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Abstract

This study complements the scarce literature on growth determinants in fast emerging economies of the BRICS and MINT by assessing the determinants throughout the conditional distributions of the growth rate and real GDP output for the period 2001-2011. An instrumenal variable (IV) quantile regression approach is complemented with Two-Stage-Least Squares and IV Least Absolute Deviations. The instrumentation process is dynamic. The following findings are established. First, while Gross FDI has a negative effect on economic growth, the impact of Net FDI is positive, with a higher magnitude in top quantiles of the distributions. Second, the positive effect of natural resources is more apparent in countries with low initial growth levels. Third, the impact of telecommunications infrastructure is not very significant. Fourth, whereas the incidence of bank credit is positive for GDP growth, it is negative for real GDP output. Fifth, while trade openness is positive in bottom quantiles of GDP growth, but for the highest quantile in real GDP output, it is consistently negative on real GDP output. Sixth, while the incidence of political stability is negative on GDP growth, it is positive on real GDP output, with the negative (positive) effect apparent only in top (bottom) quantiles of GDP growth (real GDP output). Policy implications are discussed.

JEL Classification: C52; F21; F23; O40; O50
Keywords: Economic Growth; Emerging countries; Quantile regression

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1. Introduction

The growing relevance of China in the world and the recent global financial crisis has led to an evolving stream of literature on post-Washington Consensus (WC) models. These include: a combination of the WC and the Beijing Model (BM) in a development consensus (Asongu, 2015a); new development strategies based on a combination of the WC and other development models that have successfully advanced developing countries (Fosu, 2013a); the false economics of preconditions (Monga, 2014); the need for more self-reliance (Fofack, 2014); the New Structural Economics which sustains the need for a synthesis between liberalism and structuralism (Stiglitz et al., 2013ab; Stiglitz & Lin, 2013; Norman & Stiglitz, 2012; Lin & Monga, 2011); the Liberal Institutional Pluralism[2] and the Moyo (2013) conjecture. Consistent with the Moyo conjecture, economic rights should be given priority at the early phase of industrialisation. Hence, the BM should take priority over the WC as a short-term development model[3]. This paradigm shift has motivated many developing countries to adopt strategies that steer clear of the WC.

One of such moves is a decision by leaders of the BRICS (Brazil, Russia, India, China & South Africa) countries to establish a New Development Bank (NDB) at the recent July 15th 2014 BRICS summit in Brazil, which has led to a plethora of questions in policy and academic circles, inter alia: '*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). While these concerns have already been substantially engaged (Khanna, 2014; Griffith-Jones, 2014), what is quite apparent is that the BRICS would need to maintain a respectable economic growth rate to sustain the ambitions of the Contingency Reserve Arrangement (CRA) and NDB. This brings us to a key question of determinants of economic growth in these fast emerging economies. Accordingly, understanding drivers of growth in these countries holds several lessons for other developing countries.

But before we engage the concern of understanding these drivers, it is important to briefly discuss the NDB and CRA. According to the narrative, the former or BRICS bank has a 50 USD billion initial capital. The bank's constitution is on equal-basis in terms of voting

[2] The post-WC paradigm focuses on, inter alia: institutions for good public commodity delivery, diversity in institutions, and governance conditions for economic growth. More insights into this shift can be found in Fofack (2014, pp. 5-9), Acemoglu et al. (2005), Rodrik (2008) and Brett (2009).

[3] Moyo has defined the BM as '*de-emphasised democracy, state capitalism and priority in economic rights'* and the WC as '*liberal democracy, private capitalism and priority in political rights*'.

share because of an equal contribution of 10 USD billion from each of the five signatories. The capital-base would be allocated to finance sustainable development and infrastructure projects in low- & middle-income nations as well as in the BRICS countries. The CRA of 100 USD billion is meant to provide more liquidity leverage to member nations in case they are faced with balance sheet issues. Contrary to the bank's capital that is contributed equally among member states, the CRA is funded: 41% by China, 18% from Brazil, Russia and India and 5% from South Africa.

Consistent with the underlying literature on fast growing developing countries (Akpan et al., 2014; Asongu & Nwachukwu, 2015; Asongu & Kodila-Tedika, 2015), there are many benefits fast economic growth procures, among others: finance, employment and other positive externalities from a potentially increasing foreign direct investment (FDI) that is associated with appealing trends in managerial expertise, corporate governance and transfer of know-how. According to the United Nations Conference on Trade and Development (UNCTAD, 2013), the BRICS and MINT (Mexico, Indonesia, Nigeria & Turkey) have been representing about 20% of global GDP and more than half of global FDI inflows over the past years (e.g 2011 & 2012). As presented in Table 1 below, during the period 2001-2012, growth among the BRICS and MINT nations represented about 19% of world GDP, accounted for more than 51% of the population in the world and reflected about 30% of its FDI (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)

In spite of the growing instrumentality of the nine fast developing countries in the global econnomy, to the best of our knowledge, very few studies have focused on the BRICS and MINT. Most studies have been based on determinants of FDI into these countries. These include, papers exclusively focused on the BRICS (Vijayakumar et al., 2010; Jadhav & Katti, 2012; Jadhav, 2012) and three studies oriented towards the BRICS and MINT (Akpan et al., 2014; Asongu & Nwachukwu, 2015; Asongu & Kodila-Tedika, 2015).

In the same vein, as far as we know, only four studies have assessed drivers of growth in the underlying countries. Sheng-jun (2011) has investigated education as a driver of growth in the BRIC nations to conclude that whereas Russia and Brazil invest relatively more in education compared to China and India, growth is stronger in the latter set of countries. Basu et al. (2013) on their part have concluded that the potential growth of the BRICS nations substantially depends on the capacity of its population to develop skills, especially in the working age. Agrawal (2013) has assessed the relationship between FDI and economic growth in the BRICS to conclude that there is a long-term relationship running from FDI to ecoomic growth. Goel and Korhonen (2011) had earlier addressed three questions in the BRIC, notably: *"(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?*" Their findings indicate that, whereas nations of the BRIC have better growth, there are substantial within-group disparities. China and Russia for the most part show relatively higher growth, India sometimes reflected positive growth while Brazil failed to outpeform the other three countries. These disparities in growth naturally caution empirics on growth determinants to pay specific attention to high-growth and higher-growth nations.

The present line of inquiry complements the above literature in at least three ways. First, the determinants of growth are assessed throughout the conditional distributions of growth. The intuition for this empirical technique is that growth among fast emerging economies may still be contingent on initial growth levels, such that growth determinants are different across high- and higher-growth countries. A Quantile regression (QR) estimation technique is employed to accommodate this objective. Second, MINT countries are added to the BRICS, consistent with recent literaure on fast emerging countries (Apkan et al., 2014). Third, the concern of endogeneity is addresed by instrumenting the determinants with their first-differences and first-lags. Hence, the instrumentation process is dynamic. Moreover, it

extends Asongu and Kodila-Tedika (2015) who have assessed determinants of FDI in the MINT and BRICS using QR and instrumenting only with first lags.

The remainder of the study is structured as follows. Section 2 presents the data and methodology. The empirical analysis and results are covered in Section 3. Section 4 concludes with implications.

2. Data and Methodology

2.1 Data

We assess a panel of 9 BRICS and MINT countries with data from Apkan et al. (2014) for the period 2001-2011. The original sources are the World Bank's World Development Indicators and World Governance Indicators databases. The adopted periodicity is also consistent with a recent stream of literature on FDI determinants in the BRICS and MINT (Asongu & Nwachukwu, 2015; Asongu & Kodila-Tedika, 2015). Two dependent variables are used for robustness purposes, notably: GDP growth and real GDP output.

Determinants of growth employed in the study which are classified in Table 2 below are broadly consistent with the UNCTAD (2002) and Akpan et al. (2014). The retained determinants include: *Gross FDI*, *Net FDI inflows*, *natural resources*, *infrastructure*, *private credit*, *inflation*, *political stability* and *trade openness*. With the exception of high inflation that has the potential for decreasing growth, the expected signs from other determinants are positive. Accordingly, low and stable inflation is conducive for a positive economic outlook (Asongu, 2013a).

FDI as a determinant is in line with Agrawal et al. (2014). The inclusion of both Gross FDI and Net FDI has a twofold motivation: (a) on the one hand, it is in accordance with the underlying FDI literature discussed in the introduction and; (b) on the other hand, it is meant to increase subtlety for more policy outcomes. Inflation measured as the annual Consumer Price Index and trade openness (annual imports plus exports as a % of GDP) are in accordance with Barro (2003). Private domestic or bank credit as a growth determinant is consistent with Asongu (2015b) while natural resources (or share of natural resources on GDP) and political stability (in estimate) are in line with Tridico (2007) and Fosu (2013b). The choice of infrastructure is justified by the fact that, infrastructural development has been established to 'unidirectionally' cause real output growth in China (Sahoo et al., 2010). The use of mobile phones (per 100 people) to proxy for infrastructure is in line with Asiedu (2002) and Sekkat and Veganzones-Varoudakis (2007).

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 summary statisitcs of the variables used in the study is presneted in Table 3 below. There is a twofold interest for this table. On the one hand, it reveals that, the variables are quite comparable based on their means. On the other hand, it shows that we can be confident that reasonable estimated nexuses would emerge owing to substantial variation in the variables.

Table 3: Summary Statistics

	Mean	S.D	Min	Max	Obs
Net Foreign Direct Investment Inflows (NFDI)	28.979	46.359	-2.977	280.07	99
Foreign Direct Investment (Gross FDI)	2.402	1.348	-1.855	6.136	99
GDP Growth (GDPg, annual %)	5.351	3.789	-7.820	14.200	99
Real GDP (constant of 2005 US billions) **(log)**	6.346	0.886	4.260	8.341	99
Infrastructure (Number of mobile phones per 100 people)	52.433	39.220	0.210	179.31	99
Bank Credit (Private domestic credit on GDP)	85.019	63.492	4.909	201.58	99
Natural resources (on GDP)	9.003	8.110	0.294	38.410	99
Inflation (Consumer Price Index, annual %)	8.580	7.519	-0.765	54.400	99
Trade Openness (Import + Exports on GDP)	0.514	0.128	0.225	0.856	99
Political Stability (Estimate)	-0.826	0.613	-2.193	0.286	99

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

2.2 Methodology

In accordance with the literature on conditional drivers, in order to investigate if intiial levels of growth matter in the determinants of growth, we employ a quantile regression (QR) approcah, which consists of assessing determinants of economic growth throughout the distributions of eonomic growth (Keonker & Hallock, 2001; Billger & Goel, 2009; Asongu, 2013b). Previous studies on the determinants of growth have reported parameter estimates at the conditional mean of economic growth. Some examples discussed in the introduction include: (a) Sheng-jun (2011, p. 190-193) that is based on averages and (b) Goel and

Korhonen (2011) which is focused on Two-Stage Least Squares (2SLS). Whereas mean impacts are important, the adopted QR approach is in line with the motivation of the present exposition. That is to say, it asssess how intial growth levels matter in the determinants of economic growth. For instance, while Ordinary Least Squares (OLS) suppose that growth and the error terms are normally distributed, the QR strategy is not founded on the assumption of error terms that are normally distributed. Therefore, the strategy helps us to assess the drivers with particular emphasis on the good and best candidates among the fast growing emerging countries. In this light, parameters estimated are shown at several points of the conditional distributions of growth (Koenker & Bassett, 1978). This technique therefore incorporates the conclusions of Goel and Korhonen (2011) from the BRICS literature discussed in the introduction, notably: the need to distinguish existing growth levels.

The QR technique is increasingly being employed in recent development literaure, inter alia: corruption (Okada & Samreth, 2012; Billger & Goel, 2009) and health (Asongu, 2014) studies. A common shortcoming to the underlying applications is the concern of endogeneity. We address it by instrumenting the determinants in a twofold or dynamic manner. Accordingly, we instrument the determinants with their first lags and first differences. The fitted values obtained from the first-stage regressions are used in the second-stage QR specifications. Below are the two first-stage instrumentation processes.

$$x_{i,t} = \alpha + \delta_j\left(x_{i,t-1}\right) + \varepsilon_{i,t} \tag{1}$$

$$x_{i,t} = \alpha + \delta_j\left(x_{it} - x_{it-1}\right) + \varepsilon_{i,t} \tag{2}$$

Where: $x_{i,t}$ is a growth determinant for country i at period t; α is a constant and $\varepsilon_{i,t}$ the error term. The instrumentation is based on first lags and first differences in Eq. (1) and Eq. (2) respectively. In the two equations, the estimation processes are based on Heteroscedasticity and Autocorrelation Consistent (HAC) standard errors.

The second stage of the QR is presented in Eq. (3) below, where the θth quantile estimator of economic growth is derived by optimizing the following problem. We present Eq. (3) below without subscripts for the purpose of simplicity.

$$\min_{\beta \in R^k}\left[\sum_{i \in \{i: y_i \geq x_{i'}\beta\}} \theta\left|y_i - x_{i'}\beta\right| + \sum_{i \in \{i: y_i \geq x_{i'}\beta\}} (1-\theta)\left|y_i - x_{i'}\beta\right|\right] \tag{3}$$

Where $\theta \in (0,1)$. Contrary to OLS that is based on minimizing the sum of squared residuals, the QR procedure consists of minimising the weighted sum of absolute deviations. For instance, the 75th or 90th quantiles (with θ=0.75 or 0.90 respectively) by weighing the residuals approximately. The conditional quantile of economic growth or y_i given x_i is:

$$Q_y(\theta / x_i) = x_{i'}\beta_\theta \quad (4)$$

where unique slope parameters are estimated for each θth specific quantile. Consistent with Asongu and Kodila-Tedika (2015), this formulation is analogous to $E(y / x) = x_{i'}\beta$ in the OLS slope where parameters are examined only at the mean of the conditional distribution of economic growth. In Eq. (4), while the dependent variable y_i is an economic growth (*GDP growth* or *real GDP*) indicator, x_i contains: a constant term, *Gross FDI*, *Net FDI*, *infrastructure, trade openness, inflation, private credit, natural resources* and *political stability*. For the purpose of robustness, we also report the results for Least Absolute Deviations (LAD) using the Gretl Software which should theoretically correspond to results of the 0.5th quantile based on the Stata software. It should be noted that contrary to mainstream QR findings that are complemented with OLS findings; in this study we have complemented QR estimates with 2SLS since the corresponding OLS follows an instrumental variable procedure.

Specifications in Eq. (4) are tailored to control for overparameterisation and multicollinearity issues. For this purpose, the correlation matrix in Table 4 enables the study to control for any potential concerns of high degrees of substitution among the instrumented independent variables. While Panel A of the correlation matrix is based on first-lag instrumentation, the corresponding matrix in Panel B presents them in first difference. From a preliminary examination of the correlation coefficients, there does not appear to be 'high degree of substitution' concerns among the instrumented variables. Hence, we are confident that the estimated variables would produce signs that are not biased due to highly correlated independent variables entering into conflict.

Table 4: Correlation matrix on the loadings

Panel A: Instrumentation with first lags

IVInfra	IVInfla	IVCredit	IVTrade	IVPolS	IVNres	IVFDI	IVNFDI	GDPg	RGDP	
1.000	-0.081	0.234	0.203	0.303	0.273	0.152	0.178	-0.320	0.177	IVInfra
	1.000	0.010	-0.081	-0.268	0.077	-0.165	-0.278	-0.070	-0.344	IVInfla
		1.000	-0.140	0.551	-0.490	-0.024	0.162	0.071	0.139	IVCredit
			1.000	-0.344	0.336	0.246	0.219	0.145	-0.168	IVTrade
				1.000	-0.240	0.162	0.241	-0.215	0.454	IVPolS
					1.000	0.052	0.051	-0.084	0.064	IVNres
						1.000	0.472	-0.037	0.223	IVFDI
							1.000	0.240	0.711	IVNFDI
								1.000	0.222	GDPg
									1.000	RGDP

Panel B: Instrumentation with first difference

IVInfra	IVInfla	IVCredit	IVTrade	IVPolS	IVNres	IVFDI	IVNFDI	GDPg	RGDP	
1.000	-0.122	-0.049	0.024	0.041	-0.008	0.173	0.066	0.019	0.077	IVInfra
	1.000	-0.238	0.017	-0.058	-0.283	-0.063	-0.212	-0.074	-0.132	IVInfla
		1.000	0.100	-0.021	0.342	-0.023	0.155	0.052	-0.068	IVCredit
			1.000	-0.007	0.362	0.184	0.221	0.207	-0.059	IVTrade
				1.000	-0.147	0.134	-0.089	0.037	-0.069	IVPolS
					1.000	0.211	0.308	0.207	-0.059	IVNres
						1.000	0.453	0.257	-0.004	IVFDI
							1.000	0.453	0.333	IVNFDI
								1.000	0.222	GDPg
									1.000	RGDP

IV: Instrumented Variable. Infra: Infrastructure. Infla: Inflation. Credit: Domestic Credit. PolS: Political Stability. Nres: Natural resources. FDIgdp: Gross FDI. NFDI: Net FDI. GDPg: GDP growth rate. RGDP: Real GDP output.

3. Empirical results

In Table 5, we present findings which entail estimations from 2SLS, LAD and QR. The 2SLS findings reflect baseline results on mean effects that we compare with those of LAD and various quantiles in the conditional distributions of economic growth. Whereas the findings of Panel A are based on the economic growth rate, the dependent variable for Panel B is real GDP output. The Left-Hand-Side (LHS) and Right-Hand-Side (RHS) of either panels are based on first-lag and first-difference instrumentation processes respectively. Accordingly, Panel A1 (A2) are GDP growth determinants based on first lag (difference) instrumentation while Panel B1 (B2) are real GDP output determinants based on first lag (difference) instrumentation. All estimaions are robust in standard errors. In the interpretation of estimated coefficients, it is important to note that lower quantiles of conditional distributions in economic growth denote countries with lower initial growth levels.

The following findings are observable in Table 5. First, the baseline 2SLS results when compared with the corresponding QR estimates are significantly different in terms of significance and magnitude. This difference in findings justifies the need to complement

2SLS with QR estimates. Second, the instrumental variable (IV) LAD results are consistent with the 0.5^{th} quantile across specifications and panels. This implies that the IV LAD results obtained from the Gretl software are in line with those of the 0.5^{th} quantile from the Stata software.

Second, Gross FDI has a negative effect on economic growth, with the effect most apparent in top quantiles of the growth distribution. The interpretation is consistent across specifications and panels. It is interesting to note that the corresponding 2SLS estimates are negatively insignificant for the most part.

Third, the effect of Net FDI is positively significant, consistently for both 2SLS and QR estimates. Moreover, the magnitude of significance is higher in top quantiles of the growth distributions. This interpretation is broadly consistent across panels and specifications.

Fourth, on the effect of natural resources, but for a slim exception (2SLS in Panel B1) it is broadly positive in the bottom quantiles of the growth rate distributions (0.25^{th} quantile in Panel A2 and 0.10^{th} to 0.50^{th} quantiles in Panel B1). It is also interesting to note that the decreasing tendency in 'positive effect magnitude' in Panel B1 means the positive impact of natural resources is more apparent in countries with initial high growth levels, but dissipates in higher growth countries.

Fifth, the impact of infrastructure is not very apparent because of overwhelming insignificant estimates. This finding is surprising, given that infrastructure is proxied by mobile phone penetration. Accordingly, mobile telephony has been documented to be substantially driving growth in developing countries (Sridhar & Sridhar, 2007, p. 37).

Sixth, the effect of inflation is sparsely significant, notably negative in the: 0.75^{th} quantile of Panel A1, 0.10^{th} and 0.25^{th} quantiles of Panel B1 and 2SLS, and 0.75^{th} quantile of Panel B2. The negative sign is consistent with the expectations of economic theory.

Seventh, whereas the incidence of bank credit is positive for GDP growth, it is negative on real GDP output. In Panel A1, the positive effect is apparent in 2SLS, 0.50^{th} and 0.75^{th} quantiles, while the estimates are insignificant in Panel A2. On the other hand, in Panel B, bank credit has a negative effect in the: 0.10^{th} , 0.25^{th} and 0.75^{th} quantiles of Panel B1 and 2SLS and 0.75^{th} quantile of Panel B2.

Eighth, the effect of trade openness has some significant variations. For GDP estimations in Panel A, while it is not consistently significant in Panel A1, it is highly significant in the 0.10^{th} and 0.25^{th} quantiles of Panel A2. On the other hand, for real GDP

output regressions, the estimations are consistently negative but for the 0.90^{th} quantile which is positive in Panel B1, whereas it is not consistently significant in Panel B2.

Ninth, while the incidence of political stability is negative on GDP growth, it is positive on real GDP output. The negative (positive) effect is apparent only in top (bottom) quantiles of GDP growth (real GDP output).

Table 5: Determinants of Growth

Panel A: Determinants of Growth Rate

Panel A1: Instrumentation with first lags

	2SLS	LAD	Q.10	Q.25	Q.50	Q.75	Q.90
Constant	**3.895****	2.603	2.458	0.725	2.603	**5.637*****	4.979
	(0.042)	(0.333)	(0.773)	(0.788)	(0.361)	**(0.003)**	(0.337)
FDI	-0.582	-0.302	-0.825	-0.385	-0.302	**-0.882****	-0.511
	(0.332)	(0.688)	(0.808)	(0.631)	(0.692)	**(0.023)**	(0.497)
NFDI	**0.027*****	0.023	0.027	**0.019****	**0.023***	**0.060*****	**0.047*****
	(0.000)	(0.160)	(0.312)	**(0.033)**	**(0.051)**	**(0.000)**	**(0.000)**
Nresources	0.040	0.077	0.007	-0.005	0.077	0.078	0.020
	(0.398)	(0.433)	(0.972)	(0.936)	(0.339)	(0.188)	(0.894)
Infrastructure	-0.037	-0.018	-0.073	-0.010	-0.018	**-0.02*****	-0.028
	(0.001)	(0.268)	(0.199)	(0.431)	(0.195)	**(0.002)**	(0.238)
Inflation	-0.088	-0.088	-0.306	0.003	-0.088	**-0.107****	0.005
	(0.144)	(0.489)	(0.139)	(0.968)	(0.333)	**(0.032)**	(0.954)
Credit	**0.019****	**0.024****	0.027	0.013	**0.024****	**0.024*****	0.017
	(0.029)	**(0.011)**	(0.410)	(0.256)	**(0.030)**	**(0.001)**	(0.186)
Trade	2.386	-0.146	6.308	3.113	0.146	-2.043	1.788
	(0.446)	(0.971)	(0.602)	(0.498)	(0.976)	(0.538)	(0.849)
Political Stability	**-2.154****	**-3.03*****	-1.224	-2.153	**-3.032****	**-4.05*****	**-3.163****
	(0.025)	**(0.005)**	(0.727)	(0.106)	**(0.013)**	**(0.000)**	**(0.015)**
R^2	0.250	---	0.254	0.156	0.189	0.260	0.318
Fisher	**4.717*****	---	---	---	---	---	---
Log-likelihood	-227.345	-222.069	---	---	---	---	---
Observations	90	90	90	90	90	90	90

Panel A2: Instrumentation with first difference

	2SLS	LAD	Q.10	Q.25	Q.50	Q.75	Q.90
Constant	27.810	81.832	-77.882	35.509	81.832	52.007	83.691
	(0.559)	(0.384)	(0.717)	(0.457)	(0.239)	(0.621)	(0.467)
FDI	0.169	-0.357	-0.256	1.077	0.357	0.583	**-4.00*****
	(0.765)	(0.773)	(0.892)	(0.109)	(0.680)	(0.637)	**(0.007)**
NFDI	**0.051*****	**0.068***	**0.039****	**0.032****	**0.068*****	**0.054*****	**0.050***
	(0.000)	**(0.087)**	**(0.038)**	**(0.035)**	**(0.000)**	**(0.002)**	**(0.082)**
Nresources	**1.660***	-0.281	3.567	**2.206****	-0.281	-0.025	-0.754
	(0.066)	(0.882)	(0.139)	**(0.031)**	(0.835)	(0.989)	(0.512)
Infrastructure	-0.002	0.008	0.022	0.014	0.008	-0.026	-0.033
	(0.875)	(0.728)	(0.768)	(0.335)	(0.684)	(0.490)	(0.244)
Inflation	0.127	-0.046	0.363	0.223	-0.046	-0.370	-0.012
	(0.551)	(0.884)	(0.364)	(0.123)	(0.857)	(0.404)	(0.968)
Credit	-0.455	-0.961	0.266	-0.885	-0.961	-0.432	-0.636
	(0.379)	(0.380)	(0.917)	(0.127)	(0.248)	(0.728)	(0.627)
Trade	7.520	14.396	**56.17*****	**40.85*****	14.396	-5.175	-0.073
	(0.466)	(0.577)	**(0.002)**	**(0.000)**	(0.257)	(0.829)	(0.996)
Political Stability	**6.267****	0.2828	11.559	4.790	0.282	-0.028	3.133
	(0.049)	(0.968)	(0.279)	(0.307)	(0.967)	(0.997)	(0.612)
R^2	0.164	---	---	0.387	0.231	0.120	0.109	0.144
Fisher	3.198	---	---	---	---	---	---	---
Log-likelihood	-232.20	-229.423	---	---	---	---	---	---
Observations	90	90	90	90	90	90	90	90

Panel B: Determinants of Real GDP Output (log)

Panel B1: Instrumentation with first lags

	2SLS	LAD	Q.10	Q.25	Q.50	Q.75	Q.90
Constant	**7.894*****	**7.44*****	**8.38*****	**7.972*****	**7.443*****	**7.55*****	**7.666*****
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
FDI	-0.154	-0.173	0.121	-0.159	**-0.17*****	**-0.15*****	**0.374*****
	(0.240)	(0.197)	(0.450)	(0.141)	**(0.004)**	**(0.004)**	**(0.000)**
NFDI	**0.014*****	**0.014*****	**0.010*****	**0.014*****	**0.014*****	**0.01*****	**0.025*****
	(0.000)	**(0.003)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Nresources	0.017	0.024	**0.045*****	**0.034*****	**0.024*****	0.002	0.006
	(0.225)	(0.150)	**(0.001)**	**(0.000)**	**(0.000)**	(0.794)	(0.476)
Infrastructure	0.0004	0.0004	0.0005	0.0005	0.0004	-0.0008	-0.001
	(0.847)	(0.865)	(0.786)	(0.737)	(0.707)	(0.499)	(0.341)
Inflation	-0.022	-0.010	**-0.11*****	**-0.05*****	-0.010	-0.016	-0.013
	(0.225)	(0.742)	**(0.000)**	**(0.000)**	(0.139)	(0.187)	(0.103)
Credit	-0.001	0.001	**-0.003***	**-0.003*****	0.001	**-0.001***	-0.0008
	(0.647)	(0.664)	**(0.061)**	**(0.004)**	(0.230)	**(0.094)**	(0.559)

Panel B2: Instrumentation with first difference

	2SLS	LAD	Q.10	Q.25	Q.50	Q.75	Q.90
Constant	**31.88****	35.357	13.083	0.006	35.357	**42.184****	53.588
	(0.015)	(0.144)	(0.315)	(1.000)	(0.137)	**(0.012)**	(0.399)
FDI	-0.447	**-0.981***	-0.430	-0.151	**-0.981****	**-1.05*****	**-1.666*****
	(0.152)	**(0.085)**	(0.109)	(0.813)	**(0.010)**	**(0.000)**	**(0.002)**
NFDI	**0.013*****	**0.015***	**0.019*****	**0.014*****	**0.015*****	**0.020*****	**0.020***
	(0.000)	**(0.060)**	**(0.000)**	**(0.001)**	**(0.004)**	**(0.000)**	**(0.062)**
Nresources	**-0.175***	-0.240	-0.088	0.080	-0.240	-0.174	-0.115
	(0.093)	(0.544)	(0.863)	(0.879)	(0.587)	(0.550)	(0.906)
Infrastructure	0.003	0.003	**0.013***	0.007	0.003	-0.001	-0.006
	(0.582)	(0.491)	**(0.074)**	(0.465)	(0.553)	(0.596)	(0.437)
Inflation	**-0.058***	-0.068	0.078	0.068	-0.068	**-0.124****	0.021
	(0.064)	(0.371)	(0.484)	(0.602)	(0.442)	**(0.013)**	(0.871)
Credit	**-0.257***	-0.277	-0.034	0.074	-0.277	**-0.362****	-0.483
	(0.068)	(0.326)	(0.819)	(0.843)	(0.329)	**(0.066)**	(0.498)

Trade	**-2.28****	**-2.04****	**-2.79*****	**-2.49*****	**-2.0*****	**-1.18*****	**0.683***	Trade	-2.442	-3.038	-1.644	-3.300	-3.038	-1.175	-0.884
	(0.029)	**(0.020)**	**(0.001)**	**(0.000)**	**(0.000)**	**(0.006)**	**(0.062)**		(0.119)	(0.792)	(0.889)	(0.711)	(0.501)	(0.652)	(0.994)
Political Stability	0.365	0.289	**0.448****	**0.414*****	**0.289*****	-0.005	0.067	Political Stability	-0.359	-1.195	**5.017*****	0.846	-1.195	-1.092	-0.145
	(0.146)	(0.236)	**(0.038)**	**(0.004)**	**(0.003)**	(0.958)	(0.418)		(0.791)	(0.573)	**(0.003)**	(0.756)	(0.593)	(0.426)	(0.967)
R^2	0.675	---	0.554	0.505	0.463	0.476	0.617	R^2	0.107	---	0.186	0.101	0.138	0.171	0.305
Fisher	**24.14*****	---	---	---	---	---	---	Fisher	**2.333****	---	---	---	---	---	---
Log-likelihood	-61.106	-63.745	---	---	---	---	---	Log-likelihood	-106.636	-106.306	---	---	---	---	---
Observations	90	90	90	90	90	90	90	Observations	90	90	90	90	90	90	90

***; **;*: significance levels of 1%, 5% and 10% respectively. GDP: Gross Domestic Product. Nresources: Natural Resources. Lower quantiles (e.g., Q 0.1) signify nations where Growth is least. 2SLS: Two-Stage Least Squares. LAD: Least Absolute Deviations. FDI: Gross Foreign Direct Investment. NFDI: Net Foreign Direct Investment Inflows. R^2 is Adjusted for OLS and Pseudo for QR (Quantile Regression).

4. Concluding implications

The BRICS and MINT countries represent a substantial force of the global economy today. Despite the growing literature on determinants of FDI in these fast growing countries, very few papers have focused on their growth determinants. This paper has filled this gap in the literature by contributing to the scarce empirical evidence in three ways. First, the determinants of growth have been assessed throughout the conditional distributions of growth. The intuition for this empirical strategy is that, lessons on growth determinants may be contingent on initial growth levels, such that underlying drivers of growth vary between high- and 'very high'-growth countries. Second, MINT countries have been added to a sample of BRICS countries to steer clear of previous literature which has been exclusively limited to the BRICS. Third, endogeneity-robust instrumental variable (IV) Quantile regression (QR) and Two-Stage-Least Squares (2SLS) empirical strategies have been employed, such that the instrumentation process is dynamic: in first lags and first differences.

The following findings have been established. First, we have observed that the 2SLS results are significantly different from the IV QR results. This implies that while mean effects may be important, median effects are also very relevant for policy implications. Hence, in the investigation of drivers of growth in emerging countries, it is important to account for initial levels of growth because blanket policy implications may not be effective unless they are contingent on existing growth levels and tailored differently across other high- and higher-growth nations.

Second, we have also found that Gross FDI has a negative effect on economic growth, with the effect most apparent in top quantiles of the growth distributions. A possible inference for this finding is that, in high-growth countries the outflow component of FDI in Gross FDI significantly decreases growth in terms of real GDP output and GDP growth rate. Hence, we may naturally expect Net FDI inflows to exert positive effects on growth dynamics.

Third, the effect of Net FDI is positively significant across specifications and panels, with the magnitude of positive significance greater in higher growth countries. This finding is consistent with the results on effects from Gross FDI. Two points are noteworthy here. On the one hand, FDI now exerts a positive effect on high-growth countries because of potentially negative effects of FDI outflows. On the other hand, FDI generally has a more significant impact in terms of magnitude in higher-growth countries. This inference is logically consistent with both the negative effects of FDI outflows and positive impacts of Net FDI inflows on growth dynamics. This brings us to the conclusion that, as much as countries with

higher initial levels of growth benefit more from inward FDI relative to their low-growth counterparts; they are also susceptible to experiencing more deterioration in growth owing to outward FDI.

Fourth, we have noticed that the impact of natural resources has a positive decreasing magnitude. This broadly implies the positive effect of natural resources is more apparent in BRICS and MINT nations at the bottom quantiles of the growth distributions. As a policy implication, sampled countries need to improve on their management of natural resources with increasing economic growth, in order to reverse the decreasing positive trend of growth externalities from national resources.

Fifth, the impact of infrastructure proxied by mobile penetration is not very apparent. This finding is contrary to mainstream literature documenting a positive effect of mobile phone penetration on economic growth (Sridhar & Sridhar, 2007). A possible explanation for this unexpected result could be the low usage of mobile phone for mobile banking activities in the MINT and BRICS nations (Mohseni-Cheraghlou, 2013). Global averages for 'mobile phone penetration' (per 100 people), 'mobile phone used to pay bills' (% of adults) and 'mobile phone used to send/receive money' (% of adults) are respectively: 90.90, 3. 51 & 4.71. Corresponding rates in sampled countries are: Brazil (123.2; 1.3; 0), Russia (179.3; 1.7; 1.5); India (72; 2.2; 0.6); China (73.2; 1.3; 0.6); South Africa (126.8; 4.4; 5.4); Mexico (82.4; 3.9; 1.5); Indonesia (97.7; 0.2; 0.6); Nigeria (58.6; 1.4; 9.9) and Turkey (88.7; 4.3; 2.2). Hence, the comparatively low employment of mobile phone for mobile banking purposes could explain its unexpected insignificant relationship with growth dynamics[4].

Sixth, whereas the incidence of bank credit is positive for GDP growth, it is negative on real GDP output. The implication is that while bank credit has a negative impact on the macroeconomic measurement of the economy's size, it has a positive effect on the amount of commodities produced in an economy over time. Understanding why the underlying effects are conflicting is an interesting future research direction.

Seventh, we have established that whereas the effect of political stability is negative on GDP growth, it has a positive impact on real GDP output. Moreover, the negative (positive) effect is apparent only in top (bottom) quantiles of GDP growth (real GDP output). This implies that while political stability is positive on real GDP output in sampled countries

[4] The interested reader can find more insights into the statistics on the following link : http://blogs.worldbank.org/allaboutfinance/mobile-banking-who-driver-s-seat

with lower initial levels of growth, it is negative on GDP growth in countries with higher initial growth levels.

References

Acemoglu, D., Johnson, S., & Robinson, J., (2005). "Institutions as a Fundamental Cause of Long-Run Growth". In Handbook of Economic Growth, Vol. 1, Part A. North Holland: Elsevier.

Agrawal, G., (2013). "Foreign Direct Investment & Economic Growth in BRICS Economies: A Panel Data Analysis", Proceedings of 23rd International Business Research Conference 18 - 20 November, 2013, Marriott Hotel, Melbourne, Australia.

Akpan, U. S., Isihak, S. R., & Asongu, S. A., (2014). "Determinants of Foreign Direct Investment in Fast-Growing Economies: A Study of BRICS and MINT", *African Governance and Development Institute Working Paper* No. 14/002.

Asiedu, E., (2002). "On the Determinants of Foreign Direct Investment to Developing Countries: Is Africa Different?", *World Development*, 30, pp. 107-119.

Asongu, S. A., (2013a). "Investment and Inequality in Africa: Which Financial Channels Are Good For The Poor?", *The African Finance Journal*, 15(2), pp. 43-65.

Asongu, S. A., (2013b). "Fighting corruption in Africa: do existing corruption-control levels matter?", *International Journal of Development Issues*, 12(1), pp. 36-52.

Asongu, S. A., (2014). "The impact of health worker migration on development dynamics: evidence of wealth effects from Africa", *The European Journal of Health Economics*, 15(2), pp. 187-201.

Asongu, S. A., (2015a). "Reinventing foreign aid for inclusive and sustainable development: Kuznets, Piketty and the great policy reversal", *Journal of Economic Surveys*; Forthcoming.

Asongu, S. A., (2015b). "Finance and growth: New evidence from Meta-analysis", *Managerial Finance*: 41(6): Forthcoming.

Asongu, S. A., & Nwachukwu, J. C., (2015). "Drivers of FDI in Fast Growing Developing Countries: Evidence from Bundling and Unbundling Governance", *African Governance and Development Institute Working Paper* No. 15/001.

Asongu, S. A., & Kodila-Tedika, O., (2015). "Conditional determinants of FDI in fast emerging economies: an instrumental quantile regression approach", *African Governance and Development Institute Working Paper* No. 15/003.

Barro, J. R., (2003). "Determinants of Economic Growth in a Panel of Countries", *Annals of Economics and Finance*, 4, pp. 231-274.

Basu, T., Barik, D., & Arokiasamy, P., (2013). "Demographic Determinants of Economic Growth in BRICS and selected Developed Countries", Presented in XXVII IUSSP International Population Conference (IUSSP 2013)26-31st August 2013 at BEXCO, Busan, Republic of Korea.

Billger, S. M., & Goel, R. K., (2009),"Do existing corruption levels matter in controlling corruption? Cross-country quantile regression estimates", *Journal of Development Economics*, 90, pp. 299-305.

Brett, E., (2009). Reconstructing Development Theory: International Inequality, Institutional Reform and Social Emancipation. Basingstoke: Palgrave Macmillan.

Desai, R. M., & Vreeland, J. R., (2014, July). "What the new bank of BRICS is all about", *The Washington Post*, http://www.washingtonpost.com/blogs/monkey-cage/wp/2014/07/17/what-the-new-bank-of-brics-is-all-about/ (Accessed: 14/02/2015).

Fofack, H., (2014). "The Idea of Economic Development: Views from Africa", *WIDER Working Paper* 2014/093.

Fosu, A., (2013a), "Achieving development success: Strategies and lessons from the developing world", *UNU-WIDER Policy Brief* (November).

Fosu, A. K., (2013b). "Growth of African Economies: Productivity, Policy Syndromes and the Importance of Institutions," *Journal of African Economies*, 22(4), pages 523-551.

Goel, R., & Korhonen, I (2011). "Determinants of economic growth in BRIC countries", *Institute of Advanced Development Studies Working Paper* No. 05/2011.

Griffith-Jones, S., (2014). "A Brics Development Bank: A Dream Coming True?", United Nations Conference on Trade and Development, *Discussion Paper* No. 215.

Jadhav, P., (2012). "Determinants of Foreign Direct Investments in BRICS Economies: Analysis of Economic, Institutional and Political Factors". *Procedia-Social and Behavioral Sciences* , 37, 5-14.

Jadhav, P., & Katti, V., (2012). "Institutional and Political Determinants of Foreign Direct Investment: Evidence From BRICS Economies". *Poverty & Public Policy* , 4 (3), 49-57.

Khanna, P., (2014). "New BRICS Bank a Building Block of Alternative World Order", *New Perspectives Quarterly*, 31(4), pp. 46-48.

Lin, J., & Monga, C., (2011). "Growth Identification and Facilitation : The Role of the State in the Dynamics of Structural Change". *Development Policy Review*, 29(3), pp. 264-90

Koenker, R., & Bassett, Jr. G., (1978),"Regression quantiles", *Econometrica*, 46, pp.33-50.

Koenker, R., & Hallock, F.K., (2001), "Quantile regression", *Journal of Economic Perspectives*, 15, pp.143-156.

Mohseni-Cheraghlou, A., (2013). "Mobile Banking: Who is in the Driver's Seat?", *Working for a World Free of Poverty*, World Bank. http://blogs.worldbank.org/allaboutfinance/mobile-banking-who-driver-s-seat (Accessed: 15/02/2014).

Monga, C., (2014). "The False Economics of Pre-Conditions: Policymaking in the The African Context", *Journal of African Development*, 16(2), pp. 121-140.

Moyo, D., (2013). "Is China a new idol for developing countries", TED Talks, New Ideas Every day, https://www.youtube.com/watch?v=4Q2aznfmcYU (Accessed: 07/05/2014).

Norman, A., & Stiglitz, J., (2012). 'African Development Prospects and Possibilities. In E. Aryeetey et al. (eds), The Oxford Companion to the Economics of Africa. Oxford: Oxford University Press.

Okada, K., & Samreth, S.,(2012), "The effect of foreign aid on corruption: A quantile regression approach", *Economic Letters*, 115(2), pp. 240-243.

Rodrik, D., (2008). One Economics, Many Recipes: Globalization, Institutions and Economic Growth. Princeton: Princeton University Press.

Sahoo, P., Dash, R. K., & Nataraj, G., (2010). "Infrastructure Development and Economic Growth in China", *IDE Discussion Paper* No. 261.

Sekkat, K., & Veganzones-Varoudakis, M.-A., (2007). "Openness, Investment Climate, and FDI in Developing Countries". *Review of Development Economics* , 11 (4), pp. 607-620.

Sheng-jun, Y., (2011). "Educational Policies and Economic Growth in BRICs: Comparative Perspectives", *Journal of US-China Public Administration*, 8, (2), pp.188-197.

Sridhar, K. S., & Sridhar, V., (2007). "Telecommunications Infrastructure and Economic Growth: Evidence from Developing Countries", *Applied Econometrics and International Development*, 7(2), pp. 37-61.

Stiglitz, J., & Lin, J., (eds.), (2013). The Industrial Policy Revolution I: The Role of Government Beyond Ideology. New York, Palgrave Macmillan.

Stiglitz, J., Lin, J., & Monga , C., (2013a). 'The Rejuvenation of Industrial Policy', Policy Research Working Paper 6628. Washington, DC: World Bank.

Stiglitz, J., Lin, J., Monga , C., & Patel, E., (2013b). "Industrial Policy in the African Context". Policy Research Working Paper 6633. Washington, DC: World Bank.

Tridico, P., (2007). "The determinants of economic growth in emerging economies: a comparative analysis", University of "Roma Tre", *Working Paper* No. 75, 2007.

UNCTAD. (2013). World Investment Report 2013.
United Nations Conference on Trade and Development:
http://unctad.org/en/PublicationsLibrary/wir2013_en.pdf (Accessed: 14/02/2015).

UNDP. (2013). Human Development Reports. Retrieved January 26, 2014, from United Nations Development Programme:
http://www.undp.org/content/dam/undp/library/corporate/HDR/2013GlobalHDR/English/HDR2013%20Report%20English.pdf

Vijayakumar, N., Sridharan, P., & Rao, K. C., (2010). "Determinants of FDI in BRICS Countries: A panel analysis". *Int. Journal of Business Science and Applied Management* , 5 (3), pp.1-13.

World Bank. (2013). World Development Indicators. UK Data Service. Retrieved January 23, 2014, from World Bank.