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Determinants of foreign direct investment in fast-growing economies: Evidence from the BRICS and MINT countries

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A G D I Working Paper

WP/18/038

Determinants of Foreign Direct Investment in Fast-Growing Economies: Evidence from the BRICS and MINT Countries

Forthcoming: Financial Innovation

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Determinants of Foreign Direct Investment in Fast-Growing Economies: Evidence from the BRICS and MINT Countries**Simplice A. Asongu, Uduak S. Akpan & Salisu R. Isihak**

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Abstract

This study employs panel analysis to examine the determinants of foreign direct investment (FDI) to Brazil, Russia, India, China, and South Africa (BRICS) and Mexico, Indonesia, Nigeria, and Turkey (MINT) using data for eleven years i.e. 2001 – 2011. First, it uses pooled time-series cross sectional analysis to estimate the model on determinants of FDI for three samples: BRICS only, MINT only, and BRICS and MINT combined; then, fixed effects model is also employed to estimate the model for BRICS and MINT combined. The results show that market size, infrastructure availability, and trade openness play the most significant roles in attracting FDI to BRICS and MINT while the roles of availability of natural resources and institutional quality are insignificant. Given that FDI inflow to a country has the potential of being mutually beneficial to the investing entity and host government, the challenge is on how BRICS and MINT can sustain the level of FDI inflow and ensure it results in economic growth and socio-economic transformation. To sustain the level of FDI inflow, governments of BRICS and MINT need to ensure that their countries remain attractive for investment. BRICS and MINT also need to ensure that their economies absorb substantial skills and technology spillovers from FDI inflow to promote sustainable long-term economic growth by investing more in their human capital. The study is significant because it contributes to literature on determinants of FDI by extending the scope of previous studies which often focus only on BRICS.

Keywords: FDI, determinants, fast-growing economies, BRICS, MINT

1. Introduction

Investment - whether public or private, domestic or foreign – is crucial to the socio-economic transformation of any economy. In the 1970s and 1980s, many developing countries had policies of trade restrictions and capital controls which were implemented to protect indigenous industries from the domineering influence of their foreign counterparts and to conserve foreign exchange reserves (de Mello, 1997; Dupasquier & Osakwe, 2006). The result of these policies was the distortion of social and private returns to capital which reduced foreign direct investment (FDI) flows to the countries (de Mello, 1997) as well as impaired economic growth (Rodrik, 1998). In the late 1980s and early 1990s, many Latin American countries responded to the challenges of economic development facing them and begun reforms to remove restrictions on trade and FDI which resulted in an impressive economic growth of countries in the region (United Nations Economic and Social Commission for Asia and the Pacific, UNESCAP, 2000). Faced with the challenge of shortage in domestic resources to finance their development, many developing countries are looking abroad for financial resources and now have policies to attract FDI (United Nations Conference on Trade and Development, UNCTAD, 2013; Asongu, 2013a, 2014).

FDI to developing countries has the potential of being mutually beneficial to the host country and multi-national company (MNC). To the host country, FDI provides additional financial resources through investment and taxes, creates employment, and generates spill-over effects such as transfer of skill, technology, managerial expertise, and corporate governance practices. On the other hand, MNCs gain access to market, site-specific natural resources, low-cost manpower, and exploit the advantages of bilateral and multilateral trade policies. According to the 2013 World Investment Report published by the UNCTAD, developing countries are increasingly receiving more FDI and accounted for 52% of global FDI inflows in 2012, with fast-growing economies like China, Brazil, and India being among the top twenty FDI recipients (UNCTAD, 2013). In terms of FDI spread to geographical sub/regions¹ in 2012, Nigeria received the highest FDI in Africa, Mexico in Central America, China in East Asia, Indonesia in South-Eastern Asia, India in Southern Asia, Brazil in South America, and Turkey in West Asia (World

¹Geographical sub/regions used in this study follows UNCTAD classification

Bank, 2013). Incidentally, these countries form the BRICS and MINT countries (i.e. including Russia and South Africa).

BRICS is an acronym for Brazil, Russia, India, China, and South Africa which are major emerging or newly industrialized countries and are distinguished by fast-growing middle class and significant influence in regional and/or global economy. In 2011, BRICS attracted 26% of global FDI, contributed 15% of global GDP, and accounted for 42% of the global population (World Bank, 2013). Another group of fast growing developing countries that has emerged comprises of Mexico, Indonesia, Nigeria, and Turkey, collectively called MINT². MINT share some common features: first, they have relatively large and growing young populations as compared to ageing and shrinking populations in many developed countries (and China); second, they are geographically well placed to take advantage of large markets nearby - with Indonesia close to China, Turkey being contiguous to the European Union, Mexico on America's doorstep, while Nigeria has the potential to serve as economic hub of Africa. Of the four, only Nigeria is not already a member of the G20 group of developed and developing countries but has huge endowment of natural resource, especially oil and gas. BRICS and MINT have substantive policies to promote FDI inflows to their respective countries (especially to sectors that have significant multiplier effects vis-à-vis employment and output, promote technology transfer, or local innovation) albeit restrictions exist in sectors considered to be strategic for national security (US Department of State, 2013). Between 2001 and 2012, FDI to BRICS and MINT increased by 349% from US\$113.6 billion to US\$510.4 billion (World Bank, 2013). Moreover, BRICS and MINT attracted 30% of global FDI, contributed 19% to global GDP, and accounted for 51% of the global population in 2011 (World Bank, 2013). Other stylized facts on BRICS and MINTS are presented in Table 1.

Given the increasing roles BRICS and MINT are playing in reshaping global economy, and their status as a destination of choice for FDI to emerging economies, there is need to examine the determinants of FDI to these countries. In particular, this study intends to answer the question: What are the determinants of FDI to BRICS and MINT?

² The acronym “MINT” was coined by economist Terence James "Jim" O'Neill who also coined “BRIC”

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)

The study is significant because it contributes to literature on determinants of FDI by extending the scope of previous studies which often focus only on BRICS (Jadhav, 2012; Jadhav & Katti, 2012; Vijayakumar, Sridharan, & Rao, 2010; etc). It seeks to examine whether the determinants of FDI to BRICS are also same for MINT and will provide a policy direction to other fast-growing developing countries in their aspiration to attract FDI. It also complements a recent strand of business literature that has focused on factors determining investment in developing countries (Bartels *et al.*, 2009; Tuomi, 2011; Kolstad & Wiig, 2011; Darley, 2012; Asongu, 2012, 2013b, 2013c, 2015; Ajide & Raheem, 2016; Xiong et al., 2015; Safaee & Geray, 2017; Pautwoe & Piabuo, 2017). The remaining part of the study is organized as follows: section two is a review of literature on FDI; section three presents the methodology employed by the study; section four is the presents and discusses the result; while section five will be the concluding remarks.

2. Theoretical underpinnings and related literature

2.1 Theoretical underpinnings

The extant literature distinguishes between three sets of theories on the relevance of FDI in economic development outcomes, notably, the: dependency theory, the classical theory and middle path theory (Toone, 2013; Gammoudi *et al.*, 2016). From an extreme perspective, the dependency theory builds on Marxist foundation which perceives globalization from the prisms of, *inter alia*: exploitation of cheap labour, expansion of market capitalism and the exchange of primary resources in return for obsolete technological know-how from more developed countries.

First, with respect to advocates of the dependency theory, the potentially negative influence of FDI on development outcomes in less developed countries can be substantiated from three main perspectives. (i) The rewards of FDI are not equitably distributed between host countries and multinational companies (MNC) because the latter get the lion share. Moreover, by expatriating profits to the rich-host nations after exploring profit-making avenues in less developed countries, foreign investors crowd-out local assets that would otherwise have been utilized to fund local development (Jensen, 2008). (ii) MNCs also create instability in domestic economies by distorting domestic investment; using capital-intensive technologies that increase unemployment; augment income-inequality and change the tastes of customers by undermining local values (Taylor & Thrift, 2013). (iii) The citizens in host countries are often excluded from reaping the fruits of FDI because of a potential alliance between the local politico-economic elite and foreign investors (Jensen, 2008).

Second, proponents of the classical theory maintain that the FDI can be beneficial to the domestic economy through a number of mechanisms, notably: balance of payments improvements; transfer of capital, skills and advanced technologies; growth of foreign exchange earnings and expansion of a tax base via exports resulting from FDI; integration of the domestic economy into international markets and development of domestic infrastructure (Toone, 2013). The substantially documented literature on FDI spillovers is largely motivated by the theoretical insights that spillovers take many forms, *inter alia*: better working methods, good management skills, more employment, domestic financial development and higher productivity gains (Javorcik, 2004; Asongu & De Moor, 2017).

Third, the “middle path” theory is a combination of the two preceding theoretical fronts. In essence, it is cautious theory on the development consequences of foreign direct investment. While there are obvious negatives effects from the dependency theory, there are also rewarding effects from the classical theory, especially if initial conditions for the benefits of FDI are satisfied in domestic economies (Asongu, 2017a; Gammoudi et al., 2016). Proponents of this converging theory advocate the mixture of both regulation (i.e. intervention) and openness (i.e. partial and complete) in order to address the cautions and rewards characterizing overly openness and too much government intervention by means of regulation. In nutshell, according to this theory, the goal of the domestic economy is to attract FDI while adopting policies that reduce the negative effects of FDI.

Regardless of the underpinning theories, there are fundamental determinants of FDI that are acknowledged by all strands of contending theories, notably: policy indicators (tax policy, trade policy, privatization policy, macroeconomic policy), business dynamics (incentives to investment), market-related factors (market structure, market growth and market size), resource-oriented determinants (technology, labor cost and raw material) and efficiency-economic drivers (labor productivity, transport and communication costs). The study builds on these common denominators of drivers to assess FDI determinants in fast-growing economies in the BRICS and MINT countries. This leads to theories surrounding the motivation of MNCs to adopt FDI location decisions.

Over the years, the motivations of multinational enterprises for engaging in FDI has been rationalized from several theoretical viewpoints which includes neoclassical trade theory, market imperfections, product lifecycle theory, eclectic paradigm etc. The neoclassical trade theory builds on the Hekscher-Ohlin model which asserts that trade opportunities and capital flows between two countries depend on the relative endowment of factors of production. This implies that multinational enterprises invest in countries to take advantage of higher returns on investment or low production cost. The market imperfection theory argues that because markets are imperfect, multinational enterprises are able to locate their businesses or production activities in other countries to exploit economies of scale, ownership advantages, and government incentives (Kindlerberger, 1969; Eiteman *et al.*, 2007). Furthermore, the theory asserts that market imperfections in host countries propel multinational enterprises to internalize their

operations in host countries which is the most economical means of safeguarding their intangible assets (Buckley & Casson, 1976; Hennart, 1982; Shapiro, 2006).

The product lifecycle theory developed by Vernon (1966) avers that the lifecycle of products are in four stages – introduction, growth, maturity, and decline – and follows a pattern whereby new products are first introduced in advanced countries and diffuse over time to developing countries. Therefore, the stages of the product lifecycle influences the decision of multinational enterprises between exporting or setting up production facility in foreign markets to achieve lower production cost, cater for the growing demand for its products in the foreign market as well as the home market at a competitive price. The eclectic paradigm, developed by Dunning (1988, 1993, 2000) is perhaps the most comprehensive theoretical viewpoint for rationalizing the decisions of multinational enterprises in engaging in FDI. The eclectic paradigm framework avers that scope, geography, and industrial component of FDI by multinational enterprises is influenced by the interaction of three sets of variables that are interdependent - which themselves are composed of the components of three sub-paradigms. These sub-paradigms are strategic advantages in ownership, location specificity, and internalization (OLI).

2.2 A review of related literature

Empirically, several studies have examined the determinants of FDI to developing countries. Studies focusing on a single country often use time-series analysis while multi-country studies often employ panel data analysis (Asiedu, 2002; Biswas, 2002; Jadhav, 2012; Rogmans & Ebberts, 2013; etc). The choice of dependent as well as explanatory variables also differs depending on the country/ies in focus. For the dependent variable, studies have used unidirectional FDI inflow to host countries (Rogmans & Ebberts, 2013), net FDI inflow (Jadhav, 2012), ratio of FDI inflow to GDP (Suliman & Mollick, 2009; Lehnert *et al.*, 2013) and ratio of net FDI flows to GDP (Asiedu, 2002).

The choice of explanatory variables used in empirical studies also varies, although some variables are largely consistent. Market size (often represented by real GDP or real GDP per capita) has been used by many empirical studies (Cheng & Kwan, 2000; Moosa & Cardak, 2006; etc) because it captures the demand for goods and services in the host country. Other explanatory variables that are often used include: level of trade openness, growth rate, an indicator for

infrastructure availability, inflation, and availability of natural resources, as well as indicators to capture political risks and institutional strength (Asiedu, 2002; Moosa, 2002; Moosa & Cardak, 2006; Jadhav, 2012; Sichei & Kinyondo, 2012; Rogmans & Ebbbers, 2013; etc).

UNCTAD (2002) classifies these variables into five major groups as shown in Table 2. Non-traditional variables such as type of regime in host country (democracy, autocracy, monarchy etc), regime duration, and risk of expropriation of private investment have also been used in some studies (Biswas, 2002).

Table 2: UNCTAD's Classification of FDI 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)

Jadhav (2012) explored the role of economic, institutional, and political factors in attracting FDI to BRICS economy using panel data for ten years i.e. 2000 – 2009. The findings of the study indicate that market size, openness to trade, and rule of law play significant roles in attracting FDI to BRICS while natural resource availability had a negative impact, implying that FDI to BRICS is largely market-oriented. Jadhav & Katti (2012) observed that governance effectiveness and regulatory quality had a positive effect on FDI inflow in BRICS while political instability, voice and accountability, and control of corruption had negative effects. Similarly, using data from 1975-2007, Vijayakumar *et al.* (2010) employed panel analysis to examine the determinants of FDI to BRICS and observed that market size, labor cost, infrastructure, and gross capital formation contributed positively while trade openness and inflation were insignificant.

Asiedu (2002) examined the determinants of FDI to developing countries with special focus on Africa. Building on the premise that developing countries in sub-Saharan Africa (SSA) attracted little FDI in the 1990s despite economic reforms, the study sought to understand whether the determinants of FDI in developing countries in other regions are different from those in SSA and employed panel data for 71 developing countries between 1988 and 1997. The result showed that low infrastructure development and return on capital as well low unfavourable geographic location of many SSA countries are responsible for the low FDI inflow. Similarly, Asiedu (2005) examined the role of natural resources, market size, government policy, institutions and political instability in attracting FDI to countries in SSA.

Rogmans & Ebbers (2013) examined the determinants of FDI to the Middle East and North Africa (MENA) region using panel data from 1987 -2008 and observed that natural resources endowment contributed negatively to FDI flows while trade openness had a positive effect. The study rationalized that the negative contribution of natural resource endowment to FDI was because countries that are highly endowed are more likely to have protectionist policies thereby limiting potential resource-seeking FDI. Hayakawa *et al.* (2013) investigated the effects of various components of political and financial risk on inward FDI flow using panel data for 89 developing countries for the period 1985-2007 and observed that internal conflict, military in politics, corruption, and bureaucracy quality have negative influence on FDI flow while lower financial risk have no significant impact. Cleeve (2012) examined the role of several institutional factors and political stability in attracting FDI to 40 countries in sub-Saharan Africa using panel data. In addition to the institutional variables included in many other previous studies, the study included ethnic tensions, religious tensions, and disaggregated conflicts into internal and external. A summary of results from earlier studies that have examined the determinants of FDI can be found in (Asiedu, 2002; Moosa, 2002; Moosa & Cardak, 2006). Other studies that have examined the determinants of FDI include (Sekkat & Veganzones-Varoudakis, 2007; Ranjan & Agrawal, 2011; Buchanan *et al.*, 2012; etc). Rjoub et al. (2017a) have investigated the impact of FDI inflows on economic growth in landlocked countries in Sub-Saharan Africa to establish a positive nexus between the two variables. Rjoub et al. (2016) have assessed the syndrome of FDI and economic growth in Latin American countries to document that economic growth is positively affected by FDI inflows.

3. Methodology

3.1 Data and Variables

Following previous studies, this study adopts a panel analysis procedure using data for eleven years i.e. 2001 -2011. The sample is limited to BRICS and MINT countries because these were considered as fast growing emerging economies at the time of the study. The periodicity is also between 2001 and 2011 because of data availability constraints at the time of the study. Appendix 1 concerns improvements of GDP per head with manufacturing and industrial activities in the MINT and BRICS countries for almost the same periodicity (Asongu & Odhiambo, 2018). It is apparent from the table the highest GDP growth per head corresponded to China, India, Nigeria, Indonesia and Turkey while the highest increase per year in increasing order correspond to India, South Africa, Brazil, China and Turkey.

The choice of variables used in our model is also influenced by previous studies. For the dependent variable, the study uses net FDI inflow (Jadhav, 2012). This is expressed in billion US\$ and is denoted by *NetFDI*. It is log-normalised to enable comparability with other variables. As noted by UNCTAD (2002), determinants of FDI may be market-related, resource-related, efficiency-related, or sound policies. In addition, indicators for institutional and governance quality have also be used as explanatory variables (Jahdav, 2012, Jadhav & Katti, 2012; etc) because they affect investment risks in fast-growing economies, and in-turn, the attractiveness of the country for FDI. Consequently, our explanatory variables are as follows:

- (i) *GDP*, the gross domestic product (in constant 2005 US\$, expressed in billions) - used as a proxy for market size i.e. market-related economic determinant.
- (ii) *NResGDP*, the share of natural resources in GDP (expressed in percentages) - used as a proxy for resource-related economic determinant.
- (iii) *Infrastructure*, an indicator for level of infrastructure availability [number of mobile phones per 100 persons the proxy (Asiedu, 2002; Sekkat & Veganzones-Varoudakis, 2007)] - used as a proxy for efficiency-related economic determinant.
- (iv) *Inflation*, the inflation rate (consumer price index) of a country – used as a proxy for macro-economic stability.
- (v) *Trade*, representing openness to trade i.e. ratio of total trade (exports + imports) to GDP – used as a policy variable.

(vi) *InstIndex*, the first principal component from a principal component analysis (PCA) of six governance and institutional-related indicators from the World Bank's world development indicators namely: Voice and Accountability, Political Stability/No violence, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption (Asongu, 2013d). The definitions of these indicators are in Appendix 2 and the values of each indicator range from approximately -2.5 (weak) to 2.5 (strong).

Data used in the study were obtained from the world development indicators and world governance indicators databases of the World Bank.

3.1.1 Principal Component Analysis of Governance and Institutional Indicators

The indicators for institutional and governance quality capture different broad dimensions of the quality of institutions and governance in a country which implies that including all the indicators as explanatory variables in a model has the potential of increasing the model's explanatory powers. However, because these variables capture different dimensions of governance, there is a high likelihood that they will be highly correlated which implies that a model with all the indicators is likely to suffer from multicollinearity. The matrix of pair-wise correlation coefficient of the variables as shown in Table 3 confirms this suspicion and shows that the correlations between all pairs of indicators are significant. Moreover, including all the variables may lead to over-parameterization of the model which will affect the reliability of the model. Therefore, the study uses principal component analysis (PCA) to reduce the dimension of the variables.

Table 3: Matrix of pair-wise correlation coefficients for institutional and governance indicators

Legend	Indicators	V. A.	P. S.	G. E.	R. Q.	R. L.	C. C.
Correlation	V. A.	1					
t-Statistic		-----					
Probability		-----					
	P. S.	0.3294	1				
		3.4364	-----				
		0.0009	-----				
	G. E.	0.4571	0.7597	1			
		5.0613	11.5077	-----			
		0.0000	0.0000	-----			
	R. Q.	0.5429	0.7742	0.8836	1		
		6.3675	12.0485	18.5806	-----		
		0.0000	0.0000	0.0000	-----		
	R. L.	0.5386	0.5793	0.8279	0.7166	1	
		6.2964	7.0005	14.5361	10.1199	-----	
		0.0000	0.0000	0.0000	0.0000	-----	
	C. C.	0.6329	0.7521	0.8618	0.8868	0.8189	1
		8.0509	11.2397	16.7292	18.9009	14.0510	-----
		0.0000	0.0000	0.0000	0.0000	0.0000	-----
V.A. - Voice and Accountability; P.S. - Political Stability; G.E. - Governance Effectiveness; R.Q. - Regulatory Quality; R.L. - Rule of Law; C.C.- Control of corruption							

Principal component analysis (PCA) is a statistical technique applied to reduce the dimensionality of a larger set of possibly correlated variables into a smaller set of linearly uncorrelated variables called principal components in such a way that the first principal component account for the largest possible variance from the original data set and each successive principal component accounts for a variance smaller than that of the preceding principal component (Jolliffe, 2002). The PCA for the governance and institutional indicators is computed using ordinary correlations with EvIEWS and the summary of results is presented in Table 4. From Table 4, we observe that the first eigen value encompasses up to 75% of the information on institutional and governance indicators therefore the corresponding eigen vector (i.e. eigen vector for PC 1) is selected to compute the principal component from the institutional

and governance indicators. A correlation matrix involving all the variables is provided in the Appendix 3.

Table 4: Result of principal component analysis showing eigen values and eigen vectors

Eigen values				Eigen Vectors (loadings)						
Number	Eigen Value	Proportion	Cumulative Proportion	Variable	PC 1	PC 2	PC 3	PC 4	PC 5	PC 6
1	4.5148	0.7525	0.7525	V. A.	0.3053	0.8482	0.3365	0.1214	0.2422	-0.0253
2	0.7316	0.1219	0.8744	P. S.	0.3848	-0.4612	0.5319	0.5811	0.1086	0.0829
3	0.3855	0.0643	0.9386	G. E.	0.4405	-0.2075	-0.2397	-0.2685	0.5824	-0.5424
4	0.1929	0.0322	0.9708	R. Q.	0.4400	-0.1153	0.1925	-0.6364	-0.0374	0.5913
5	0.1072	0.0179	0.9887	R. L.	0.4089	0.0956	-0.7136	0.4078	-0.0231	0.3841
6	0.0680	0.0113	1	C. C.	0.4516	0.0477	0.0117	-0.0645	-0.7671	-0.4484
V.A. - Voice and Accountability; P.S. - Political Stability; G.E. - Governance Effectiveness; R.Q. - Regulatory Quality; R.L. - Rule of Law; C.C. - Control of corruption										

3.2 Model Specification

We specify our model as follows:

$$NetFDI_{it} = \beta_0 + \beta_1 GDP_{it} + \beta_2 NResGDP_{it} + \beta_3 Infrastructure_{it} + \beta_4 Inflation_{it} + \beta_5 Trade_{it} + \beta_6 InstIndex_{it} + \varepsilon_{it} \dots(1)$$

Where i represents the i th country and t represents year.

A priori, the study expects that the coefficient of *GDP* will be positive since market size is expected to have a positive influence on FDI inflow. Although natural resources availability in developing countries can attract resource-seeking FDI, studies have argued that resource-seeking FDI to resource-rich developing countries depends on existing investment policies and market orientation (Rogmans & Ebbers, 2013). In some studies, natural resources availability contributes positively to FDI (Asiedu, 2005; Sichei & Kinyondo, 2012) while in others, it contributes negatively (Jahdavi, 2012; Rogmans & Ebbers, 2013). Therefore, the expected sign of the coefficient of *NResGDP* is not certain. The availability of good infrastructure reduces

transaction cost; therefore, the study expects the coefficient of *Infrastructure* to be positive. The coefficient of *Trade* is expected to be positive because countries that are more open to trade tend to attract market-seeking FDI while the coefficient of *Inflation* is expected to be negative because a low and stable inflation rate reduces macroeconomic risks associated with investment and makes the host country more attractive to FDI. Furthermore, high political risks and inefficient institutions generally discourage FDI (Asiedu, 2005; Dupasquier & Osakwe, 2006), therefore *InstIndex* is expected to have positive coefficient³. The analysis is done using Eviews

4. Results and Discussions

We present the descriptive statistics for BRICS and MINT in Table 5. We observe from Table 5 that net FDI inflow to BRICS between 2001 and 2011 range from US\$-0.18billion to US\$280.07 billion with an average of US\$43.15billion and standard deviation of US\$58.05 billion. Similarly, the maximum and minimum GDP are US\$4194.94 billion and US\$210.30 billion respectively while the mean and standard deviation are US\$1119.96billion and US\$922.76 billion respectively. For institutional index, the maximum and minimum values are 1.71 and -2.12 respectively while the mean and standard deviation are -0.11 and 0.82 respectively. On the other hand, the maximum and minimum net FDI inflows to MINT for the years under consideration are US\$31.38billion and US\$-2.98 respectively, with mean of US\$11.26 billion and standard deviation of US\$9.41 billion. Institutional index in MINT ranges from -3.08 to 0.13, with mean of -1.20 and standard deviation of 1.12. Table 6 provides the full summary statistics for the BRICS and MINT countries, including with units of measurements.

³ Based on their calibrations, the values of the political risks and institutional quality variables in countries that are highly instable and have inefficient institutions are closer to -2.5 while those that are stable and have efficient institutions have values closer to 2.5. Countries that are more stable and have efficient institutions are expected to have greater FDI inflow hence the expected positive coefficient.

Table 5: Descriptive statistics of the variables used in the analysis

BRICS	NetFDI	GDP	Infrastructure	NResGDP	Inflation	Trade	InstIndex
Maximum	280.07	4194.94	179.31	38.41	21.46	0.71	1.71
Minimum	-0.18	210.30	0.61	3.01	-0.77	0.23	-2.12
Mean	43.15	1119.96	57.43	10.76	6.77	0.48	-0.11
Median	22.46	882.19	46.35	6.32	5.86	0.51	-0.08
Std Dev.	58.05	922.76	44.94	9.74	4.34	0.14	0.82
MINT							
Maximum	31.38	995.03	102.49	17.22	54.40	0.86	0.13
Minimum	-2.98	70.84	0.21	0.29	3.41	0.38	-3.08
Mean	11.26	451.95	46.18	6.81	10.84	0.56	-1.20
Median	8.61	382.46	43.15	7.52	8.66	0.54	-0.92
Std Dev.	9.41	294.52	29.96	4.67	9.79	0.10	1.12

Table 6: Summary Statistics of 9 countries for the period 2001-2011: 99 observations

	Mean	S.D	Min	Max	Units
Net Foreign Direct Investment Inflows (NFDI)	28.979	46.359	-2.977	280.07	Current (Log)
Log of Real GDP (constant of 2005 US billions)	6.346	0.886	4.260	8.341	Real (Log)
Infrastructure (Number of mobile phones per 100 people)	52.433	39.220	0.210	179.31	Per heads
Natural resources (on GDP)	9.003	8.110	0.294	38.410	Share GDP
Inflation (Consumer Price Index, annual %)	8.580	7.519	-0.765	54.400	Rate of growth
Trade Openness (Import + Exports on GDP)	0.514	0.128	0.225	0.856	Share GDP

Notes : S.D: Standard Deviation. Min: Minimum. Max: Maximum. Units of measurement: Current value of NFDI is in Billions USD. Shares of GDP are expressed in percentages of GDP. Rates of growth are the % of annual increase.

To examine whether the determinants of FDI to BRICS are different from those of MINT, we employ pooled time-series cross sectional technique (i.e. OLS) to estimate equation (1) for three samples: BRICS only, MINT only, and BRICS and MINT combined. Pooled analysis is preferred to panel analysis for the BRICS only and MINT only subsamples because panel analysis will involve testing whether the model follows a fixed effect model or random effect model, and random effects estimation requires the number of cross sections to be greater than the number of coefficients. The results of the pooled analysis are presented in Table 6. We observe from Table 6 that GDP is a significant determinant of FDI to BRICS and MINT respectively; the coefficient of *NResGDP* is positive and insignificant in the subsample of only BRICS but negative and insignificant in the subsample of only MINT; and the coefficient of infrastructure is positive and significant in BRICS but not significant in MINT. For *Inflation*, its coefficient is negative in MINT as expected although insignificant but positive in BRICS; the coefficient of

Trade is negative and insignificant in BRICS but positive and significant in MINT; while the coefficient of *InstIndex* is positive and significant in BRICS as expected but negative in MINT. Thus, we observe that depending on the set of countries considered, the determinants of FDI to fast-growing developing differ. For the combine sample of MINT and BRICS estimated using OLS, the signs of the coefficients of *GDP*, *Infrastructure*, and *Trade* are in line with *a priori* expectation and also significant suggesting that these are the main determinants of FDI to BRICS and MINT.

We go further to ascertain the appropriate specification (i.e. fixed-effect or random-effect) to use in estimating the model for combined sample of BRICS and MINT. We carry out the *Hausman specification test* (Hausman, 1978) under the null hypothesis that the individual effects are uncorrelated with the other regressors in the model (i.e. estimates from the random-effect model are consistent and efficient). The p-values (0.0000) of the chi-square statistic (35.06) from the *Hausman specification test* for cross-section random effect is less than 0.05 indicating that the null hypothesis be rejected. Consequently, the fixed effect model specification is employed to estimate the panel model and the summary of the result is presented in Table 7.

Table 7: Fixed effects model result of panel regression analysis

Dependent Variable: NETFDI								
	Pooled time-series cross sectional analysis						Fixed effects model	
	BRICS only		MINT only		BRICS and MINT combined			
Explanatory Variables	Coef.	Prob.	Coef.	Prob.	Coef.	Prob.	Coef.	Prob.
C	-44.134	0.000	-12.478	0.081	-47.136	0.000	-44.140	0.000
GDP	0.063	0.000	0.027	0.000	0.056	0.000	0.056	0.000
NRESGDP	0.150	0.666	-0.388	0.122	-0.132	0.519	-0.200	0.381
INFRASTRUCTURE	0.222	0.000	0.014	0.708	0.134	0.003	0.156	0.042
INFLATION	1.197	0.091	-0.118	0.225	0.389	0.075	0.302	0.198
TRADE	-10.028	0.606	25.561	0.023	39.164	0.005	31.942	0.032
INSTINDEX	11.903	0.000	-0.319	0.849	-1.131	0.506	-2.282	0.245
Adjusted R²	0.944		0.779		0.905		0.913	

Notes: Heteroscedasticity and autocorrelation consistent standard errors are used in the estimations (see Rjoub *et al.*, 2017b). Moreover, the Hausman test is used to determine the relevance of the fixed effects model.

Consistent with recent literature, the fixed effects model is adopted in order to control for country-specific features or the unobserved heterogeneity, which is part of endogeneity. Furthermore, according to the authors, when a panel consists of observations on fixed and comparatively small sets of cross section units (e.g. member states of a given region), there is a presumption in favour of FE (Asongu, 2016; Asongu & Nwachukwu, 2018).

We observe from Table 7 that the coefficient of *GDP* is positive as expected and significant indicating that market size is an important determinant of FDI flows to BRICS and MINT. It shows that *ceteris paribus*, if the GDP of BRICS and MINT increases by US\$1billion, on average, inward FDI to the countries will increase by US\$56million. The sign of *NResGDP* is negative but insignificant, and indicates that BRICS and MINT countries that are less dependent on natural resources are likely to receive more FDI. It also suggests that FDI flows to BRICS and MINT are not resource-oriented but market-oriented. The sign of the coefficient of the *Infrastructure* is in line with *a priori* expectations and also significant. It shows that for every unit increase in the number of mobile phones user per 100 persons in BRICS and MINT, on average, FDI inflow to the countries will increase by \$US156million all other things being equal. This further emphasized the importance of infrastructure in reducing cost of transacting business in a country thereby encouraging investment. The study expected the coefficient of *Inflation* to be negative but the result yielded a positive and insignificant coefficient. This suggests that BRICS and MINT countries that have higher inflation rate tend to attract more FDI. A more plausible explanation is that macro-economic stability in BRICS and MINT tends to play a lesser role in investment decisions by multinational companies. The coefficient of *Trade* is positive as expected and significant, indicating that countries that are more open to trade are more likely to attract more FDI. The coefficient of the *InstIndex* is negative contrary to *a priori* expectations but insignificant. This indicates that MNCs are more likely to invest in BRICS and MINT countries with lower institutional and governance quality or that the quality of governance and institutions in host countries plays a less important role in FDI decisions by MNCs.

5. Concluding remarks

The roles of BRICS and MINT in reshaping the global economic environment cannot be trivialized. In 2011, BRICS and MINT accounted for 51% of the global population, attracted 30% of global FDI, and contributed 19% of global GDP. Based on these facts, this study set out to examine the determinants of FDI to MINT and BRICS and observed that market size, infrastructure availability, and trade openness play the most significant roles in attracting FDI to BRICS and MINT while natural resources availability and institutional quality play insignificant roles. Given that FDI inflow to a country has the potential of being mutually beneficial to the investing entity and host government, the challenge is on how BRICS and MINT can sustain the level of FDI inflows and ensure it results in economic growth and socio-economic transformation. To sustain the level of FDI inflow, governments of BRICS and MINT need to ensure that their countries remain attractive for investment. This implies that in addition to the large market size and strategic geographical location, these countries need to ensure that the existing legal framework for investment protects investors and creates a level field for competition in the domestic market. BRICS and MINT also need to ensure political stability in their countries as this will reduce investment risk. The governments of countries with relatively low level or inefficient infrastructure, especially transportation and energy (e.g. India and Nigeria) need to invest more in these sectors.

Future studies should use other empirical strategies to assess whether the established linkages withstand empirical scrutiny from country-specific settings. Such country-oriented frameworks are necessary for more targeted policy implications. Adding human capital to the conditioning information set is also worthwhile. Accordingly, human capital is relevant in economic development as research and education have a multitude of indirect and direct positive impacts on real production per head as well as in socio-economic welfare (government quality, the empowerment of women and a multitude of indicators). This narrative on human capital is supported by a recent strand of international development literature (Guisan & Neira, 2006; Guisan, 2009, 2015; Asongu & Tchamyou, 2018; Asongu, 2017b; Tchamyou, 2017, 2018).

6. List of Abbreviations

FDI: Foreign Direct Investment

BRICS: Brazil, Russia, India, China, and South Africa

MINT: Mexico, Indonesia, Nigeria, and Turkey

GDP: Gross Domestic Product

UNESCAP: United Nations Economic and Social Commission for Asia and the Pacific

UNCTAD: United Nations Conference on Trade and Development

MNC: multi-national company

OLI: ownership, location specificity, and internalization

SSA: sub-Saharan Africa

MENA: Middle East and North Africa

PC: Principal Component

PCA: Principal Component Analysis

VA: Voice and Accountability

PS: Political Stability

GE: Governance Effectiveness

RQ: Regulation Quality

RL: Rule of Law

CC: Corruption Control

InstIndex: the first principal component of six governance and institutional-related indicators

7. Declaration

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Compliance with Ethical Standards

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This article does not contain any studies with human participants or animals performed by the author.

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Appendices

Appendix 1

The evolution of real value-added per capita of Manufacturing and Non-manufacturing activities, as well of real Gross Domestic Product per capita of BRICS and MINT countries for the period 2000-2010. Graph A1 shows the average annual increase of real production per head for the period 2000-2010.

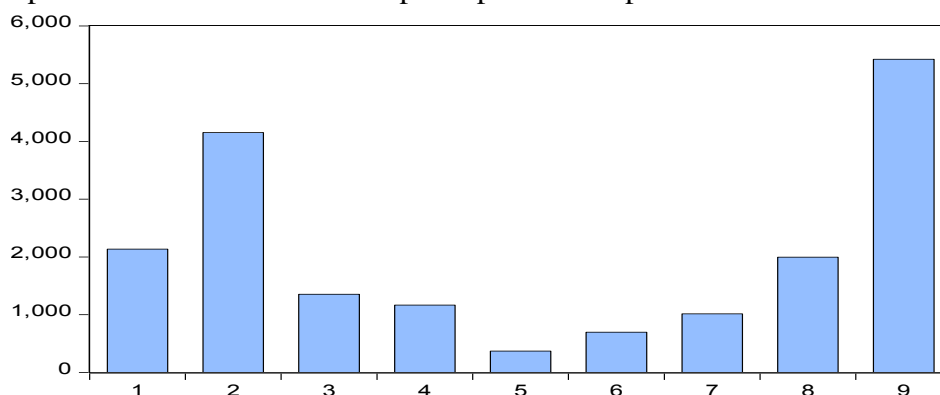
Appendix 1. Production per capita, annual increase and rate of growth (5), 2000-2010.

Country name	QMH 2000	QMH 2010	GDPH 2000	GDPH 2010	QNMH 2000	QNMH 2010	Increase Per year	Rate ph Compound
Brazil	1347	1307	7921	10056	6574	8749	214	2.42
China	852	2181	2664	6816	1812	4635	415	9.85
India	258	430	1718	3073	1460	2643	136	5.99
Indonesia	760	931	2714	3880	1954	2949	117	3.64
Mexico	2414	2239	12071	12441	9657	10202	37	0.30
Nigeria	58	151	1456	2152	1398	2002	70	3.98
Russia	3425	3322	23108	24124	19683	20803	102	0.43
South Africa	1421	1137	7480	9477	6059	8340	200	2.39
Turkey	3085	4435	17959	23382	14875	18948	542	2.67

Notes: QMH and QNMH are, respectively, manufacturing and non-manufacturing real value-added per head, while GDPH is the sum of both variables. Data of QMH, GDPH, QNMH in US Dollars at 2005 Purchasing Power Parities (PPPs). The last columns are the average increase per year and the annual percentage of growth (calculated with compound rate). Source: Guisan and Aguayo(2015), Guisan and Exposito(2015) and Guisan (2017 a b), elaborated from World Bank indicators.

It is apparent from Appendix 1 that the order of the countries is not the same if we use the highest positive variations or the highest rates of growth, because for a same increase a lower initial value implies faster growth (higher rate of growth). The highest rates of growth of per head corresponded to China, India, Nigeria, Indonesia and Turkey, but the highest increases, of real GDP per capita, per year corresponded, in descending order, to Turkey, China, Brazil, South Africa and India (Asongu & Odhiambo, 2018).

Graph A1. Increase of real GDP per capita for the period 2000-2010



Source: Elaborated with data of GDPH from Appendix 1. Countries: 1. Brazil, 2. China, 3. India, 4. Indonesia, 5. Mexico, 6. Nigeria, 7. Russia, 8. South Africa, 9. Turkey

Appendix 2

These definitions of the indicators of governance and institutional quality are obtained from the World Governance Indicators database of the World Bank.

- (i) Voice and accountability - reflects perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.
- (ii) Political Stability/ No violence - reflects perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism.
- (iii) Governance effectiveness - reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.
- (iv) Regulatory quality - reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.
- (v) Rule of Law - reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.
- (vi) Control of Corruption - reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.

Appendix 3: Full correlation matrix

Infra	Infla	Nres	VA	PS	RQ	GE	RL	CC	InstIndex	NFDI	RGDP	
1.000	-0.102	0.277	0.032	0.291	0.291	0.190	0.132	0.141	0.212	0.183	0.198	Infra
	1.000	0.077	-0.061	-0.274	-0.124	-0.254	-0.150	-0.253	-0.219	-0.251	-0.339	Infla
		1.000	-0.269	-0.228	-0.261	-0.345	-0.490	-0.455	-0.397	0.049	0.066	Nres
			1.000	0.329	0.542	0.457	0.538	0.632	0.648	-0.056	-0.241	VA
				1.000	0.774	0.759	0.579	0.752	0.817	0.221	0.450	PS
					1.000	0.883	0.716	0.886	0.934	-0.028	0.255	RQ
						1.000	0.827	0.861	0.936	0.128	0.393	GE
							1.000	0.818	0.868	0.028	0.326	RL
								1.000	0.959	-0.067	0.181	CC
									1.000	-0.028	0.282	InstIndex
										1.000	0.697	NFDI
											1.000	RGDP

Infra: Infrastructure. Infla: Inflation. Nres: Natural resources. VA: voice & accountability. PS: political stability. RQ: regulation quality. GE: government effectiveness. RL: rule of law. CC: Corruption-control. InstIndex: Institutional index. NFDI: Net Foreign Direct Investment. RGDP: real GDP.