIP) and the New Structural Economics (NSE). The latter has been advanced by Lin and Monga (2011), Norman and Stiglitz (2012), Stiglitz et al. (2013ab), Stiglitz and Lin (2013) and Monga (2014). The NSE advocates for the reconciliation between structuralism and liberalism ideologies. The former school or the LIP put forward by Acemoglu et al. (2005), Rodrik (2008) and Brett (2009), among others, is concerned with: the quality of institutions for the delivery of public goods, institutional diversity and institutional conditions for economic growth.

In light of the above, a recent drift from the WC is a decision by the BRICS (Brazil, Russia, India, China and South Africa) nations on the 15th of July 2014 to create a New Development Bank (NDB). The establishment of the new bank has prompted much debate and reactions in policy circles (Griffith-Jones, 2014; Khanna, 2014). Most of the questions arising have been substantially documented, among others: '*What is the purpose of this BRICS bank? Why have these countries created it now? And, what implications does it have for the global development-finance landscape?*' (Desai & Vreeland, 2014). A resulting certainty however is that an important rate of economic growth would have to be sustained for the BRICS to foster the ambitions of her NDB and Contingency Reserve Arrangement (CRA). This motivates an important policy concern of what drives economic growth in fast-developing nations. In essence, understanding determinants of economic growth in fast-growing emerging economies holds important lessons for less developed countries.

It is important to briefly engage the CRA and NDB before focusing on our principal line of inquiry. With respect to the introductory narrative, the CRA is a $ 100 billion contingency fund intended for liquidity to member states in event of balance sheet crises. Contributions to the fund are to the tune of 5%, 18%, 18%, 18% and 41% for South Africa, Russia, Brazil, India and China respectively. On the other hand, the NDB is a bank with an initial $50 billion capital. Unlike contributions to the CRA which are based on economic

fundamentals, those to the bank among BRICS members are on equal-share basis. Hence, equal voting rights are conferred to all member states.

In accordance with the literature on fast-growing emerging economies, there are a plethora of benefits from high economic prosperity. These include, inter alia: employment, finance and positive rewards for inward foreign direct investment (FDI) like corporate governance, know-how transfer and managerial expertise (Akpan et al., 2014; Asongu & Kodila-Tedika, 2015; Asongu & Nwachukwu, 2015). In line with the United Nations Conference on Trade & Development (UNCTAD, 2013), the MINT (Mexico, Indonesia, Nigeria & Turkey) and BRICS countries have constituted around a fifth of world GDP and about 50% of world FDI in recent years. In essence, as shown in Table 1, the growth experienced by these nine countries was about 19% of the global GDP during the 2001-2012 period. During the same period, these nations have represented around 30% of the world FDI and about 51% of the global population (World Bank, 2013).

Table 1: Stylized facts on BRICS and MINT

	GDP (constant 2005 US$, billions)	**GDP per capita (constant 2005 US$)**	**GDP growth (annual %)**	**GDP per capita growth (annual %)**	**FDI net inflows (BoP, current US$, billions)***	**Population growth (annual %)**	**Population, total, millions**	**Natural resources, Share of GDP***	**Human Development Index (HDI)**
Brazil	1136.56	5721.23	0.87	0.00	71.54	0.87	198.66	5.72	0.73
China	4522.14	3348.01	7.80	7.28	280.07	0.49	1350.70	9.09	0.70
India	1368.76	1106.80	3.24	1.94	32.19	1.26	1236.69	7.36	0.55
Indonesia	427.47	1731.59	6.23	4.91	19.24	1.25	246.86	10.00	0.63
Mexico	997.10	8250.87	3.92	2.65	21.50	1.24	120.85	9.02	0.78
Nigeria	177.67	1052.34	6.55	3.62	8.84	2.79	168.83	35.77	0.47
Russia	980.91	6834.01	3.44	3.03	55.08	0.40	143.53	22.03	0.79
South Africa	307.31	6003.46	2.55	1.34	5.89	1.18	51.19	10.64	0.63
Turkey	628.43	8492.61	2.24	0.94	16.05	1.28	74.00	0.84	0.72

*2011 data

Source of data: UNDP (2013), World Bank (2013) and Akpan et al. (2014)

Despite the growing importance of the BRICS and MINT countries, as far as we have reviewed, literature on them is scarce. Accordingly, most lines of inquiry on the exposition have been oriented towards FDI determinants. The few studies that fall within this stream of the literature are: works that exclusively target the BRICS (Vijayakumar et al., 2010; Jadhav, 2012; Jadhav & Katti, 2012) and more extensive expositions that have added MINT nations

to the BRICS (Akpan et al., 2014; Asongu & Kodila-Tedika, 2015; Asongu & Nwachukwu, 2015).

The stream of literature that has motivated queries on determinants of growth is also not abundant. First, education as a determinant of growth in the BRIC countries has been assessed by Sheng-jun (2011) to establish that while Brazil and Russia have invested comparatively more in education, as opposed to India and China, growth is more apparent in the latter nations. Second, Basu et al. (2013) have followed a similar line of inquiry to conclude that the growth potential of BRICS countries is substantially contingent on the ability of its citizens to develop working-age skills. Third, the nexus between FDI and growth has been investigated by Agrawal (2013) in the BRICS to establish that there is a long-run nexus flowing from FDI to growth. Fourth, Goel and Korhonen (2011) have also contributed to the literature by investigating three main concerns in the BRIC nations, namely: *"(a) How do medium term growth determinants differ from short term determinants? (b) What are differences between growth effects of aggregate versus disaggregated exports? And (c) Does lower institutional quality hinder growth?*" The results show that, while BRIC countries are predisposed to higher growth, some significant within-group differences are apparent. India shows some positive growth, Russia and China reflect higher levels, whereas Brazil fails to outperform the corresponding three nations.

The present study extends the above literature by investigating the determinants of growth in the BRICS and MINT nations with particular emphasis on bundling and unbundling governance dyanmics. In summary, it has at least four contributions to existing literature. First, depending on the outcome of the Hausman test for endogeneity, we employ Fixed-effects (FE) or Random-effects (RE) estimations. The FE regressions have the additional interest of accounting for some unobserved heterogeneity like time- and country-effects. Second, non-contemporary and contemporary specifications are used to examine whether growth drivers depend on some underlying contemporary characteristics. Hence, contrary to some previous studies, our estimation techniques have some bite on endogeneity. E.g Sheng-jun (2011) is based on averages of data (p. 190-193). Third, the underlying literature on growth determinants have been limited to BRIC (Sheng-jun, 2011; Goel & Korhonen, 2011) or BRICS (Agrawal, 2013; Basu et al., 2013) countries. Hence, we complement the underlying stream by investigating both MINT and BRICS nations. Fourth, following Asongu and Nwachukwu (2015) in the FDI current, we bundle and unbundle governance determinants in order to provide more room for policy implications. The adopted governance dynamics

include: political govenance, institutional governance, economic govenance, general govenance, voice and accountability, political stability/no voilence, government effectiveness, regulation quality, rule of law and corruption-control[2].

We devote some space to briefly discussing the motivation for articulating goverannce. In essence, the intuition draws from a recent current of the literaure broadly based on bundling and unbundling governance for more subtlety in development implications. First, the impact of a plethora of governance indicators on innovation has been examined by Oluwatobi et al. (2014) to establish that government effectiveness and regulation quality (constituting economic govenance) are most instrumental in Africa. Second, the impact of formal institutions on software piracy has been investigated by Andrés and Asongu (2013) who have concluded that corruption-control is the most effective tool for mitigating software piracy. Andrés et al. (2014) extend the study by assessing if the implementation of treaties on intellectual property rights (IPRs) contribute to knowledge economy(KE). They conclude that, governance dynamics are necessary but not a sufficient condition for KE, contingent on the intrumentality of IPRs treaties. The same empirical strategy has been employed in some empirics to predict the Arab Spring (Asongu & Nwachukwu, 2014a) and assess the effect of lifelong learning on non-voilence/political stability (Asongu & Nwachukwu, 2014b). Drawing from the above; Asongu and Kodila-Tedika (2016) have investigated the most effective government tools in the fight against African conflicts and crimes to conclude that corruption-control is the most effective tool.

The remainder of the paper is presented as follows. The data and methodology are discussed in Section 2. Section 3 presents the empirical results. Section 4 concludes with implications.

2. Data and Methodology

2. 1 Data

The study examines a panel of nine MINT and BRICS nations with data for the period 2001-2011 from Apkan et al. (2014). The principal data sources are World Governance Indicators and World Development Indicators from the World Bank. The data has also been used by Asongu and Kodila-Tedika (2015) and Asongu and Nwachukwu (2015) in the FDI-

[2] Institutions and governance are interchangeably used throughout the study. The former concept is quite distinct from 'institutional governance' which is represented by the rule of law and corruption-control.

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determinant literature. We use two dependent variables for the purpose of robustness, namely: real GDP output and GDP growth.

The governance dynamics which are our main independent variables include: (i) *corruption-control*, (ii) *the rule of law*, (iii) *government effectiveness*, (iv) *regulation quality*, (v) *political stability*, (vi) *voice and accountability*, (vii) *general governance*, (viii) *institutional governance*, (ix) *economic govenance* and (x) *political governance*. The last-four are bundled indicators that are common factors derived from the first-six, by means of the Principal Component Analysis (PCA) technique which we discuss in Section 3.2.1.

Adopted control variables are in line with the UNCTAD (2002) presented in Table 2. These have also been adopted by Akpan et al. (2014) and Asongu and Nwachukwu (2015). They include: *natural resources, private credit, infrastructure* and *inflation*. But for high inflation which decreases economic growth, expected signs from the remaining three variables are positive. It is important to note that the expected inflation sign could also be positive because, stable and low inflation are needed for a promising economic outlook (Asongu, 2013). Inflation which is measured by the Consumer Price Index is in line with Barro (2003), bank credit is justified by Asongu (2015), and natural resources (% of GDP) are consistent with Fosu (2013). 'Mobile phones' (per 100 people) which is used as a proxy for infrastructure, is in accordance with Sekkat and Veganzones-Varoudakis (2007) and Asiedu (2002). The relevance of infrastructure as an important growth determinant has been recently documented by Sahoo et al. (2010) on a unidirectional flow of causality from infrastructure to output in China.

Table 2: Classification of Growth determinants

Determining Variables	**Examples**
Policy variables	Tax policy, trade policy, privatization policy, macroeconomic policy
Business variables	Investment incentives
Market-related economic determinants	Market size, market growth, market structure
Resource-related economic determinants	Raw materials, labor cost, technology
Efficiency-related economic determinants	Transport and communication costs, labor productivity

Source: UNCTAD (2002) and Akpan et al. (2014)

The descriptive statistics of the indicators are shown in Table 3. Two points are noteworthy. On the one hand, the indicators are relatively comparable. On the other hand, the rate of variation is quite substantial for us to expect plausible nexuses from the estimations.

Table 3: Summary Statistics

	Mean	S.D	Min	Max	Obs
GDP Growth (GDPg)	5.351	3.789	-7.820	14.200	90
Real GDP (constant of 2005 US billions) (log)	6.346	0.886	4.260	8.341	90
Infrastructure (Number of mobile phones per 100 people)	52.433	39.220	0.210	179.31	90
Bank Credit (on GDP)	85.019	63.492	4.909	201.58	90
Natural resources (on GDP)	9.003	8.110	0.294	38.410	90
Inflation (Consumer Price Index)	8.580	7.519	-0.765	54.400	90
Voice & Accountability	-0.192	0.680	-1.681	0.727	90
Political Stability	-0.826	0.613	-2.193	0.286	90
Regulation Quality	-0.104	0.437	-1.322	0.778	90
Government Effectiveness	-0.100	0.454	-1.200	0.691	90
Rule of Law	-0.428	0.458	-1.522	0.279	90
Corruption Control	-0.431	0.462	-1.333	0.612	90
Political Governance	0.000	1.153	-2.210	1.976	90
Economic Governance	-0.000	1.372	-3.291	2.639	90
Institutional Governance	0.000	1.348	-3.048	2.412	90
General Governance	0.000	2.124	-4.650	3.765	90

S.D: Standard Deviation. Min: Minimum. Max: Maximum. Obs: Observations.

3.2 Methodology

3.2.1 Principal Component Analysis (PCA)

In accordance with Asongu and Nwachukwu (2014a, 2015), we employ the PCA technique in bundling and unbundling the governance dynamics. The PCA is usually used to reduce highly correlated variables into a smaller set of uncorrelated principal components (PCs). The corresponding correlation matrix is presented in Table 4. The criterion used to retain the PCs is from Kaiser (1974) and Jolliffe (2002) who have recommended the retention of those with an eigenvalue greater than the mean or more than one. Hence, as presented in Table 5 below, the retained common factors all have eigenvalues greater than one. For example, the *general governance* indicator has an eigenvalue of about 4.51 with a corresponding total variation of more than 75%. In other words, when the six governance indicators are bundled, the resulting *general governance* index represents about 75% of total variability in the six constituent indicators. This logic is consistent with the reported values for political, economic and institutional governance dynamics.

"*Political governance, which measures the election and replacement of political leaders is approximated by: voice & accountability and political stability/non-violence; Economic governance, which is the formulation and implementation of policies that deliver public commodities, is denoted by regulation quality and government effectiveness ;*

Institutional governance, which is defined as the respect of the State and citizens of institutions that govern interactions between them is measured by the rule of law and corruption-control" (Asongu & Nwachukwu, 2015a, p. 11; Andrés et al., 2014).

Table 4: Correlation Matrix

VA	PS	RQ	GE	RL	CC	Polgov	Ecogov	Instgov	G.Gov	
1.000	0.329	0.542	0.457	0.538	0.623	0.815	0.515	0.614	0.648	VA
	1.000	0.774	0.759	0.579	0.752	0.815	0.790	0.698	0.817	PS
		1.000	0.883	0.716	0.886	0.807	0.970	0.840	0.934	RQ
			1.000	0.827	0.861	0.746	0.970	0.885	0.936	GE
				1.000	0.818	0.685	0.795	0.953	0.868	RL
					1.000	0.849	0.900	0.953	0.959	CC
						1.000	0.800	0.804	0.899	Polgov
							1.000	0.889	0.963	Ecogov
								1.000	0.958	Instgov
									1.000	G.Gov

P.C: Principal Component. VA: Voice & Accountability. RL: Rule of Law. R.Q: Regulation Quality. GE: Government Effectiveness. PS: Political Stability. CC: Control of Corruption. G.Gov (General Governance): First PC of VA, PS, RQ, GE, RL & CC. Polgov (Political Governance): First PC of VA & PS. Ecogov (Economic Governance): First PC of RQ & GE. Instgov (Institutional Governance): First PC of RL & CC.

Table 5: Principal Component Analysis (PCA) for Bundling Governance (Gov)

Principal Components	Component Matrix (Loadings)						Proportion	Cumulative Proportion	Eigen Value
	VA	PS	RQ	GE	RL	CC			
First PC (G.Gov)	0.305	0.385	0.440	0.441	0.409	0.452	0.752	0.752	4.514
Second PC	0.848	-0.461	-0.207	-0.115	0.096	0.048	0.121	0.874	0.731
Third PC	0.337	0.532	-0.240	0.192	-0.714	0.012	0.064	0.938	0.385
First PC (Polgov)	0.707	0.707	---	---	---	---	0.664	0.664	1.329
Second PC	-0.707	0.707	---	---	---	---	0.335	1.000	0.670
First PC (Ecogov)	---	---	0.707	0.707	---	---	0.941	0.941	1.883
Second PC	---	---	-0.707	0.707	---	---	0.058	1.000	0.116
First PC (Instgov)	---	---	---	---	0.707	0.707	0.909	0.909	1.818
Second PC	---	---	---	---	-0.707	0.707	0.090	1.000	0.181

P.C: Principal Component. VA: Voice & Accountability. RL: Rule of Law. R.Q: Regulation Quality. GE: Government Effectiveness. PS: Political Stability. CC: Control of Corruption. G.Gov (General Governance): First PC of VA, PS, RQ, GE, RL & CC. Polgov (Political Governance): First PC of VA & PS. Ecogov (Economic Governance): First PC of RQ & GE. Instgov (Institutional Governance): First PC of RL & CC.

It is important to discuss issues that could result from estimates originating from underlying regressions. According to Asongu and Nwachukwu (2014b), these concerns have been raised by Pagan (1984, p. 242) who has established that there are three main issues with augmented regressors, notably: (i) efficiency, (ii) consistency and, (iii) inferential validity of estimations from second stage regressions. According of the narrative, while the two-step process produces efficient and consistent estimates, not all resulting inferences are valid.

There is also an abundant supply of recent literature on inferential issues from two-stage modelling, notably: Oxley and McAleer (1993), McKenzie and McAleer (1997), Ba and Ng (2006) and Westerlund and Urbain (2013a).

The use of PC-augmented estimators is also consistent with the above narrative. As far as we know, Westerlund and Urbain (2012, 2013b) have drawn from existing studies to elucidate factors derived from PCA, notably: Stock and Watson (2002), Bai (2003), Pesaran (2006), Bai (2009) and Greenaway-McGrevy et al. (2012). They have established that normal inferences are possible with PC regressors provided the estimated coefficients converge at a rate $\sqrt{NT}$ towards their real values. Since, N (T) is the number of cross-sections (time series), we argue in the present exposition that our sample cannot be extended beyond nine countries because the line of inquiry is positioned on the BRICS and MINT nations.

3. 2 Estimation Technique

Consistent with Asongu and Nwachukwu (2015a), we examine contemporary and non-contemporary drivers of growth using panel regressions. Results of the Hausman test for endogeneity determine the choice of either a Fixed Effects (FE) or a Random Effects (RE) model. The specifications are also modelled to control for time-effects.

For the purpose of simplicity, we assume the presence of endogeneity, so that Eq. (1) and Eq. (2) below represent respectively the corresponding FE contemporary and non-contemporary specifications.

$$Growth_{i,t} = \alpha + \sum_{j=1}^{m} \sum_{h=1}^{n} \delta_j W_{h,i,t} + \eta_i + \xi_t + \varepsilon_{i,t} \qquad (1)$$

$$Growth_{i,t} = \alpha + \sum_{j=1}^{m} \sum_{h=1}^{n} \delta_j W_{h,i,t-1} + \eta_i + \xi_t + \varepsilon_{i,t} \qquad (2)$$

Where: $Growth_{i,t}$ is economic prosperity (represented by *GDP growth* or *real GDP output*) for country i at period t; α is a constant; W is the vector of determinants (governance dynamics and control variables); η_i is the country-specific effect; ξ_t is the time-specific effect and $\varepsilon_{i,t}$ the error term. The specifications are Heteroscedasticity and Autocorrelation Consistent (HAC) consistent in standard errors. We also control for serious issues of multicollinearity and overparameterization using the correlation matrix presented in Table 6. From a preliminary assessment of associations between governance dynamics and growth variables, nexuses with GDP growth (real GDP output) are negative (positive).

Table 6: Correlation matrix

Control Variables				Governance Variables										Dependent Variables		
Infra	Infla	Credit	Nres	VA	PS	Pgov	RQ	GE	Egov	RL	CC	Ingov	Ggov	GDP	RGDP	
1.000	-0 .102	0.210	0.277	0.032	0.291	0.198	0.291	0.190	0.248	0.132	0.141	0.143	0.212	-0.200	0.198	Infra
	1.000	-0.0004	0.077	-0.061	-0.274	-0.205	-0.124	-0.254	-0.193	-0.150	-0.253	-0.211	-0.219	-0.225	-0.339	Infla
		1.000	-0.488	0.114	0.548	0.406	0.585	0.682	0.658	0.716	0.703	0.744	0.668	0.031	0.144	Credit
			1.000	-0.269	-0.228	-0.305	-0.261	-0.345	-0.312	-0.490	-0.455	-0.495	-0.397	0.051	0.066	Nres
				1 .000	0.329	0.815	0.542	0.457	0.515	0.538	0.632	0.614	0.648	-0.409	-0.241	VA
					1.000	0.815	0.774	0.759	0.790	0.579	0.752	0.698	0.817	-0.194	0.450	PS
						1.000	0.807	0.746	0.800	0.685	0.849	0.804	0.899	-0.370	0.128	Pgov
							1.000	0.883	0.970	0.716	0.886	0.840	0.934	-0.354	0.255	RQ
								1.000	0.970	0.827	0.861	0.885	0.936	-0.163	0.393	GE
									1.000	0.795	0.900	0.889	0.963	-0.266	0.334	Egov
										1.000	0.818	0.953	0.868	-0.069	0.326	RL
											1.000	0.953	0.959	-0.229	0.181	CC
												1.000	0.958	-0.156	0.266	Ingov
													1.000	-0.263	0.282	Ggov
														1.000	0.222	GDP
															1.000	RGDP

Infra: Infrastructure. Infla: Inflation. Credit : Domestic Credit. Nres: Natural resources. VA: Voice & Accountability. PS: Political Stability. Polgov: Political governance. RQ: Regulation Quality. GE: Government Effectiveness. Egov: Economic governance. RL: Rule of Law. CC: Corruption-Control. Ingov: Institutional governance. Ggov: General governance. GDPg: GDP growth rate. RGDP: Real GDP.

4. Empirical results

The results presented in Table 7(8) are contemporary (non-contemporary) drivers of growth. In Panel A of both tables, the dependent variable is the *GDP growth rate* while in the corresponding Panel B of the two tables; *Real GDP output* is the dependent variable. As discussed in the methodology section, a decision of if the RE or FE model is appropriate, is contingent on the Hausman test. Accordingly, a FE model is adopted when the null hypothesis of the underlying test is rejected. This implies that the country-specific factors are relevant in explaining economic growth. The following general results can be observed: contemporary drivers are more significant compared to non-contemporary determinants.

The following could be established from Table 7 revealing contemporary results. First, only *political stability* is significant in stimulation GDP growth. Second, governance dynamics have a positive effect on *real GDP growth* with the following increasing order of magnitude: *institutional governance, economic governance, general governance, rule of law, corruption-control, regulation quality and government effectiveness*. It is important to note that these estimated variables are comparable for at least three reasons: (a) the same variables are employed in the specifications; (b) the number of observations in specifications is equal and (c) the line of interpretation is consistent with the underlying literature on bundling and unbundling governance (Andrés & Asongu, 2013; Asongu & Kodila-Tedika, 2016). Third, the significant control variables have signs that are consistent with expectations. Accordingly, on the one hand, the positive effects of *natural resources* and *infrastructure* on *real GDP output* are expected (Panel B). On the other hand, the negative effect of *infrastructure* on *GDP growth* may be traceable to the low usage of mobile phones for mobile banking purposes in the sampled countries.

It is relevant to devote some space in clarifying the negative effect of *infrastructure* which has been proxied by mobile phone penetration. While mobile telephony has been established to positively affect economic growth (Sridhar & Sridhar, 2007), it is comparatively less used in BRICS and MINT countries for banking-related activities. Consistent with Mohseni-Cheraghlou (2013), global averages for 'mobile phone penetration' (per 100 people), 'mobile phone used to send/receive money' (% of adults) and 'mobile phone used to pay bills' (% of adults) are respectively: 90.90, 4.71 and 3. 51. Corresponding rates in the MINT and BRICS countries are: Mexico (82.4; 1.5; 3.9); Indonesia (97.7; 0.6; 0.2); Nigeria (58.6; 9.9; 1.4); Turkey (88.7; 2.2; 4.3); Brazil (123.2; 0; 1.3), Russia (179.3; 1.5; 1.7); India (72; 0.6; 2.2); China (73.2; 0.6; 1.3) and South Africa (126.8; 5.4; 4.4). Therefore

the relative low usage of mobile phones for other services could elucidate the unexpected negative nexus of *infrastructure* with *GDP growth*[3].

Table 7: Contemporary determinants (Panel Fixed- and Random-Effects)

					Panel A : GDPg					
Constant	0.790 (0.74)	3.023 (0.259)	1.508 (0.658)	0.613 (0.813)	0.610 (0.818)	0.463 (0.862)	1.017 (0.717)	0.578 (0.832)	0.648 (0.805)	0.593 (0.817)
Voice & Accountability	0.292 (0.900)	---	---	---	---	---	---	---	---	---
Political Stability	---	**1.897** (0.027)	---	---	---	---	---	---	---	---
Political Governance	---	---	1.146 (0.176)	---	---	---	---	---	---	---
Regulation Quality	---	---	---	0.701 (0.631)	---	---	---	---	---	---
Government Effectiveness	---	---	---	---	0.247 (0.929)	---	---	---	---	---
Economic Governance	---	---	---	---	---	0.258 (0.758)	---	---	---	---
Rule of Law	---	---	---	---	---	---	1.043 (0.520)	---	---	---
Corruption-Control	---	---	---	---	---	---	---	-0.180 (0.921)	---	---
Institutional Governance	---	---	---	---	---	---	---	---	0.164 (0.736)	---
General Govevernance	---	---	---	---	---	---	---	---	---	0.455 (0.211)
Nresources	0.075 (0.612)	0.095 (0.550)	0.091 (0.516)	0.083 (0.550)	0.078 (0.616)	0.085 (0.552)	0.079 (0.590)	0.074 (0.621)	0.076 (0.600)	0.092 (0.505)
Infrastructure	**-0.036** (0.014)**	**-0.044*** (0.005)**	-0.038 (0.101)	**-0.034** (0.018)**	**-0.036** (0.033)**	**-0.034** (0.046)**	**-0.037*** (0.008)**	**-0.037** (0.014)**	**-0.03*** (0.004)**	**-0.033** (0.019)**
Inflation	0.063 (0.226)	0.052 (0.316)	0.059 (0.356)	0.064 (0.213)	0.063 (0.204)	0.064 (0.208)	0.068 (0.206)	0.060 (0.302)	0.0680 (0.229)	0.072 (0.170)
Domestic Credit	0.034 (0.149)	0.024 (0.377)	0.023 (0.533)	0.036 (0.203)	0.036 (0.213)	0.036 (0.204)	0.036 (0.203)	0.035 (0.198)	0.035 (0.210)	0.034 (0.226)
Hauman test	**13.088**	**12.171**	**12.054**	**11.766**	**10.387***	**10.083***	**12.166**	**11.605**	**11.255**	**10.579***
Time effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log-likelihood	---	---	---	---	---	---	---	---	---	---
Within variance	---	---	---	---	---	---	---	---	---	---
Between variance	---	---	---	---	---	---	---	---	---	---
Within R^2	0.498	0.517	0.511	0.499	0.498	0.498	0.499	0.498	0.498	0.502
Fisher	**7.347***	**7.758***	**7.635***	**7.364***	**7.346***	**7.358***	**7.374***	**7.346***	**7.351***	**7.429***
Observations	90	90	90	90	90	90	90	90	90	90
					Panel B : Real GDP(log)					
Constant	**5.890*** (0.000)**	**5.829*** (0.000)**	**5.856*** (0.000)**	**5.927*** (0.000)**	**5.839*** (0.000)**	**5.827*** (0.000)**	**5.980*** (0.000)**	**6.015*** (0.000)**	**5.879*** (0.000)**	**5.889*** (0.000)**
Voice & Accountability	0.060 (0.669)	---	---	---	---	---	---	---	---	---
Political Stability	---	-0.032 (0.539)	---	---	---	---	---	---	---	---
Political Governance	---	---	-0.014 (0.705)	---	---	---	---	---	---	---
Regulation Quality	---	---	---	**0.413*** (0.000)**	---	---	---	---	---	---
Government Effectiveness	---	---	---	---	**0.453*** (0.000)**	---	---	---	---	---
Economic Governance	---	---	---	---	---	**0.191*** (0.000)**	---	---	---	---
Rule of Law	---	---	---	---	---	---	**0.273**	---	---	---

[3] More information on the statistics can be found on the following link : http://blogs.worldbank.org/allaboutfinance/mobile-banking-who-driver-s-seat

							(0.014)			
Corruption-Control	---	---	---	---	---	---	---	**0.290*** (0.000)**	---	---
Institutional Governance	---	---	---	---	---	---	---	---	**0.125*** (0.000)**	---
General Govevernance	---	---	---	---	---	---	---	---	---	**1.981*** (0.000)**
Nresources	**0.019*** (0.000)**	**0.019*** (0.000)**	**0.019*** (0.000)**	**0.016*** (0.000)**	**0.020*** (0.000)**	**0.0180*** (0.000)**	**0.020*** (0.000)**	**0.015*** (0.000)**	**0.017*** (0.000)**	**0.018*** (0.000)**
Infrastructure	**0.004*** (0.000)**	**0.004 (0.000)**	**0.004*** (0.000)**	**0.004*** (0.000)**	**0.004*** (0.000)**	**0.004*** (0.000)**	**0.004*** (0.000)**	**0.004*** (0.000)**	**0.004*** (0.000)**	**0.004*** (0.000)**
Inflation	0.0001 (0.957)	0.0001 (0.961)	-0.000 (0.990)	0.001 (0.468)	0.001 (0.647)	0.002 (0.371)	0.001 (0.634)	0.004 (0.114)	0.004 (0.151)	0.002 (0.361)
Domestic Credit	0.0006 (0.691)	0.0009 (0.538)	0.001 (0.536)	0.0008 (0.527)	0.001 (0.309)	0.001 (0.325)	0.0009 (0.554)	0.0003 (0.841)	0.0005 (0.725)	0.0004 (0.760)
Hausman	3.832	2.446	3.223	2.443	1.632	1.828	2.257	2.897	1.969	1.981
Time effects	No	No	No	No	No	No	No	No	No	No
Log-likelihood	-116.2592	-115.697	-115.048	-113.238	-109.618	-111.297	-111.488	-114.710	-112.619	-112.269
Within variance	0.012	0.012	0.0124	0.008	0.010	0.008	0.011	0.011	0.010	0.010
Between variance	1.093	1.323	1.151	1.255	1.341	1.344	1.243	1.201	1.343	1.330
Adjusted R^2	---	---	---	---	---	---	---	---	---	---
Fisher	---	---	---	---	---	---	---	---	---	---
Observations	90	90	90	90	90	90	90	90	90	90

*,**,*** : significance levels of 10%, 5% and 1% respectively.

The following findings can be observed from the non-contemporary regressions in Table 8. First, for *GDP growth* (Panel A) only *political governance* and its components (*voice & accountability* and *political stability/non-violence*) have a positive effect on *GDP growth*. The order of increasing importance is: *political governance* (1.161), *political stability* (1.350) and *voice and accountability* (4.933). The corresponding order of increasing negative governance effects is: *general governance* (-0.96), *economic governance* (-1.501), *regulation quality* (-3.970), *government effectiveness* (-4.976) and *corruption-control* (-5.15).

Second, in relation to Panel B, while *political governance* and its constituents are not significant, the other variables are positively significant in the following order of increasing magnitude: *general governance* (0.093), *institutional governance* (0.141), *economic governance* (0.164), *corruption-control* (0.279), *rule of law* (0.357), *regulation quality* (0.364) and *government effectiveness* (0.377). Third, the control variables have signs that are expected for the most part. In addition to those already discussed for Table 7 (*natural resources* and *infrastructure*), *inflation* and *domestic credit* are now significant with the expected negative and positive signs respectively.

Table 8: Non-Contemporary determinants (Panel Fixed- and Random-Effects)

Panel A : GDPg										
Constant	**7.925***	**9.209****	**6.840*****	**5.227*****	**5.265*****	**5.587*****	**7.216***	**3.816****	6.019	**5.944*****
	(0.041)	**(0.021)**	**(0.000)**	**(0.000)**	**(0.002)**	**(0.000)**	**(0.062)**	**(0.014)**	(0.143)	**(0.000)**
Voice & Accountability (-1)	**4.933*****	---	---	---	---	---	---	---	---	---
	(0.003)									
Political Stability (-1)	---	**1.350***	---	---	---	---	---	---	---	---
		(0.096)								
Political Governance (-1)	---	---	**1.161****	---	---	---	---	---	---	---
			(0.010)							
Regulation Quality (-1)	---	---	---	**-3.970*****	---	---	---	---	---	---
				(0.001)						
Government Effectiveness(-1)	---	---	---	---	**-4.976*****	---	---	---	---	---
					(0.000)					
Economic Governance (-1)	---	---	---	---	---	**-1.501*****	---	---	---	---
						(0.000)				
Rule of Law (-1)	---	---	---	---	---	---	2.480	---	---	---
							(0.244)			
Corruption-Control (-1)	---	---	---	---	---	---	---	**-5.15*****	---	---
								(0.000)		
Institutional Governance (-1)	---	---	---	---	---	---	---	---	0.933	---
									(0.301)	
General Governance (-1)	---	---	---	---	---	---	---	---	---	**-0.96*****
										(0.003)
Natural Resources (-1)	**0.141***	0.144	0.148	0.058	0.025	0.043	0.136	0.033	0.131	0.022
	(0.041)	(0.184)	(0.157)	(0.396)	(0.740)	(0.553)	(0.151)	(0.609)	(0.123)	(0.758)
Infrastructure (-1)	**-0.021***	**-0.043*****	**-0.039*****	**-0.039*****	**-0.041*****	**-0.040*****	**-0.038*****	**-0.04*****	**-0.03*****	**-0.04*****
	(0.062)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.001)**	**(0.000)**	**(0.000)**	**(0.006)**	**(0.001)**
Inflation (-1)	0.003	-0.025	-0.020	-0.093	-0.096	-0.097	-0.0009	**-0.150****	0.016	-0.106
	(0.924)	(0.512)	(0.583)	(0.137)	(0.137)	(0.129)	(0.979)	**(0.022)**	(0.709)	(0.101)
Domestic Credit (-1)	-0.003	0.006	0.001	**0.028*****	**0.032****	**0.031****	0.018	**0.035*****	0.016	**0.030****
	(0.925)	(0.874)	(0.963)	**(0.007)**	**(0.015)**	**(0.010)**	(0.619)	**(0.001)**	(0.685)	**(0.010)**
Hauman test	**11.995****	**9.265***	**9.044***	8.403	7.159	5.160	**13.064****	5.897	**9.582***	6.272
Time effects	Yes	Yes	Yes	No	No	No	Yes	No	Yes	No
Log-likelihood	---	---	---	-202.225	-205.460	-202.699	---	-200.602	---	-202.816
Within variance	---	---	---	8.488	8.123	8.460	---	8.504	---	8.502
Between variance	---	---	---	1.922	3.003	2.551	---	1.819	---	2.390
Within R^2	0.517	0.509	0.5140	---	---	---	0.507	---	0.507	---
Fisher	**7.372*****	**7.212*****	**7.297*****	---	---	---	**7.158*****	---	**7.167*****	---
Observations	81	81	81	81	81	81	81	81	81	81
Panel B : Real GDP(log)										
Constant	**6.012*****	**5.957*****	**5.969*****	**5.999*****	**5.937*****	**5.913*****	**6.107*****	**6.095*****	**5.964*****	**5.976*****
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Voice & Accountability (-1)	0.116	---	---	---	---	---	---	---	---	---
	(0.406)									
Political Stability (-1)	---	-0.008	---	---	---	---	---	---	---	---
		(0.878)								
Political Governance (-1)	---	---	0.004	---	---	---	---	---	---	---
			(0.902)							
Regulation Quality (-1)	---	---	---	**0.364*****	---	---	---	---	---	---
				(0.000)						
Government Effectiveness(-1)	---	---	---	---	**0.377*****	---	---	---	---	---
					(0.003)					
Economic Governance (-1)	---	---	---	---	---	**0.164*****	---	---	---	---
						(0.000)				
Rule of Law (-1)	---	---	---	---	---	---	**0.357*****	---	---	---
							(0.001)			
Corruption-Control (-1)	---	---	---	---	---	---	---	**0.279*****	---	---
								(0.005)		
Institutional Governance (-1)	---	---	---	---	---	---	---	---	**0.141*****	---
									(0.000)	
General Governance (-1)	---	---	---	---	---	---	---	---	---	**0.093*****
										(0.000)
Natural Resources (-1)	**0.016*****	**0.016*****	**0.016*****	**0.013*****	**0.017*****	**0.015*****	**0.016*****	**0.012*****	**0.013*****	**0.015*****
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.005)**	**(0.001)**	**(0.000)**

Infrastructure (-1)	**0.004*** **	**0.004*** **	**0.004*** **	**0.004*** **	**0.004*** **	**0.004*** **	**0.003*** **	**0.004*** **	**0.004*** **	**0.004*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Inflation (-1)	0.000	-0.0004	-0.0004	0.001	0.0004	0.001	0.001	0.004	0.004	0.001
	(0.982)	(0.885)	(0.861)	(0.653)	(0.868)	(0.599)	(0.573)	(0.157)	(0.114)	(0.449)
Domestic Credit (-1)	0.0005	0.0009	0.0008	0.001	0.001	0.001	0.001	0.0006	0.0008	0.0007
	(0.755)	(0.559)	(0.589)	(0.392)	(0.305)	(0.256)	(0.471)	(0.686)	(0.589)	(0.629)
Hausman	4.009	2.417	3.053	2.518	1.704	1.918	2.176	3.001	2.009	2.025
Time effects	No	No	No	No	No	No	No	No	No	No
Log-likelihood	-105.388	-103.105	-102.912	-101.636	-99.003	-100.24	-99.418	-103.007	-101.275	-100.842
Within variance	0.011	0.011	0.011	0.008	0.0100	0.008	0.009	0.010	0.009	0.009
Between variance	1.1015	1.306	1.172	1.240	1.342	1.332	1.242	1.185	1.341	1.323
Adjusted R^2	---	---	---	---	---	---	---	---	---	---
Fisher	---	---	---	---	---	---	---	---	---	---
Observations	81	81	81	81	81	81	81	81	81	81

*,**,*** : significance levels of 10%, 5% and 1% respectively.

5. Concluding implications

We discuss concluding implications in five main strands, notably: differences in contemporary and non-contemporary specifications; heterogeneity in *political governance*; differences in the effects of other governance dynamics; interesting magnitude of *economic governance* on *real GDP output* and negative effects on *GDP growth* in non-contemporary regressions.

First, the evidence that governance is more positively significant in non-contemporary specifications as opposed to contemporary regressions implies that some lag is necessary for growth-targeting or timing of growth dynamics based on anticipated drivers. The interesting policy implication is that growth drivers for the most part are more significantly determined by past information.

Second, there is some interesting evidence on the heterogeneity of the *political governance* driver. We have observed that *political governance* and its constituents (*political stability* and *voice & accountability*) are significantly positive in *GDP growth* but insignificant in *real GDP output* regressions. The inference is consistent for both contemporary and non-contemporary specifications. A resulting implication is that the election and replacement of political leaders (or political governance) is a more important driver of economic growth, with the significance of effects more apparent in non-contemporary regressions.

Third, for the other governance dynamics, we have noticed that they are more significant determinants of *real GDP output*, as opposed to *GDP growth*. Accordingly, they are insignificant in contemporary regressions and negatively significant in non-contemporary regressions for *GDP growth*. As a policy implication, the formulation and implementation of policies that deliver public commodities (or *economic governance*) and the respect of the

State and citizens of institutions that govern interactions between them (or *institutional governance*) are more positively predisposed to driving *real GDP output* than *GDP growth*.

Fourth, we have also noticed that the constituents of *economic governance* have the highest magnitude in the positive effects of governance dynamics on *real GDP output*. The dominance of *economic governance* is consistent with Asongu and Nwachukwu (2015) in which economic governance, government effectiveness and regulation quality are the most significant determinants of FDI in terms of magnitude. This finding is also consistent with the underlying institutional literature on innovation. Accordingly, Oluwatobi et al. (2014) have recently concluded that the most instrumental driving force in governance for innovation in Africa is economic governance and its consituents. Asongu and Nwachukwu (2015) and Oluwatobi et al. (2014) converge in the perspective that innovation is proxied with FDI in the underlying literaure on bundling and unbundling governance (Andrés et al., 2014, p.10).

Fifth, the negative effect on GDP growth of economic and institutional governance dyanmics in non-contemporary regressions and insignificance in corresponding contemporary specifications may imply that these dynamics in governance are less sensitive to 'business cycle' effects from a contemporary perspective and more negatively senstive from a non-contemporary view point. This inference is on the assumption that, *GDP growth* is more 'business cycle' sensitive, compared to *real GDP output*. Elucicating this concern is an interesting future research direction.

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