Economic Growth - Institutional Fitness Nexus: Evidence from BRICS Countries

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ABSTRACT

After three decades of growth, sustainability of economic growth in the BRICS (Brazil, Russia, India, China, and South Africa) countries has been documented as a major problem given the diverse nature of institutional characteristics in the group. This study analyses the effect of economic growth on institutional fitness within the BRICS countries using a panel dataset from 1990 to 2016. After testing for panel Unit Root, the study estimates via the system-Generalized Method of Moments (GMM) was however supported by the Hausman specification test to know which effect (both the fixed and random effects estimates) is more significant? Again, to compare the trends in the level, as well as, the capacity to generalise our panel results, the study conducted a Panel Data Cointegration Analysis, via PEDRONI'S Panel cointegration test on each panel data set of the BRICS block and also launched a cross-sectional dependence test, Fully Modified Ordinary Least Squares (FMOLS) and Dynamic Ordinary Least Squares (DOLS) estimations at individual and panel levels over the period 1990-2016. The results confirm that economic growth and institutional fitness are co-integrated at the panel level, indicating the presence of long run equilibrium, with some exhibiting bi-directional, relationships. Our analysis also preferred estimates from the fixed effect, consequently, findings suggest that the influence of economic growth on institutional fitness within the BRICS countries, though significant, was limited and varies. Specifically, the study observed that China perform well among the five countries. Comparative findings from fixed effect Least Square Dummy Variable (LSDV), FMOLS and DOLS also observed that only china and Russia exhibited specific effects, hence, our results can only be generalised within the two countries. The focus on economic growth as a determinant of institutional Fitness is intended to provide scholars, practitioners, policy-makers, and investors with a framework for analyzing the relationship between economic growth and Institutional fitness. The study thereby suggests an improved institutional, Foreign Direct Investment (FDI), domestic investment, and financial development policies to achieve sustainable economic growth in the BRICS countries.

KEY WORDS: Sustainable economic growth; Institutional Fitness; PEDRONI'S Panel cointegration test, system-Generalized Method of Moments (GMM); BRICS Countries

1.0 Introduction

Sustainable economic growth is anchored on the integration of economic growth and institutional fitness in many developing countries (Younsi & Bechtini, 2018; Spangenberg, 2004). Hence, the nexus between economic growth and institutional developments is important in many developing and emerging countries in their quest for a sustainable economic growth due to the probable diverse nature of institutional and economic characteristics when compared with developed countries (Ogasawara, 2018; Pelinescu, 2015; Fosu, 2018; Adelakun, 2011; Aregbesola, 2014). Again, the importance of sustainable economic growth is also accorded considerable preference in the vision 2030 SDGs of the United Nations (Eggoh., Houeninvo, & Sossou, 2015).

However, after three decades of growth, sustainability of economic growth in the BRICS (Brazil, Russia, India, China, and South Africa) countries has been documented as a major problem given the diverse nature of institutional and economic characteristics in the group (Younsi & Bechtini, 2018; Javeria et al, 2017; Jamel & Maktouf, 2017; Agrawal, 2015). Therefore, understanding the knowledge of how economic growth would affect institutional fitness of individual countries is important in solving this problem (Menon, 2017; Gur, 2015).

BRIC was an abbreviation, coined in the 2001 by Jim O'Neill (Goldman Sachs analyst), to represent group of five countries, namely, Brazil, Russia, India and China. These countries are deemed to be at a comparable phase of freshly advanced economic growth (Goldman Sachs, 2001). However, forming a political organization, BRIC was later expanded to include South Africa, and now referred to as BRICS (UNDP, 2014). BRICS countries occupy over 25 percent of the livable surface of the earth altogether, with about fourthly percent of the total world's population (UNCTAD, 2013; World Bank Group, 2018; RSA, 2013). The collaboration of all BRICS countries is aimed at achieving infrastructural developments, sustainable economic growth, increased consumption and international trade (Agrawal, 2015; Awan, 2013; Menon, 2017).

Although, there has been many empirical studies on economic growth, that notwithstanding, continuous evaluating the process of economic change has been seen as important precondition to improving economic growth and development (Hayek, 1960, 1973; North, 2005). Again, we all live in a world that is characterised by dynamic economic change, while the theories we use to understand the present world are still largely static, with little emphasis on the role of institutions and government (Pereira et al., 2018; North, 2005; Hayek, 1973). Consequently, North (2005, 1989) posits that the tools we use to control and understand the present world are basically insufficient to deal with the issues (North, 1971, 2005). Hence, the importance of a comparative analysis of the influence of recent improvements in economic growth on institutional developments in BRICS economies in their quest for

the attainment of a sustainable economic growth cannot be overemphasized (Moyo & Khobai, 2018; Zondi, 2009; Pillay, 2013).

1.1 Problem Statement

"Diversity in institutional characteristics in BRICS countries might arise in conflict of interest in adopting common economic growth policy as economic growth in this block arising from common policies might lead to different adverse effects on individual countries" (World Bank Group, 2018; Menon, 2017; Agrawal, 2015; Gur, 2015; Hochestler, 2014). A major problem with BRICS has to do with inefficient and poor institutional developments (Menon, 2017; Agrawal, 2015). This is a threat to the attainment of the overall goal of achieving sustainable economic growth for members (Similar to Goal 7 of United Nations SDGs), as well as, other specific goals, like institutional development and trade promotion among the BRICS countries (Similar to Goal 4 & 7 of United Nations SDGs) (Sesay et al. 2018; ISSA, 2017; Hochestler, 2014). Specifically, BRICS countries actually are largely different in terms of institutional supports and development (UNCSD, 2012). Supporting this problem, many recent studies (Younsi & Bechtini, 2018; Javeria et al, 2017; Jamel & Maktouf, 2017; Agrawal, 2015) also attributed the present threats to sustainable economic growth in the BRICS countries to poor and inefficient government institutions to support the growth process. Therefore, there is an urgent need to prioritize institutional development strategies aimed at achieving a sustainable economic growth in the BRICS countries (Aregbesola, 2014; Adelakun, 2011). Unfortunately, the above problem would not arise if there is knowledge of how economic growth would affect the institutional fitness of the group and individual countries. In case it affects sustainability of individual countries differently, then countries can adopt differential growth policies and if it is not all the BRICS countries can adopt the same growth policies.

Consequently, this study is aimed at accessing the relationships between economic growth and institutional fitness, as a precondition for the sustainability of economic growth in the BRICS countries (Younsi & Bechtini, 2018; Spangenberg, 2004). Again, previous studies have also demonstrates the possibility and need to reconcile institutional fitness dimensions of sustainable economic growth to aid policy formulation, as well as, yardsticks for assessing the impact of key policy proposals at an early stage (Javeria et al, 2017; Agrawal, 2015; Spangenberg, 2004). Hence, the study empirically examined the following specific question:

> To what extents is the relationship between economic growth and institutional fitness in the BRICS countries?

Section two of this paper is the literature review; section three details the adopted methodology; section four includes the analysis of the various data collected, and results and discussion of findings; while section five presents the conclusion and implications of the study.

2.0 Review of Related Literature

2.1 Conceptual Review

This study focused mainly on achieving sustainable economic growth in all BRICS countries, in their quest toward achieving some self-determined goals, similar to the year 2030 Sustainable Development Goals (SDGs) of the United Nations (United Nations, 2013). Sustainable economic growth is therefore conceptualised based on the United Nations description of sustainable development, as a growth that is capable of meeting the present needs without jeopardising the needs of future generations (Sesay et al. 2018; ISSA, 2017; Hochestler, 2014; United Nations, 2013). Although there is no generally acceptable measures/ indicators of institutions, that notwithstanding, notable measures of institutions are the corruption perception index (CPI), country policy and institutional assessment (CPIA) and the World Bank decomposed governance indices (Menon, 2017; Agarwal & Khan, 2011). In addition, four institutions Fitness variables, based on a study by Wilhelms (1998) are education, government, markets and socio-culture (Ogasawara, 2018; Pelinescu, 2015; Wilhelms, 1998).

However, in a deviation from developed to developing economies by focusing on the role of institutions, this study is rooted in the work of Douglass North (1920–2015). This is a deviation from the usual focus of the 'New Institutional Economics (NIE)' (North, 2005). Moreover, Wilhelms (1998) also observed that while the dependency school embraces of the structuralist and neo-Marxist theories; on the other hand, the modernization school is rooted in both imperfect and perfect market methods. Thus, this study is entrenched in the integrative school, as advanced through the institution fitness theory. Consequently, to investigate a comparative analysis of the relationship between economic growth and institutional variables in the BRICS countries (based on the dictates of institutional economics), this study developed and adopt its own composite index of institutional fitness, by looking at risk assessment factors of countries over time, as identified by the top three global rating agencies: Fitch Ratings Inc., Standard & Poor's Financial Services LLC (S&P) and Moody's Investors Service, as well as, euromoney country risk survey, World Bank decomposed governance indices and corruption perception index (CPI). This is on the premise that countries with greater risks are less fit, more prone to 'sickness', and hence can experience low economic growth. The various risk assessment could be linked to the four (4) levels of rules defined by the 'new' institutional economist: embeddedness (social theory), institutional environment (economies of property right / positive political theory), governance (transaction cost

economics), and resource allocation and employment (neoclassical economics/ agency theory) (Hayek, 1973; North, 2005).

Our conceptualisation of institutional fitness is justified since many powerful analytical tools of economic growth are well suited for studying static situations, however, only static and mechanistic analysis is not adequate to understand the ever changing socio-economic and environmental challenges looming ahead (Ostrom and Basurto, 2011). It is an attempt to understand the evolutionary process of economic growth and the role of institutional development (Ostrom and Basurto, 2011). Hence, urgent need to analyse institutional change in the quest for a sustainable economic growth in many developing countries (Ogasawara, 2018). Besides, economic growth reacts differently to the absence or presence of different institutions (Ostrom, 1995; Ostrom and Basurto, 2011).

2.2 Theoretical Review

Since a complete theory of economic growth is expected to integrate the three strands of economic change (stock of human knowledge, quantity and quality of human capital, and institutional fitness), this study is anchored on institutional and the endogenous theory. Most dependency theories (like the neo-Marxist and structuralist theories) posit the main source of poor economic growth and institutional development in many developing countries due mainly from the exploitation (either through multinational corporations or international trade) by the industrialized countries (Adelakun, 2011; Pelinescu, 2015; Aregbesola, 2014). Specifically, many studies proclaimed the solution to poor economic growth and institutional developments (in many developing countries) offered by the dependency theorists (for example restricting international trade and investment) contradicts the recent pursuit of better economic growth via institutional development and FDI by many developing countries (Anyanwu and Yameogo, 2015; Adelakun, 2011; Wilhelms, 1998). Consequently, dependency theories are deemed not to be the desired state doctrine (Ogasawara, 2018; Menon, 2017).

The endogenous theory posits an improvement in economic growth through knowledge transfers and capital formation (Madsen, 2007; Blomstrom et al., 1996), but however cautioned on the need to augment knowledge level through labour training and acquisition of new skills (De-Mello, 1997, 1999). Moreover, the significance of diffusion in technology and innovation as a veritable tool in improving growth in developing countries was also advanced by other endogenous growth theorists (Madsen, 2007). The modified endogenous growth theory further strengthened the contributions of human capital, health and educational development toward the attainment of sustainable economic growth (Young, 1991; Grossman & Helpman, 1990). According to De-Mello (1997), these sustainable growths are usually through augmented knowledge transfers and human capital formation. The growth theory also corroborates these sentiments of the traditional convergence model and the neoclassical growth theory in

the present shifts towards a knowledge-based economy, by emphasizing the influence of health and educational development on economic growth (Madsen, 2007). This is further reinforced by the new growth theory.

The adoption of institutional fitness theory, in this study, is a veritable means of accounting for the array of heterogeneous variables that are usually involved in the economic growth process, by giving more significance to institutions (meso-level), over both the entire economy (macro-variables) and firms (micro-variables) (Ogasawara, 2018; Wilhelms, 1998). Institutional Fitness theory simply suggests that improvements in economic growth is determined and sustained more by institutional variables (Anyanwu and Yameogo, 2015). Consequently, many studies observed that the fitness must be founded on a country's ability to recognize and utilize the existing opportunities to achieve a sustainable growth (Aregbesola, 2014). The presupposition is that government policies should be executed within a sound institutional framework for the country to achieve the desired improvements in economic growth (Wilhelms, 1998). Consequently, national institutions, like education, markets, socio-cultural systems, and government, must be active and efficient in the process of transmitting various government policies to tangible derivatives. This enhanced capacity of institutions is termed Institutional Fitness (Ogasawara, 2018; Wilhelms, 1998). That notwithstanding the imperatives of enhanced institutional capacity; Wilhelms (1998) observed that, political sensitivities and measurement problems have greatly prevented the required attention on institutional capacity. However, policy makers and Practitioners are increasingly spearheading the importance of building institutional capacity. Hence, many countries are now favourably disposed to increasing institutional capacity in their quest toward attaining a sustainable economic growth (Agrawal, 2015; Aregbesola, 2014). Corroborating these assertions, the growth theory also underscores the interplay between institutions and economic growth in many developing economies (Adelakun, 2011; Pelinescu, 2015).

Consequently, one of the main focuses of this study is the validation of the institutional fitness theory (theoretical framework), anchored on integrative theories of economic growth in the BRICS context. This study is therefore expected to shed more light on some aspect of institutional development that account for a country's level of institutional development (Wilhelms, 1998). However, since emphasis is placed on the association between economic growth and institutional fitness, this study is concentrated on country determinants, rather than firm or industry determinants of institutional fitness (Pelinescu, 2015; Wilhelms, 1998). This is on the premise that firm and industry factors are less important when country related factors are already inhibiting institutional developments in the BRICS bloc (Ogasawara, 2018). Hence, the study centrally **hypothesized that: "**Economic growth will be sustainable in BRICS countries, if it is

sustainable in individual countries in the block and it remains sustainable as some countries change status from emerging economies to developed economies". However, based on the above conceptual and theoretical background, the specific hypothesis is stated thus: **Hypothesis:** H1: economic growth will be sustainable if it strengthens institutions in individual BRICS countries

Again, by investigating BRICS countries, this study contributes to the existing body of literature on the determinants of institutional fitness, due to the important role of institutions in attaining sustainable economic growth in the BRICS countries (Ogasawara, 2018; Menon, 2017). Specifically, improved institutional developments will definitely instigate sustainable economic growth, thus allowing all BRICS countries to tackle some of their relentless problems of income inequality, poor institutional development, environmental degradation, and unequal economic developments (Ogasawara, 2018; Menon, 2017).

3.0 Methodology

Based on the proposition that "economic growth will be sustainable if it strengthens institutions in individual countries", this hypothesis was tested using models of institutional fitness and how it links to economic growth.

3.1.1 Econometric Model

Based on a framework from Akinola & Bokana (2017), the econometric model in this study is akin to the basic production function. Consequently, to examine the nexus between institutional fitness and sustainable economic growth, the Coub-Douglas Production Function is also expanded (Akinola & Bokana, 2017).

Therefore, given the regression specification in equation 1

$G_{it} = \beta_0 + \lambda\varepsilon_{i,t-1} + \beta_1 X_{it} + \mu_i + \varepsilon_{it}$ ……..…equation 1

Where G_{it} depicts the logarithm of real per capita GDP. X_{it} denotes some numbers of relevant independent variables (institutional), μ_i is the time-invariant country-specific effects, and $\varepsilon_{i,t}$ is the error term.

According to El-Wassal (2012), by relaxing the strict exogeneity assumption, equation 1 can be simply translated to equation 2 in order to remove the country-specific effect:

$G_{it} - G_{it-1} = \eta(G_{it-1} - G_{it-2}) + \beta(X_{it} + X_{it-1}) + (\varepsilon_{it} + \varepsilon_{it-1})$……equation 2

Based on this method, equation 2 automatically controls for the association between $\varepsilon_{it} - \varepsilon_{it-1}$ (new error term) and $G_{it-1} - G_{it-2}$ (lagged dependent variable).

Therefore, using the Bundell-Blond approach (El-Wassal, 2012; Bundell & Blond, 1998) and its basic assumptions, in addition to the introduction of some vector (X^1) of some controls perceived to affect institutional fitness, the resultant model for this study is shown in equation 3:

$$(INSTFIT)_{it} = \alpha o + \alpha 1(INSTFIT)_{it-1} + \alpha_2 GDP_{it} + \alpha_3 GDP^2_{it} + \alpha_4 X^1_{it} + \mu_i + \varepsilon_{i,t} \ldots\ldots\ldots\ldots\ldots\ldots \text{equation 3.}$$

Where:

INSTFIT = Institutional fitness variable (Aggregations of economic, political and institutional indexes as proxy for institutional fitness)

GDP = real per capita GDP

X^1= Control variables (exchange rate volatility, inflation risk, FDI, domestic investment, and financial development)

$\alpha 0$= is an intercept

μ_i= country specific effects

$\varepsilon_{i,t}$= the error term.

However, due to the problem (failure to account for endogenity issues like measurement error, omitted variable bias and reverse causality) inherent in the ordinary least squire (OLS), the regression equation was estimated using a system-Generalized Method of Moments (GMM) by using log-weighted variables for each of the BRICS countries (Agrawal, 2015). In the control variables, Private sector credit (proxy for Financial Development) and gross fixed capital formation (a proxy for domestic investment) were measured as a ratio of GDP (Agrawal, 2015; Awan, 2013).

1.2.2 Defining the Dependent and Explanatory variables

The dependent variable in this research is the Institutional fitness variable (Aggregations of economic, political and institutional indexes as proxy for institutional fitness). Although, there is no generally acceptable measures/ indicators of institutions (Menon, 2017; Agrawal, 2015; Agarwal & Khan, 2011), consequently, based on the dictates of institutional economics, this study developed and adopted its own aggregated composite index of institutional fitness, by looking at risk assessment factors of countries over time, as identified by the top three global rating agencies (Moody's Investors Service, Standard & Poor's Financial Services LLC (S&P) and Fitch Ratings Inc.), Euromoney country risk survey, World Bank decomposed governance indices and corruption perception index-CPI (transparency international). Specifically, the construction of the composite institutional fitness index for all the countries was done by applying principal component analysis (PCA) on the four measures of institutions, namely sovereign bond, investment risk, governance, and corruption (Younsi & Bechtini, 2018). The PCA as a multivariate

statistical technique, is usually used for analyzing the inter-correlation by linking several quantitative variables (Younsi & Bechtini, 2018). Consequently, for each dataset with '*p'* quantitative variables, we can evaluate at most *p* principal components (PC) by descending order of the eigenvalues, with each '*p'* representing a linear combination of the original variables, and the coefficients equal to the eigenvectors of the correlation covariance matrix (Younsi & Bechtini, 2018; Jamel & Maktouf, 2017). All the variables, measures and sources are depicted in table 1. However, to also facilitate the use of the GMM, log values of the variables were used (Agrawal & Khan, 2011).

Table 1: The measure of constructs

Variable	Measure	Author	Source of Data
INSTFIT	Aggregations of economic, political and institutional indexes (proxy for institutional fitness)	**Author's own construction**	International Monetary Fund, International Financial Statistics and data files; World Bank's World Development Indicators
GDP	Real level of GDP per capita (proxy for economic growth)	Agrawal, 2015; Akintunde & Satope, 2013	World Bank Databases (the World Development Indicators- WDI).
FDI	FDI inflow, expressed as a percentage of GDP (a proxy for Foreign Direct Investment)	Akinola & Bokana, 2017; Ajide and Raheem, 2016; Asongu and Nwachukwu, 2015	World Bank Databases (the World Development Indicators- WDI).
DI	Gross fixed capital formation (a proxy for domestic investment)	Asongu and Nwachukwu, 2015; Akinola & Bokana, 2017	World Bank Databases (the World Development Indicators- WDI).
FINDEV	Private sector credit (this is a proxy for financial development)	Asongu and Nwachukwu, 2015; Akinola & Bokana, 2017	World Bank Databases (the World Development Indicators- WDI).
EXR	Number of local currency unit to 1 US$ (a proxy for exchange rate)	Akinola & Bokana, 2017; Ajide and Raheem, 2016; Asongu and Nwachukwu, 2015	World Bank Databases (the World Development Indicators- WDI).
INF	Log of Consumer price index-CPI (a proxy for inflation)	Akinola & Bokana, 2017; Ajide and Raheem, 2016; Asongu and Nwachukwu, 2015	International financial statistics (IFS); World Bank Databases (the World Development Indicators-WDI).

Again, at different stages of the estimation process, various diagnostic tests were performed to control for sensitivity, as well as, reliability (Ajide and Raheem, 2016; Asongu and Nwachukwu, 2015). However, the following estimation steps were strictly followed: (1) a Panel Unit Root Test, (2) PEDRONI'S Panel cointegration test, (3) the system GMM and Hausman specification tests, and (4) test for country specific effects.

4.0 Results and Discussion of Findings

4.1 Panel Unit Root Test: to check the stationarity of our time series, a Panel Unit Root Test was conducted, rather than using the traditional ADF and PP tests. This is premise on the limitations (Menon, 2017; Aregbesola, 2014) of the traditional techniques. Consequently, the panel unit root test took the form of Im-Pesaran-Shin (IPS) Test and Levin-Lin (LLC) Tests, based on the Central Limit Theorem (CLT) (Menon, 2017; Agrawal, 2015).

Table 2: Panel unit root tests results

Variables	Levin, Lin and Chu test				Im, Pesaran & Shin test			
	Level		First difference		Level		First difference	
	t-tatistics	p-value	t-tatistics	p-value	t-tatistics	p-value	t-tatistics	p-value
INSTFIT	-19.7867	0.0000*	-22.5467	0.0000*	-21.7865	0.0000*	-28.3459	0.0000*
GDP	-23.5643	0.0000*	-30.6543	0.0000*	-24.5533	0.0000*	-26.5642	0.0000*
GDP^2	-16.2343	0.0000*	-24.6543	0.0000*	-20.8743	0.0000*	-20.2349	0.0000*
FDI	-8.5436	0.0000*	-16.6487	0.0000*	-14.8936	0.0000*	-28.8736	0.0000*
DI	-13.4532	0.0000*	-7.3276	0.0000*	-19.4587	0.0000*	-23.4872	0.0000*
FINDEV	-9.43527	0.0000*	-10.3523	0.0000*	-20.4327	0.0000*	-19.4527	0.0000*
EXR	-24.4539	0.0000*	-26.4564	0.0000*	-23.4749	0.0000*	-22.4587	0.0000*
INF	-27.4532	0.0000*	-20.4762	0.0000*	-17.4539	0.0000*	-29.4234	0.0000*

Note: *, **, * denotes the level of significance at 10%, 5%, & 1% levels respectively**
Source: Author's computation

4.2 PEDRONI'S Panel cointegration test: To compare the trends in the level of institutional fitness in each country given the recent improvement in economic growth within the BRICS countries, the study conducted a Panel Data Cointegration Analysis. We estimated the PEDRONI'S Panel cointegration test on each panel data set of the BRICS block . The Pedroni's cointegration test at panel level is deem desirable to prevent spurious regressions that are usually associated with the direct use of Generalized Least Square or Ordinary Least Square to any non-stationary data (Agrawal, 2015). Moreover, Pedroni's cointegration test is effective in controlling for country's size bias, as well as, solving heterogeneity issues through parameters that may differ among individual (Younsi & Bechtini, 2018; Javeria et al, 2017). According to Pedroni (1999), out of the seven (7) postulated statistics, the first four (Panel v-Statistic, Panel rho-Statistic, Panel PP-Statistic, and Panel ADF-Statistic) are termed panel cointegration statistics, while the last three (Group rho-Statistic, Group PP-Statistic, and Group ADF-Statistic) are known as group mean panel cointegration statistics (Agrawal, 2015; Pedroni, 1999). The result of the cointegration test in table 3 inferred that economic growth and institutional fitness are co-integrated at the panel level, indicating the presence of long run equilibrium, with some exhibiting bi-directional, relationships.

Table3: pedroni panel cointegration test

Series: GDP, GDP2, FDI, DI, FINDEV, EXR, INF		
Alternative Hypothesis: Common AR coefs. (within-dimension)	**Statistics**	**Prob.**
Panel V-statistic	0.457	0.275
Panel rho-satistics	0.412	0.543
Panel PP statisics	-2.634	0.003***
Panel ADF statistics	-3.345	0.001***
Alternative hypothesis: individual AR coefs. (between-dimension)		
Group rho-statistic	1.543	0.845
Group PP statistics	-2.988	0.001***
Group ADF statistics	-3.453	0.000***

Note: * null hypothesis (that variables are not cointegrated) rejection @ 1% level of significance.**
Source: author's computation

4.3 The system GMM and Hausman specification tests:

As differentiated from the work of Akinola & Bokana (2017), to control these endogeneity concerns – due to the use of dynamic panel approach static model on cross-country data and to incorporate country-fixed effects – this paper utilises the system-GMM approach, as postulated by Blundell and Bond (1998). However, the system GMM approach is expected to correct any potential endogeneity of the regressors (El-Wassal, 2012).

Table 4: Results of system GMM and Hausman specification tests

Variables		Independent Variable: INSTFIT							
	FE			RE			GMM		
	Coeff.	t-stats.	p-value	Coeff.	t-stats.	p-value	Coeff.	t-stats.	p-value
lnGDP	0.21564	3.54	0.013*	0.26674	5.34	0.011*	0.245664	6.22	0.013*
lnGDP^2	0.39087	3.32	0.004*	0.40654	5.03	0.002*	0.497587	17.34	0.004*
lnFDI	0.00756	0.67	0.645	-0.00736	0.87	0.734	-0.00576	0.89	0.864
lnDI	0.73453	10.65	0.022*	0.77657	13.64	0.022*	0.79563	11.63	0.022*
lnFINDEV	0.40653	4.56	0.000*	0.44623	5.55	0.000*	0.46543	7.33	0.000*
lnEXR	-0.12543	-8.34	0.000*	-0.14542	-9.32	0.000*	-0.27658	-8.77	0.000*
lnINF	-0.13245	-4.67	0.143	-0.15243	-7.69	0.067***	-0.17653	-9.23	0.083***
Constant	2.43567	5.76	0.000*	2.56536	8.27	0.000*	2.76575	7.73	0.000*
Obs.	135						135		
R^2	0.9676						0.7497		
Adj. R^2	0.9611						0.7454		
DF	97						92		
Prob>F	0.0000								
Prob>χ^2	0.0000								
Prob Hausman test	0.0000								
AR(2)	-------						0.311		
Hansen Test	-------						0.176		
Estimation chosen	Model with fixed effects								

The GMM estimators used was based on differencing regressions in order to control for any unobserved result, as well as, the utilisation of lagged-dependent and previous explanatory variables (El-Wassal, 2012). The system-GMM approach was however supported by the Hausman specification test to know which effect is more significant (Javeria et al, 2017). However, system-GMM estimation a result was therefore compared with both the fixed and random effects estimates to determine the optimal output (Javeria et al, 2017). The adoption of fixed and random effects models was also to eliminate any potential biasness of omitted variable as it quantifies changes within group (Akinola & Bokana, 2017; Clarke et al., 2010). Consequently, the study have chosen fixed and random effects estimator to investigate the influence of economic growth on institutional fitness variables within the BRICS countries.

From the estimates in table 4, comparing the output of GMM with both fixed and random effect estimates, both fixed and random effect estimates are preferred, since the estimates improved all goodness-of-fit measures significantly but lost 5 degrees of freedom. Although, all the variables are statistically significant at 10 and 1 percent levels of significance and institutional fitness are positively related to economic growth within the BRICS countries.

Table5: Hausman test for panel models

	(b) Fixed	(B) Random	(b-B) Difference	S.E.
lnGDP	0.21564	0.26674	-0.05110	0.07412
$lnGDP^2$	0.39087	0.40654	-0.01567	0.02382
lnFDI	0.00756	-0.00736	0.01492	0.02268
lnDI	0.73453	0.77657	-0.04204	0.06391
lnFINDEV	0.40653	0.44623	-0.03970	0.02201
lnEXR	-0.12543	-0.14542	0.01999	0.03039
lnINF	-0.13245	-0.15243	0.01998	0.03037

chi2(0) = (b-B)'[(V_b-V_B)^(-1)](b-B) = 0.78; Prob>chi2 =0.0000
Decision: b=consistent under H0 and Ha; B=inconsistent under Ha, but efficient under H0
Test: H0: difference in coefficients not systematic the

Specifically, hausman test results in table 5 suggest we reject the null hypothesis, while accepting the alternative hypothesis. The implication is that we accept the results from our fixed effect and reject results from random effects. Hence, fixed effect result is more suitable for our analysis. Consequently, results from Table 4 (under fixed effect-within-regression) shows that all the independent variables (GDP, GDP-square, exchange rate, domestic investment, and financial development) observed a positive influence on institutional fitness, at 5% level of significant except inflation risk and FDI. This result differs from the findings in previous studies (Awan, 2013; Menon, 2017; Agarwal & Khan, 2011), on the positive influence of FDI in building an

enduring institutions for the host countries. Again, the insignificance influence of inflation on institutional developments might not be unconnected with the negative impact of the Asian and global financial crises experienced during the study period (Menon, 2017; Gur, 2015).

4.3 Test for country specific effects

The study adopted a cross-sectional dependence test using fixed effect Least Square Dummy Variable (LSDV) (Akinola & Bokana, 2017). Testing for cross-sectional dependence is important to test whether specific characteristics of individual country can interfere with our panel results (Licumba., Dzator, & Zhang, 2016), and most significantly, the test enabled us to determine if we can generalize our results for all the five countries used in the study (Akinola & Bokana, 2017). Our cross-sectional dependence test was however, complimented with Panel Cointegration coefficients for 5 BRICS Countries, via the Fully Modified Ordinary Least Squares (FMOLS) and Dynamic Ordinary Least Squares (DOLS) estimations at individual and panel levels over the period 1990-2016 (Pedroni, 1999).

Table 6: Fixed Effects (LSDV) Estimation Results

	Coef.	**Std. Err.**	**t**	**P>|t|**	**[95% Conf. Interval]**	
lnGDP	0.21564	8.03464	3.54	0.000*	1.3946	1.65422
$lnGDP^2$	0.39087	0.03455	3.32	0.000*	0.35658	0.45353
lnFDI	0.00756	0.04741	0.67	0.231	0.02316	0.05313
lnDI	0.73453	6.44783	10.65	0.000*	1.33318	1.68766
lnFINDEV	0.40653	0.34358	4.56	0.000*	3.43217	4.85320
lnEXR	-0.12543	0.75643	-8.34	0.000*	-4.54371	-6.78761
lnINF	-0.13245	0.44227	-4.67	0.000*	-3.53648	-4.76837
Country						
Brazil	3.426	0.856	0.61	0.642	-965.4562	1831.984
Russia	5.235	1.150	5.02	0.000*	3209.843	7335.732
India	0.984	0.733	1.23	0.245	-526.8393	2306.188
China	-7.324	0.832	-8.74	0.000*	-9072.894	-5745.974
South Africa	1.366	0.025	1.62	0.133	-349.5972	13688.917
_cons	-3.345	0.799	-0.39	0.545	-1854.491	1237.757
R-squared = 0.9345 = (overall) F(1.762) = 1.795; Prob> F = 0.0000 Number of obs = 135						

Note: *statistical significance at 1%.
Source: Authors Computation

The LSDV result in table 6 is merely an extension of the fixed effects results, by adding a computation of coefficient for dummy variables as intercept or constant for all the five countries and also their individual statistical significance (Menon, 2017; Akinola & Bokana, 2017).

Table 7: Panel Cointegration coefficients for 5 BRICS Countries (1990-2016)

Country	Individual FMOLS		Individual DOLS	
	lnGDP	$lnGDP^2$	lnGDP	$lnGDP^2$
Brazil	-2.23 (-3.25)	0.22** (3.11)	0.83 (0.91)	-0.07 (0.69)
Russia	3.77* (1.65)	-0.99* (-1.11)	6.33* (5.22)	-0.35* (-4.98)
India	-0.33 (-0.20)	0.01 (0.26)	0.92 (0.81)	-0.72 (0.17)
China	9.34* (7.89)	-0.78* (-6.55)	6.55* (4.76)	-0.44* (-4.55)
South Africa	0.98 (1.01)	0.01 (0.33)	0.65 (0.34)	-0.03 (-0.34)
	Panel FMOLS		Panel DOLS	
Panel	1.68* (4.33)	-0.06* (-2.69)	1.05* (5.38)	-0.04* (-4.23)

Note: t-statistics=values in parentheses; *=1% level of significance; **=5% level of significance

A comparative analysis of results from table 6 (Fixed Effects (LSDV) Estimation Results) and 7 (FMOLS and DOLS) showed that out of the five BRICS countries investigated in our study, only two (China and Russia) observed a statistically significant constants. The inference of this is that the cross-sectional dependence noticed may be more pronounced in these two countries, based on the presumption that the two countries share common features (Akinola & Bokana, 2017). Similarly, the Fixed Effects (LSDV) Estimation Results were also corroborated by the FMOLS and DOLS estimates in table 7, with the upper and lower parts of the table showing individual countries and panel estimations respectively. The coefficients of lnGDP and of $lnGDP^2$ yielded significance positive and the negative estimators, respectively, on INSTFIT for the pool of all the five countries. Then we can conclude the significance influence of economic growth on institutional fitness within the panel sample, but differs from one country to another. The insignificance and sometimes negative results at both Individual FMOLS and DOLS estimates for Brazil, India and South Africa is an indication that economic growth has the potential to diminish institutional fitness in the three countries. Again, as depicted in table 7, the outputs of the analyses are mixed and they differ from one country to another in terms of the economic growth-institutional fitness nexus. This result seems to support the findings of Younsi & Bechtini (2018) and Javeria et al. (2017) that economic growth often dampens institutional developments in many developing countries. It is again noted that the log of GDP-square exhibit a very weak negative relationship with institutional fitness in the bloc. This is seen to be in contrast with the

studies of Jamel and Maktouf (2017) and Agrawal (2015) which found a significant positive link between institutional fitness and the development over time of the overall economic growth.

5. Conclusion and Implication of Study

This study analyses the effect of economic growth on institutional fitness within the BRICS countries using a panel dataset from 1990 to 2016. After testing for panel Unit Root, the study estimates via the system-Generalized Method of Moments (GMM) was however supported by the Hausman specification test to know which effect (both the fixed and random effects estimates) is more significant? Again, to compare the trends in the level, as well as, the capacity to generalise our panel results, the study conducted a Panel Data Cointegration Analysis, via PEDRONI'S Panel cointegration test on each panel data set of the BRICS block and also launched a cross-sectional dependence test, Fully Modified Ordinary Least Squares (FMOLS) and Dynamic Ordinary Least Squares (DOLS) estimations at individual and panel levels over the period 1990-2016.

Based on our findings, we can conclude the significance influence of economic growth on institutional fitness within the panel sample, but differs from one country to another. Again, we also concluded that economic growth and institutional fitness are co-integrated at the panel level, indicating the presence of long run equilibrium, with some exhibiting bi-directional, relationships. Hence, the influence of economic growth on institutional fitness within the BRICS countries, though significant, was limited and varies. Specifically, the study observed that China and Russia performed well among the five countries. Comparative findings from fixed effect Least Square Dummy Variable (LSDV), FMOLS and DOLS also observed that only china and Russia exhibited specific effects, hence, our results can only be generalised within the two countries. The insignificance and sometimes negative results at both Individual FMOLS and DOLS estimates for Brazil, India and South Africa is an indication that economic growth has the potential to diminish institutional fitness in the three countries.

The focus on economic growth as a determinant of institutional Fitness is intended to provide scholars, practitioners, policy-makers, and investors with a framework for analyzing the relationship between economic growth and Institutional fitness. The study thereby suggests an improved institutional, Foreign Direct Investment (FDI), anti-inflationary and financial development policies to achieve sustainable economic growth in the BRICS countries. Our findings have clearly shown that institutional developments has not been adequately supported

and developed in all the BRICS. Specifically, there is urgent need for Brazil, India and South Africa to undertake different transformational institutional and sustainable economic growth policies that will turn the tunnel of low institutional developments in the three countries.

In addition, another novelty of this study is the development of an aggregated composite index of institutional fitness based on the dictates of institutional economics, by looking at risk assessment factors of countries over time, as identified by euromoney country risk survey, corruption perception index-CPI (transparency international), World Bank decomposed governance indices, and the top three global rating agencies, namely, Fitch Ratings Inc., Standard & Poor's Financial Services LLC (S&P) and Moody's Investors Service (World Bank Group, 2018). The results will be beneficial to all the BRICS countries, as well as, many developing countries in the formulation of their institutional development policies. It will also help policy-makers, practitioners and scholars in developing an objective framework for investigating the interplay between economic growth and Institutional fitness within the BRICS bloc (Anyanwu and Yameogo, 2015; Wilhelms, 1998).

However, the results of this study should be adopted with care. it could be argued that grouping some determinants that have been identified in the literature as prerequisites to improved institutional development in one set and treating them equally may be misleading because they are not of equal importance (Anyanwu and Yameogo, 2015). Consequently, the main "inevitable" weakness of our estimated models was the items used to measure the determinants of institutional fitness, which might not include a number of other relevant variables. Further studies might consider the inclusion of these variables; chiefly among the variable are resource endowments, agglomeration effects and the degree of diversification of the economy (Anyanwu & Yameogo, 2015; El-Wassal, 2012). Lastly, the cross-sectional dependence observed in our study might be more evident in these five countries as it appears they share common features, again the degree of the common features may even vary when the growth process of BRICS is compared with other developing and developed blocs like the MINT and G-7 countries respectively. This is an important area for further research.

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