



Regular Article

FDI Flows to Sub-Saharan Africa: The Impact of Finance, Institutions, and Natural Resource Endowment

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Using a panel data from 38 Sub-Sahara African (SSA) countries and a dynamic system GMM model, this study examines the individual and interactive impact of financial development, institutional quality, and natural resource endowment on both the stock and the flow of inward foreign direct investment (FDI) to the region. It finds that inward FDI is more dynamic in non-resource-rich than in resource-rich countries; that in non-resource-rich countries, foreign investors rely more on the efficiency of the governance institutions, but in resource-rich countries, the formal financial system provides alternative platform for managing the stock of existing FDI, as well as for providing financial allocative and intermediation roles; that the impact of natural resource endowment and macro-economic factors are more robust in the stock than it is in the flow of inward FDI; that the capacity of an SSA country's financial system to attract and support foreign investments is dependent on the quality of her telecommunication infrastructure, the quality of legal and governance structures, and the kind of FDI in question; that the positive impact of infrastructure on FDI depends on the size of a country's market; and that although natural resource endowment appears to be key source of inward FDI to SSA countries, its importance has diminished since the start of 2000.

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INTRODUCTION

In absolute terms, foreign direct investment (FDI) inflows to Africa have maintained a steady increase since the start of 1990s. According to the 2010 World Investment Report (UNCTAD, 2010), inward FDI flows to Africa peaked from US\$2.845 billion in 1990 to a level of \$72.179 in 2008, before dipping to \$58.565 billion in 2009. Similarly, inward FDI stock in the region grew from \$60.675 in 1990 to as high as \$514.759 in 2009. In terms of the contribution to the region's gross domestic product, the report also shows some noticeable improvement. The FDI/GDP ratio progressed from 12.4% in 1990 to 36.2% in 2008, whereas inward flows of FDI to GDP ratio increased from just 3% to 22.9% within the same period (see Figures 1 and 2 for the trends).

Although the number of African countries recording growth in FDI flows has increased over the past few years, it is interesting to note that only 13 out of the 55 countries in Africa attracted inward FDI flows up to \$1 billion in 2009; and as many as 25 countries mostly in the Sub-Saharan region even recorded < \$0.1 billion inward FDI flows (see Figure 3). As expected, Figure 3 indicates that the stock of FDI, measured as the ratio of stock of inward FDI to GDP in a country, is more stable and less volatile than the flow of inward FDI. The unstable and volatile nature of FDI flows essentially implies that most of the countries still lag behind in terms of the capacity to attract new foreign investments and the required conducive environment for investment to thrive. It has along this line been argued that most of the FDI flows go to the mineral resource sector, and that very little achievement has occurred in

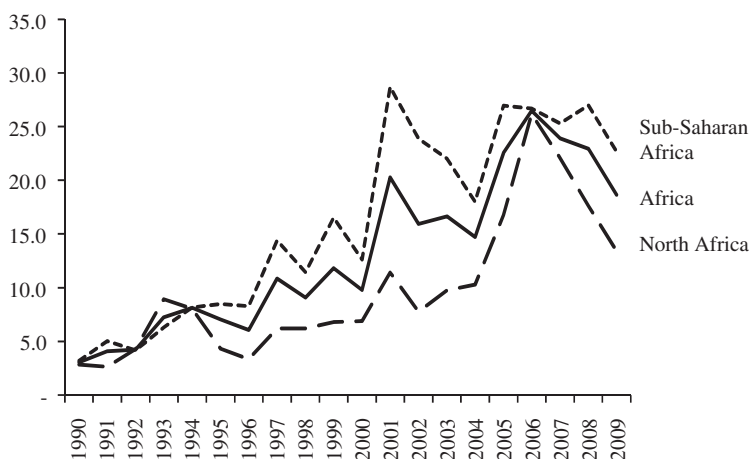


Figure 1: FDI inflows as a percentage of gross fixed capital formation (1990–2009)

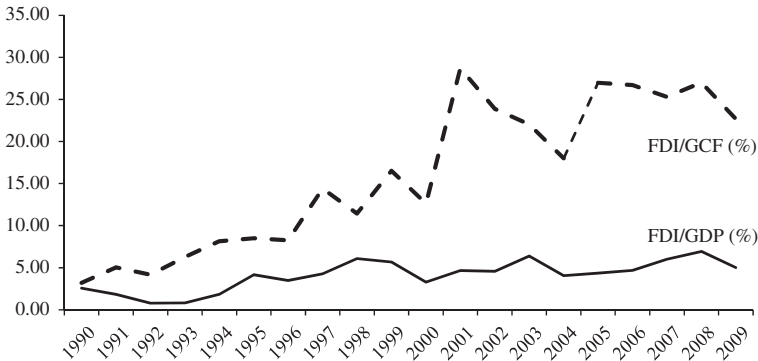


Figure 2: Trends in the flows and stock of inward FDI to the SSA region (1990–2009)

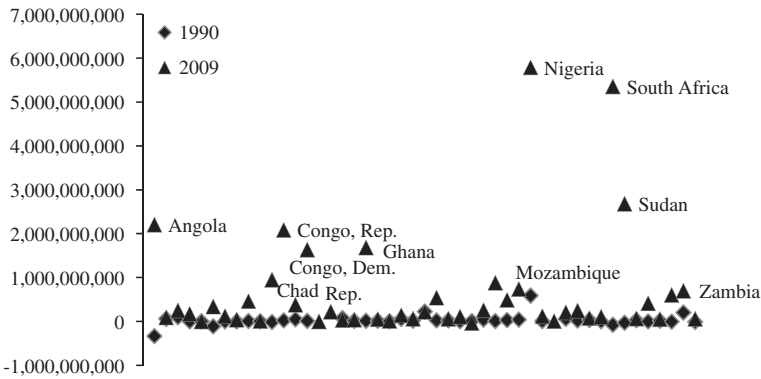


Figure 3: FDI inflows to SSA countries in 2009 (\$)

attracting efficiency- and market-seeking FDI to the region. UNCTAD (2005), for instance, reports that in Sub-Sahara Africa (SSA), the percentage of foreign investment flows to the primary sector ranges from as high as 55% to 80%.

A common premise in the literature is that most FDI flows to Africa are resource seeking, and that top in the list of factors constraining the flow of other kinds of FDI to the region are lack of financial system infrastructure and weak institutions (Asiedu and Lien, 2011; Asiedu, 2006). However, the changing patterns of FDI flows in the region in recent years call for a rethink of the FDI dynamics. Some interesting aspects of these changing dynamics are clearly highlighted in the 2010 World Investment Report, and include the shift from resource-induced FDI to service- and manufacturing-based FDI, the rising influence of FDI from developing economies, and the growth in



intraregional FDI flows. In addition to the dominance of resource-seeking FDI, there are a number of other factors that make an investigation into the determinants of inward FDI in the region very distinctive. First, substantial investment-oriented economic and financial systems reforms have taken place in a number of SSA countries since the start of the 1990s. According to Abdulai (2007), the fiscal and monetary policies which most of these countries pursued led to a reduction in the macroeconomic imbalances in the region, including substantial removal of domestic price controls, establishment of market-determined interest rates, liberalisation of exchange rates, and the restructuring of public sector enterprises. Amidst these new developments, there is also a general claim that the FDI flows originating from developing economies are resilient to the deterioration of the socio-political crises and weak institutions in the region (UNCTAD, 2010; UNIDO, 2007). It is not yet clear, in existing literature, how the emerging macroeconomic and institutional conditions have influenced the stock and flows of FDI in the region. Again, in the case of Africa, little empirical evidence actually exists to motivate optimal FDI policies. Studies on capital flows and foreign investments remain very limited and are yet to account fully for the structural characteristics that are peculiar to countries in the region, as well as the macroeconomic changes that have occurred due to years of reforms. The implication of this gap is amplified by the evidence from previous studies that what constitute the drivers of FDI in other developing regions do not necessarily match well with the case of SSA countries (Asiedu, 2002, 2006), and that policies that have been successful in other regions may not be so in Africa (Zeng *et al.*, 2002). One way such conclusion arises is the inability of previous researchers to distinguish between growth in the stock of existing FDIs and the flow of new FDIs to the region. This distinction is important because factors that encourage the continuing stay and safety of foreign investors and reinvestment of earnings and reserves (FDI stock) may be different from those that ensure the attraction of new investors and new capital (FDI flows). Unlike the previous studies, this study strives to answer the following questions: (1) Do the determinants of the stock of FDI differ from the flow of FDI in the SSA region? (2) What role do development in the financial systems, institutional structures, and natural resource endowment play in attracting FDIs to the region? (3) Have the determinants of FDI, as postulated in the traditional FDI literature, changed over time due to reforms that occurred in most African countries? To answer these questions, the study makes use of a panel data consisting of 38 SSA countries and covering a period 1995–2009. The study contributes to existing literature on international capital flows in some ways: first, it focuses only on SSA region where studies on capital flows and foreign investments have remained relatively



very limited; second, it strives to establish whether the numerous economic and political reforms embarked upon by many African countries have significantly improved the way the financial system, macroeconomic, and institutional factors impact on FDI stock and flow; and third, it gauges the persistent of the acclaimed impact of natural resource endowment on FDI stock and flows to the region.

THE DETERMINANTS OF FDI INFLOWS

The 1998 UNCTAD report on trends and determinants of FDI identifies three major factors that impact on a country's capacity to attract FDI flows. They are the policy framework (such as economic and political stability, trade and tax policies, privatisation and so on); economic determinants; and extent of business facilitation in the host country (UNCTAD, 1998). The report goes on to classify economic determinants according to the motives of foreign investors – namely, market-seeking (market size, market growth, access to regional and global markets, country-specific consumer preferences, and structure of market); resource/asset-seeking (raw materials, low cost unskilled labour, technology, and physical infrastructure); efficiency-seeking (cost of inputs and other resources, regional integration). Since the release of the 1998 UNCTAD report, empirical studies on the determinants of FDI across developed and developing countries have mostly focused on factors such as macroeconomic condition, institutional characteristics, and more recently financial development. For Africa, most of the previous empirical works were motivated by the idea that inward FDI flows were popularly resource seeking, and as such were influenced by natural resourced endowment, fiscal incentives, and related factors. Thus, most of such empirical literature failed to adequately capture the impact of other FDI determinants such as financial development, institutions, and macroeconomic conditions. The following passages take a global but brief review of the literature on each of these traditional determinants.

Financial determinants

Financial development can affect FDI through the allocative channel, the transaction cost reduction channel, the liquidity channel, and the financial enforcement contract channel. Through the allocative channel, financial intermediaries increase the productivity of capital by directing financial resources to projects with the highest rates of return, and by providing the mechanisms for risk reduction and diversification (Ncube, 2007; Claessens and Laeven, 2003; Fosu *et al.*, 2003). This is the major aspect of the financial



intermediation theory. A financial system is adjudged developed if it generally makes it easier for individuals and entities in need of external funds to gain access at relatively low cost (Guiso *et al.*, 2004).

In addition, financial development induces economic efficiency because of its capacity to ease information flow, contract enforcement, and transactions costs (Méon and Weill, 2010; Hermes and Lensink, 2003; Levine, 1997). Financial institutions provide transaction cost-reducing information on industries, markets and utility services to investors (Bartels *et al.*, 2009). By so doing, they reduce the level of asymmetric information that constrains international capital mobility (King and Levine, 1993). Essentially, a developed financial system increases liquidity, and thus facilitates trading of financial instruments and timing and settlement of such trades (Levine, 1997); enhances competition in the industrial sector by allowing the creation of new firms and the sustenance of existing ones (Rajan and Zingales, 1998); and facilitates the enforcement of financial contracts (Mendoza *et al.*, 2007).

On the other hand, lack of development of local financial markets, in particular, can adversely limit the capacity of an economy to take advantage of potential FDI benefits (Alfaro *et al.*, 2008). This implies that while a developed financial system eases capital and investment flows, an undeveloped system constrains both the flow and the impact on the host countries. Along this line, Antràs *et al.* (2007) argue that weak financial institutions decrease the scale of multinational firm activity by simultaneously increasing the reliance on capital flows from the parent. Without a developed financial system, ensuring smooth intermediation (at both domestic and international levels) may be difficult. Unfortunately, financial systems in the SSA region generally match the description of underdeveloped systems. The systems are characterised by limited financial products and financial innovation, wide interest rate spreads, weak legal systems, and pronounced market fragmentation (Beck and Hesse, 2009; Ncube, 2007; Marr, 1997).

Among the few existing studies on the relationship between financial development and FDI in developing countries, Alfaro *et al.* (2008) find that better local (financial) conditions not only attract foreign companies, but also may allow host economies to maximise the benefits of foreign investments. Similarly, Lee and Chang (2009) provide evidence that the relationship between FDI and growth is endogenously influenced by the development of the domestic financial sector. A related study by Al Nasser and Gomez (2009), which makes use of pooled data from 15 Latin American countries from 1978 to 2003, establishes that FDI is significantly and positively correlated with the banking sector variables, and that FDI is directed into countries that are financially developed and institutionally strong. In a case study of Malaysia, Ang (2008) uses time series data over a period 1960–2005 to demonstrate that



increases in the level of financial development, infrastructure development, and trade openness promote FDI.

In practice, it remains inconclusive whether underdeveloped financial systems are largely responsible for the low volume of inward FDI inflows to Africa. As argued by Claessens *et al.* (2001), the first principle in the FDI-finance debate in developing economies could be to presume that financial development might stifle the flow of FDI. Nevertheless, such a conclusion needs to be empirically tested, especially considering the alleged substitutive role of FDI and financial development. According to Claessens *et al.*, due to the possibility of FDI substituting for financial market development in countries where firms encounter difficulties investing in the capital market, the positive relationship between FDI and financial development does not always hold true. Interestingly in the case of Africa, a reasonable stock of inward FDI has been to the financial sector of the economies. As such, one expects that lack of a developed financial system can as well be a source of attraction to foreign investors wishing to invest in the sector.

The macroeconomic conditions and growth

Some of the commonly investigated macroeconomic determinants of FDI are inflation, real exchange rate, market size, economic growth, and real interest rate. For inflation, Yartey and Adjasi (2007) and Asiedu (2002) find a negative significant effect and explain it to mean that both domestic and foreign investors will be unwilling to invest in an atmosphere of a high inflation rate. Inflation can impact negatively on the flow of FDI because it sometimes signals weakness in a country's economic conditions and monetary management, and because it affects the profitability of businesses (de Mello, 1997). As noted by Onyeiwu and Hemanta (2004), to the extent that inflation signals poor economic management, it should have a decreasing effect on FDI flows. On the contrary, it is equally possible that inflation induces FDI flows in certain circumstances. Using the framework of the intertemporal consumption theory, Sayek (2009) has, along this line, demonstrated how an increased domestic inflation rate increases foreign investment *via* changes in the savings and consumption pattern of the agent, and how the effect of inflation on current consumption can reduce the cost of FDI.

On the relationship between real interest rate and FDI, the capital-arbitrage hypothesis states that the inward and outward movement of FDI is dependent on the cost of and returns on capital (Caves, 1982, p. 174). Theoretical predictions on the relationship also follow consistently with tenets of the portfolio theory, which expresses that under an efficient market condition capital moves from countries with low interest rates to countries with high interest rates (Denisia, 2010); the wealth distribution theory by Fischer and



Modigliani (1978) that positive real interest rates are more beneficial to investors; as well as the neo-classical theory that the price of capital determines its supply, allocation, and demand. Despite the strength of the arguments surrounding these theories, empirical studies such as Onyeiwu and Hemanta (2004) find a negative but non-significant correlation between inward FDI flows and real interest rate. In line with the propositions of the overvalued currency hypothesis and the economic exposure theory, real exchange rate is expected to negatively impact on FDI flows. The overvalued currency hypothesis posits that real exchange rate appreciation discourages FDI flows and undermines the stock of existing FDIs. The economic exposure theory also argues that exchange rate risk discourages the flow of new capital into a country and tends to force foreign firms to either recycle funds domestically in the host countries or make extensive use of the local financial markets (Goswami and Shrikhande, 2001). Ang (2008) finds that for Malaysia, appreciation of the real exchange rate appears to discourage FDI inflows, given that an overvalued currency is capable of negatively affecting a country's international competitiveness. This is, however, contrasted by the argument of Yol and Teng (2009), which demonstrates that based on the currency area hypothesis, firms would not invest in countries with weaker currencies. Their empirical test on this reveals that real exchange rate has a strong positive effect on FDI.

Consistent with the market size hypothesis, market size is expected to have a positive impact on FDI flows to developing countries because western foreign investors usually target economies with large markets (Billington, 1999). This claim is confirmed by Al Nasser and Gomez (2009) and Chakrabarti (2001), all of whom find the relationship between FDI and market size of the host country significantly positive at conventional levels. Neubaum (2006) argues, however, that this impact cannot be generalised to all kinds of FDI, given that market size has significant positive impact on horizontal FDI but does not seem to have any significant effect on vertical FDI. A developing country with relatively low per capita GDP and high economic growth will be more attractive to foreign investments than a developed country with matured and saturated economy. In similar vein, a growing economy may provide better opportunities for making profits, and so could attract more FDI flows (Onyeiwu and Hemanta, 2004; Chakrabarti, 2001).

Natural resource endowment

The pattern of the impact of natural resources endowment on FDI is an interesting one, especially in the case of Africa where the dominant view in the literature is that the Continent has been mostly attractive to resource-seeking FDI (Dunning and Lundan, 2008; UNCTAD, 2005). The argument is



that based on their comparative advantage in the resource sector, most FDI to the region naturally targets the mineral sector. To the extent that this assumption holds true, one expects an overwhelming influence of natural resources as a determinant of FDI, compare with the other conventional factors such as the institutional quality and macroeconomic variables. This notwithstanding, the empirical literature on the actual effect of natural resources on FDI flows in Africa is conflicting. Asiedu (2006) uses a panel of 22 African countries and finds, for instance, that natural resources and large markets promote FDI. Basu and Srinivasan (2002) find that some African countries have been able to attract FDI not because of natural resources, but through a broad improvement in the business environment and deliberate image-enhancing campaigns. This is also coupled with the position of Dunning and Lundan (2008, p. 68) that three types of resource seekers exist among foreign investors, namely, those seeking physical resources of different kinds, those seeking plentiful supplies of cheap labour, and those seeking technology and management expertises. Employing a dynamic panel model, Asiedu and Lien (2011) recently establish that natural resource export intensity has an adverse effect on FDI. Thus, a conclusion on the real impact of resource endowment may be influenced by measurement-related issues.

The institutional determinants

Institutional factors that have been examined in previous literature as major determinants of FDI are trade openness, infrastructure, legal origin, and rule of law. Nearly all the previous empirical studies controlled for the degree of a country's openness to international trade. The argument is that trade openness can be used to compare countries' receptiveness to foreign businesses. As Law and Habibullah (2009) put it, an open economy helps to check the power of political and economic elites and promote competitive markets. A more open economy is, therefore, expected to attract higher FDI flows. Theoretically, a significant positive effect of the factor has equally been confirmed by a number of previous studies, including Ang (2008), Onyeiwu and Hemanta (2004), and Asiedu (2002). Chakrabarti (2001) also ranks a country's level of openness to international trade as the most important determinant of inward FDI to the country. However, it is still possible that an open economy can lead to a situation where international trade substitutes for FDI.

Theoretical and empirical literatures on the impact of infrastructure are also divided. Asiedu and Lien (2011), Ang (2008), Asiedu (2006), and Onyeiwu and Hemanta (2004) find that the relationship between the level of infrastructure development and FDI flows is significantly positive, whereas Marr (1997) argues that the prevalence of poor infrastructure in the areas of road, rail system, electricity, and telecommunication can create an incentive



for the flow of foreign investments. *A priori*, one expects that the extensive infrastructural underdevelopment, which is a basic feature of most African countries, could be a source of attraction for foreign investments in the areas of construction, telecommunication and so on. In the case of urban agglomeration, Al-Sadig (2009, p. 274) hypothesises that a high degree of urbanisation could signal a high quality of infrastructural development and concentration of consumers, and would as such be a source of attraction to foreign investors.

Some of the previous studies have also tried to proxy institutional quality using rule of law and legal origin. According to Biswas (2002, p. 496), rule of law theoretically reflects the degree to which the citizens of a country are willing to accept the established institutions to make and implement laws and adjudicate disputes. More importantly, he argues that a rule-of-law index presents a good measure for the security of property and contract rights. In particular, the seminal paper by La Porta *et al.* (1999) argues that countries whose commercial legal systems take after the English common law system have higher institutional quality because such system protects shareholders and creditors better, preserve property rights better, and are associated with less regulation of markets. In the case of Africa, Assane and Malamud (2009) find that African countries with British legal origin have more developed and impacting financial development system than those with French legal origin. Similarly, Globerman and Shapiro (2003) find that FDI originating from the United States of America mostly prefer countries that are rooted in English Common law, which is presumed to be characterised by better governance infrastructure. Theoretically, therefore, the nature of the impact of financial system development may as well be a function of the prevailing legal institutions in the affected country. Despite the merits of the empirical and theoretical conclusions on the positive impact of institutional quality, Blonigen (2005, p. 390), however, draws attention to the fact that estimating the magnitude of the effect of institutions on FDI is difficult because there are not any accurate measurements of institutions, and that most measures are some composite index based on survey responses that are difficult to compare across countries.

EMPIRICAL MODEL AND DATA

Data specifications

Panel data used in this study cover 1995–2009 and are generated from 38 SSA countries (see Appendix C for the list of countries). The choice of the 38 countries is based mostly on data availability. The main variable under



study is inward FDI, defined in some of the existing literature as the ratio of the stock of inward FDI to GDP (Asiedu and Lien, 2011). The static nature of this definition, however, makes it difficult to truly observe the dynamics of FDI flows in most circumstances. Recognising the lack of general applicability of this definition in empirical and statistical analysis, OECD (1996) explicitly lays down the difference between FDI stock and FDI flow (see Appendix A for the OECD definitions). This is especially so in the case of Africa where the emergence of FDI originating from developing countries such as China, India, Brazil, and Malaysia is becoming very visible. Using a complementary measure that captures the growth trends allows one to better evaluate the stability of the impact of the traditional determinants. Following the definition of UNCTAD, this study introduces the ratio of inward flows of FDI to gross capital formation as a proxy for FDI flows.

In the baseline model, the explanatory variables are grouped according to financial, macroeconomic, natural resources endowment, and institutional determinants. Three proxies are used to represent the role of financial development in supporting FDI flows. They are the ratio of broad money to gross domestic products, which is taken as a measure for the overall size of the monetary system (Giuliano and Ruiz-Arranz, 2009); the ratio of bank credit to the private sector to GDP, which measures the contribution of financial institutions in funding private sector investments (Liberti and Mian, 2010), and also represents the ease with which funds can be accessed from the local financial markets (Beck *et al.*, 2000); and the ratio of quasi money to GDP, which gauges the actual depth of the monetary system. The reason for the introduction of the quasi-money measure is to address the inadequacies associated with the conventional broad money to GDP measure. The macroeconomic condition serves as the control variables in the baseline model, and is made up of inflation, real exchange rate, real interest rate, economic growth, and market size. The market size, measured as real per capita GDP, is included to accommodate the labour cost/wage rate hypothesis and as a proxy for the level of wage rates in each of the selected countries. The latter reason arises due to lack of time series data on wage rates in most African countries. In line with previous studies on the determinants of FDI, the baseline model controls for the level of urban agglomeration.

Similarly, variables used to capture the quality of existing institutional structures in each of the countries include infrastructure development, trade openness, rule of law, and legal origin. Also among the main explanatory variables is natural resource endowment, defined as the ratio of mineral rents to GDP per year in a country. The mathematical definitions of these variables and the sources of their respective data are contained in Appendix B. The descriptive statistics on these baseline variables are contained in

Tables 1 and 2. According to *a priori* expectation, the financial development variables are strongly correlated with each other, which provides justification for their alternative applications in the literature. A test for multicollinearity indicates that the average variance inflation factor (VIF) for the entire set of explanatory variables ranges from 2.29 to 2.49; and that the major sources of multicollinearity in the baseline model are the proxies for infrastructure (VIF = 5.94 to 7.36), natural resource endowment (VIF = 2.65 to 3.08), rule of law (VIF = 2.85 to 3.72), and financial development (VIF = 2.56 to 3.67). The fact that the range of VIFs for the main independent variables is greater than the benchmark level of two renders an OLS model unfit for the primary estimations and justifies the choice of a simultaneous equation model, as explained in the next section.

Empirical model

The baseline estimation model used in the study is presented as follows:

$$I_{i,t} = \alpha + \sum_{i=1}^j \beta_i(L)I_{i,t} + \sum_{j=1}^K \gamma_j \chi_{i,t} + \varepsilon_{i,t},$$

where $I_{i,t}$ indicates the proxy for the stock of FDI in country i at the end of year t ; the sigma sign represents the lag order of the series, while L is the lag

Table 1: Summary statistics on the FDI and its determinants

Variable	Observation	Mean	Standard deviation	Minimum	Maximum
FDI/GDP	570	4.185	9.258	-8.589	145.202
FDI/GCF	569	17.163	19.408	-45.453	132.389
M2/GDP	558	26.051	16.584	4.425	103.971
Quasi money/GDP	558	12.419	13.855	0.204	77.289
Domestic credit/GDP	558	18.307	23.212	0.796	161.907
Real per capita GDP	570	1233.547	2275.748	85.540	28102.530
Real GDP growth rate	570	4.950	6.425	-28.100	71.188
Real interest rate	514	11.492	9.521	-24.470	60.688
Real exchange rate	534	106.260	24.598	57.769	414.000
Inflation	569	8.682	12.402	-100.000	132.824
Nature resource rent/GDP	570	10.284	16.750	0.000	79.580
Infrastructure	570	2.436	4.660	0.075	29.725
Legal origin	570	0.395	0.489	0.000	1.000
Rule of law	530	-0.624	0.636	-1.899	1.053
Urban population	570	34.890	15.553	7.200	85.520
Trade openness	551	0.744	0.387	0.000	2.752

Notes: FDI/GDP=Percentage of inward stock of foreign direct investment to gross domestic product; FDI/GCF=Percentage of flow of inward foreign direct investment to gross capital formation; GFCF/GDP=Percentage of gross fixed capital formation to gross domestic product. All the other variables are as defined in the methodology.

Source: Authors' calculations

Table 2: Correlations between the variables used in the different functional estimations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	VIF
FDI/GDP	1.000																
FDI/GCF	0.862	1.000															
M2/GDP	0.000	-0.064	1.000														
Quasi money/GDP	0.004	-0.067	0.790	1.000													
Domestic credit/GDP	-0.052	-0.089	0.806	0.807	1.000												
Real per capita GDP	0.161	0.052	0.219	0.270	0.375	1.000											
Real GDP growth rate	0.200	0.133	-0.212	-0.078	-0.185	0.099	1.000										
Real interest rate	0.059	0.112	-0.036	-0.020	-0.049	-0.025	0.002	1.000									
Real exchange rate	-0.105	-0.127	-0.054	-0.016	-0.174	-0.153	-0.171	0.082	1.000								
Inflation	-0.107	-0.135	-0.133	0.034	-0.247	-0.126	0.009	-0.284	0.051	1.000							
Nature resource rent/GDP	0.187	0.194	-0.630	-0.576	-0.498	-0.169	0.127	-0.075	0.078	0.034	1.000						
Infrastructure	0.165	0.100	0.665	0.692	0.653	0.579	-0.049	-0.058	-0.085	-0.134	-0.515	1.000					
Legal origin	0.167	0.176	0.106	0.352	0.099	0.047	-0.019	-0.085	0.065	0.313	-0.075	0.200	1.000				
Rule of law	0.134	-0.005	0.621	0.657	0.561	0.342	-0.034	0.064	-0.091	-0.041	-0.653	0.644	0.214	1.000			
Urban population	0.328	0.351	0.181	0.150	0.146	0.460	-0.043	0.159	-0.075	-0.138	0.050	0.543	-0.010	0.206	1.000		
Trade openness	0.487	0.361	0.184	0.138	0.170	0.380	0.111	0.008	-0.060	-0.097	-0.038	0.488	0.099	0.294	0.420	1.000	

Notes: The column number corresponds with the row titles. All the variables, with the exception of Legal origin and rule of law, are expressed their natural logarithm forms. The numbers of observations vary across variables and as shown in Table 1. The variance inflation factors, which arise as a test for multicollinearity, are omitted to conserve space.

Source: Authors' calculations





operator (with $LI_{i,t} = I_{i,t-1}$); $\chi_{i,t}$ represents a vector of the finance, institution, natural resource endowment, and macroeconomic variables; β_i is the coefficient of the lagged FDI and γ_i is a vector of the explanatory variables; α and $\varepsilon_{i,t}$ are the constant term and the white noise, respectively.

Following Levine *et al.* (2000), log of 100% + inflation rate, GDP growth rate, and real interest rate are consecutively used to minimise the number of missing observations that arise from logging series with negative numbers.

To the extent that some members of the vector $\chi_{i,t}$ are correlated with the error term (α) and are endogenous to $I_{i,t}$, estimating the regression parameters using an OLS fixed-effects or a traditional random effects model becomes inefficient. For instance, the same factors that drive financial development can equally be observed as the drivers of FDI. In addition, the correlation matrix reported in Table 2 indicates the presence of multicollinearity in the baseline model, arising mostly from the inclusion of proxies such as infrastructure development, natural resources, financial development, and rule of law. This observation is consistent with the causal correlation between financial development on one the hand, and macroeconomic conditions (Alfaro *et al.*, 2004), trade openness (Herger *et al.*, 2008), as well as institutional quality (Herger *et al.*, 2008) on the other. Calderon and Serven (2010) also find a strong positive correlation between infrastructural development and economic growth. This will mean that the most appropriate way to comparatively assess the impact of financial development, institutional factors, and natural resource endowment on FDI is to apply a simultaneous estimation model that addresses any endogeneity and multicollinearity biases in the baseline model.

Consequently, following Asiedu and Lien (2011) and Singh *et al.* (2010), the present study adopts a dynamic system GMM estimator, which is proved to be asymptotically efficient and robust to heteroscedasticity. The choice of the system GMM over the difference GMM is based on the fact that the baseline model in this paper includes macroeconomic variables that are known in economics to bear the characteristics of random walk. On the basis of the statistical evidence presented above on the sources of multicollinearity in the baseline model, financial development, infrastructure, economic growth, and rule of law are treated as endogenous variables in most of the regressions, while the rest of the explanatory and control variables are treated as strictly exogenous. In addition, each of the functional regressions makes use of only the internal instruments in the estimation. As in Asiedu and Lien (2011), the first different of all the exogenous variables are used by the difference and system estimators as standard instruments; and the lags of the endogenous variables are applied to generate the system GMM-type instruments described in Arellano and Bond (1991). Unlike the different estimations, the system



Table 3: Allero-Bover system GMM estimates of the impact of finance, institution, and natural resources on FDI inflows in the SSA region

	Dependent variable=stock of inward FDI/GDP			Dependent variable=FDI inflows/GCF		
	1	2	3	4	5	6
FDI/GDP _{t-1}	0.276 (0.053)***	0.267 (0.052)***	0.271 (0.052)***	0.337 (0.050)***	0.313 (0.049)***	0.309 (0.049)***
M2/GDP	-0.619 (0.289)**			-0.989 (0.275)***		
Quasi money/GDP		0.276 (0.184)			-0.299 (0.166)*	
Domestic credit/GDP			-0.142 (0.187)			-0.465 (0.170)***
Real per capita GDP	-0.018 (0.078)	0.084 (0.077)	0.064 (0.076)	-0.239 (0.077)***	-0.154 (0.075)**	-0.122 (0.077)
Real GDP growth rate	-2.867 (0.938)***	-3.206 (0.852)***	-1.929 (0.928)**	0.752 (0.910)	0.242 (0.824)	1.322 (0.879)
Real interest rate	2.256 (0.688)***	2.083 (0.689)***	2.048 (0.699)***	1.473 (0.651)**	1.169 (0.625)*	0.930 (0.632)
Real exchange rate	-1.063 (0.396)***	-1.159 (0.397)***	-0.958 (0.382)**	-1.100 (0.380)***	-1.365 (0.360)***	-1.440 (0.344)***
Inflation	1.768 (0.808)**	2.065 (0.750)***	0.739 (0.771)	-0.992 (0.814)	-0.617 (0.735)	-1.177 (0.761)
Natural resources	0.227 (0.098)**	0.258 (0.098)***	0.244 (0.095)***	0.063 (0.093)	0.011 (0.091)	0.084 (0.091)
Infrastructure	0.401 (0.203)**	-0.066 (0.191)	0.177 (0.201)	0.558 (0.196)***	0.197 (0.172)	0.383 (0.187)**
Legal origin	0.526 (0.257)**	0.254 (0.308)	0.565 (0.257)**	0.830 (0.254)***	1.029 (0.287)***	0.960 (0.253)***
Rule of law	0.251 (0.228)	0.056 (0.246)	0.117 (0.241)	-0.231 (0.229)	-0.433 (0.236)*	-0.352 (0.231)
Urban agglomeration	0.201 (0.316)	0.127 (0.325)	0.235 (0.311)	1.445 (0.299)***	1.533 (0.308)***	1.342 (0.300)***
Trade openness	1.163 (0.279)***	1.455 (0.315)***	1.204 (0.305)***	0.388 (0.276)	0.390 (0.291)	0.194 (0.288)
Wald χ^2	256.41 (0.000)	261.68 (0.000)	244.27 (0.000)	1474.00 (0.000)	1478.77 (0.000)	1334.54 (0.000)
AR(1)	-3.932 (0.000)	-3.964 (0.000)	-2.957 (0.000)	-3.220 (0.001)	-3.326 (0.0001)	-3.345 (0.001)
AR(2)	0.172 (0.864)	0.197 (0.844)	0.170 (0.865)	-1.040 (0.298)	-0.888 (0.375)	-0.848 (0.397)
Sargan test	167.694 (0.363)	173.209 (0.259)	183.962 (0.114)	205.344 (0.345)	251.493 (0.158)	250.491 (0.169)
No. of instruments	175	175	175	211	243	243
Observations	402	402	402	403	403	403

Notes: Standard errors are shown in parentheses. *, **, and *** represent statistical significance at 10%, 5%, and 1% level, respectively. For Models 1, 2, 4, and 5, consecutively, with the exception of rule of law and legal origin, all the other variables are in natural logarithm forms.

Source: Authors' calculations

estimations make use of lagged differences of the endogenous variables as instruments for the level equation. The Sargan χ^2 statistic presents good evidence confirming the null hypothesis that the over-identifying restrictions are valid in all the functional equations, with the probability value of the Sargan χ^2 ranging from 0.114 as in Table 3 to 0.758 as in Table 5. This is not



enough evidence to reject the null hypothesis of exogeneity of the levels and differenced instruments, as required in a standard GMM equation. The test for the first- and second-order residual autocorrelation in all the regressions (AR(1) and AR(2), respectively), shows evidence rejecting the H_0 of no serial correlation at Order 1 in the first-differenced errors but a failure to reject the H_0 at Order 2. This does not invalidate the model, as according to Arellano and Bond (1991) rejecting the null hypothesis of no serial correlation at Order 1 in the first-differenced errors does not imply that the model is misspecified. Essentially as is recommended by Arellano and Bond (1991), the GMM estimates are robust in the presence of first-order serial correlation, but not in the second-order serial correlation in the error terms.

RESULTS

Empirical results

Table 3 presents the results of the dynamic system GMM estimations, based on two sets of equations – FDI stock equations (represented in Columns 1–3) with the ratio of inward FDI to GDP as the dependent variable; and FDI flow equations (contained in Columns 4–6) defined as the ratio of annual flow of inward FDI to gross capital formation. Starting with the main explanatory variables, the lagged FDI variable in all the functional regressions is correctly signed and significant at 1% level, which confirms the dynamic nature of both the stock and the flow of inward FDI in the region. Against our expectation and the earlier finding by Lee and Chang (2009), Al Nasser and Gomez (2009), Alfaro *et al.* (2008), and Ang (2008), the coefficients of the proxies for financial system development in most of the functional equations are largely negative and significant at conventional levels. However, the coefficients are more significant in the flow equations than in the stock equations. Consistent with theoretical propositions, finance can enhance the flow and stock of FDI only when it is able to play key allocative, transaction cost reduction, the liquidity, and financial enforcement contract roles. The inverse link between financial development and FDI in the region can thus be due to the low level of financial system development in most SSA economies. Also, considering the inefficiency of most African financial markets, it is possible that the financial substitution theory proposed by Giuliano and Ruiz-Arranz (2009), Aggarwal and Kyaw (2008), and Claessens *et al.* (2001), which predicts that internal capital market provides viable financing alternative for firms operating in countries with weak financial and institutional structures, holds in the case of the SSA countries. The finding can also be that the impact of financial development is sensitive to macroeconomic and institutional factors.



In all the functional estimations reported in Table 3, natural resource endowment enters positively in the regression, although the coefficient is significant at conventional levels only in the FDI stock equation. This implies that, on average, the stock of FDI in the SSA region is still influenced greatly by the level of natural resource endowment. The persistent positive impact could have been induced by the increase in the value of reinvestible reserves by mining and exploration companies already operating in the region. This is also coupled with the theoretical expectation that the scrambling to increase ownership and control stakes in the sector can force parent firms into wanting to increase the stock of their investments in foreign subsidiaries. The finding, which is consistent with the tenets of the theory of comparative advantage, provides support for the earlier evidence from Asiedu (2006) and offers further explanation to the statistical report by UNCTAD (2005) that majority of FDI flows to Africa are indeed motivated by natural resources endowments. Alternatively, the finding fails to provide proof that natural resource endowment significantly contributes to flow of new capital or Greenfield investments into the SSA region.

Among the institutional variables, legal origin and trade openness are positively and mostly significantly correlated with both the stock and the flow of inward FDI. This is in agreement with the literature evidence that a more open economy attracts higher FDI flows (Law and Habibullah, 2009; Ang, 2008). Consistent with the earlier evidence by Globerman and Shapiro (2003), Biswas (2002) and others, countries whose commercial legal systems bear similar features with the English common law system are more attractive to foreign investors. The reason is that such countries are endowed with more developed financial systems and are characterised by better governance.

With the exception of one of the dynamic regressions reported in Table 3, the coefficient of the proxy for infrastructure development appears positive, and is even significant in three occasions – implying that the capacity of an SSA country to attract FDI is dependent on the level of her investments in infrastructure. This result corroborates the earlier finding by Asiedu and Lien (2011), Ang (2008), Onyeiwu and Hemanta (2004), UNCTAD (1998, 2007), as well as the premise of resource/asset-seeking theory that FDIs are naturally mindful of the state of infrastructural development in the host economies. The study does not provide enough evidence to support the claim by Zeng *et al.* (2002) and Marr (1997) that lack of infrastructure is a source of attraction to foreign investors in the case of the SSA countries. Rather, the finding suggests that, in most cases, infrastructural development enhances the stock of FDI and can also induce further flow of FDI. In similar manner, the results reveal that trade openness is positively correlated with the stock and flow of FDI in the region, which is consistent with the theory that



countries that have open and transparent economic systems attract the most FDIs. However, the positive impact of openness to trade is more significant in the stock equation – suggesting that, in Africa also, open economies, in terms of transparent trade and fiscal practices, allows investors to maximise the value of their investments.

The likely positive role infrastructure plays in enhancing the stock and flow of FDI is further confirmed by the evidence that urban agglomeration is positively signed and significant at conventional levels in the flow equation. Urban densities theoretically suggest more developed infrastructure, access to market, and industrial concentration. In the case of the SSA region, that the coefficient of urban agglomeration is not significant in the stock equation is attributable to the fact that bulk of the existing FDIs currently in the region are in the natural resource sector, which in most cases is located outside cities. On the other hand, the significant and positive sign found in the flow equation indicates that the new crop of FDIs to Africa might be market and resource seeking.

Unexpectedly, rule of law, which represents a measure of security of property and contract rights, does not have a clear impact on the stock and flow of FDI in the SSA region. The coefficient even turns negative in the flow equation (Columns 4–6), which can possibly be attributed to a situation where property and contract laws in the region are not efficient and sufficient enough to motivate the flow of FDIs.

On the effects of the control variables, mostly the macroeconomic factors, the different functional estimations in Table 3 reveal that against theoretical expectation, real GDP growth rate is negatively and significantly correlated with FDI stock. That the link with FDI flow is largely positive though non-significant can be explained based on the projection of the growth theory that a growing economy signals better opportunities for making profits and is consistent with the existing evidence in the literature that high growth economies are strongly correlated with stable macroeconomic conditions and are more attractive to foreign investments (Al-Sadig, 2009; Chakrabarti, 2001). Consistent with the results by Asiedu and Lien (2011), the coefficient of per capita GDP in most of the different function regressions is negative and even significant at 1% level in the equation on FDI flows. Although this result seems to conflict with the market size hypothesis, it does supports the position of Neubauss (2006) that the impact of the size of a country's economy is sensitive to different types of FDI flows. Large size economies might also be an indication of a matured and saturated market; and low per capita income could spell the existence of unexplored investment opportunities in the case of Africa. To the extent that real per capita GDP also measures wage level in the affected countries, the above outcome fails to provide support that cheap



labour in the SSA region itself is a major source of attraction to foreign investors.

For the other macroeconomic variables, inflation is positively correlated with the stock of FDI but negatively correlated with the flow of FDI, although for the latter the coefficient is generally non-significant. Consistent with the intertemporal consumption theory enunciated by Sayek (2009), the positive impact of inflation on FDI stock can occur because the effect of inflation on current consumption reduces the cost of investment. On the other hand, the negative correlation between inflation and FDI flow, though not generally significant, provides support to the earlier evidence that high inflation rate signals weakness in economic management and erodes the margin of returns on investments (Yartey and Adjasi, 2007; Onyeiwu and Hemanta, 2004; Asiedu, 2002; de Mello, 1997; Sayek, 2009). Real interest rates proxy enters positively and significantly in most of the regressions, which is consistent with the predictions of the portfolio theory, the wealth distribution theory, and the neo-classical theory. Because of the quest for higher returns on investments, movement of capital is more from countries with low interest rates to countries with high interest rates than it is the other way round. For the coefficient of real exchange rate, in all the functional regressions, the coefficient is negative and highly significant at conventional levels. The sign generally agrees with the proposition of the overvalued currency hypothesis, the economic exposure theory, and Dutch Disease hypothesis as earlier highlighted in the literature. The result suggests that exchange rate volatility might have been one of the major macroeconomic factors dwarfing the flow and stock of FDI in the SSA region. The outcomes of the macroeconomic variables generally show that the level of macroeconomic instability, represented by inflation, real exchange rate, real interest rate, inconsistency in economic growth and market size, does not have definite impact on FDI in the region, and that the effects of instability is actually sensitive to whether FDI is defined in terms of inward stock or inward flow.

Comparing the sets of our explanatory variables whose outcomes are reported in Table 3, it can be seen that first, financial variables, financial development explains the flow more than it does to the stock of FDI; real interest rate and real exchange rate uniformly explain both the stock and flow of FDI across different functional regressions although the impact is positive for the latter and negative for the former, but inflation is only an important factor in explaining the stock, and not the flow, of FDI in the SSA region. Second, natural resource endowment significantly enhances the stock of existing FDI, but due to the changing patterns of FDI flows as earlier explained, the impact on the flow of new and Greenfield FDIs is not significant. Third, for the institutional factors, only the legal origin positively and



significantly explains both the stock and flow of FDIs. Infrastructural development only impacts strongly on the flow of FDI, whereas trade openness only matters for the stock of FDIs. It is therefore possible that the relationship between financial development and FDI is sensitive to institutional quality, natural resources, and even macroeconomic factors. We test this suspicion by incorporating some interactive terms in the dynamic system GMM regression.

Table 4 presents the results of the interactive impact of financial development, institutional variables, and natural resource endowment on both the stock and the flow of inward FDI. In the different functional estimation models, the coefficients of the non-interactive variables remain relatively unchanged as in Table 3. In the FDI stock equation, the coefficient of financial development (in terms of the depth of the monetary system and the level of financial intermediation) turns positive and significant, whereas the coefficient of the proxy for the size of the monetary system turns positive but non-significant at conventional levels. In the case of the FDI flow equation, the coefficients of the different proxies of financial development, with the exception of the size of monetary system, appear positive but only significant in Column 5 (where the depth of the monetary system proxies financial development). While this can be interpreted to mean that the impact of financial development on FDI directly and indirectly depends on institutional and macroeconomic factors, it also suggests that financial development plays definite role in enhancing the stock and flow of FDI.

In all the functional models reported in Table 4, the coefficient of the interactive term between financial development and infrastructural development is largely positive but non-significant at conventional levels, which suggests some likelihood that the financial system relies on the efficiency of the telecommunication infrastructure to impact positively on both the flow and the stock of inward FDI. The interactive term between financial development and natural resource endowment is mostly negative and largely non-significant in the different functional equations; the term appears significant only in Column 3 when domestic private sector credit to GDP ratio is used to proxy financial development. The finding suggests that the positive impact of financial development postulated by Alfaro *et al.* (2008) and Ang (2008) may be dependent on the level of economic diversification in a country. The implication here could be that the financial system works better in attracting FDI in countries with higher degree of economic diversification.

Similarly, the negative and moderately significant coefficient of the interactive terms between financial development, and legal origin, is an indication that a strong and efficient legal system that provides adequate protection for foreign investors (for example, efficient auditing and bankruptcy laws) can

Table 4: Allerro-Bover system GMM estimates of the interactive impact of finance, institution, and natural resources on FDI inflows in the SSA region

	Dependent variable=stock of inward FDI/GDP			Dependent variable=FDI inflows/gross capital formation		
	1	2	3	4	5	6
FDI _{t-1}	0.239 (0.054)***	0.242 (0.055)***	0.218 (0.054)***	0.294 (0.051)***	0.248 (0.051)***	0.265 (0.050)***
Financial development	0.213 (0.633)	1.098 (0.390)***	1.208 (0.443)***	-0.056 (0.643)	0.752 (0.375)**	0.208 (0.439)
Natural resources	-0.779 (0.633)	0.345 (0.223)	0.797 (0.337)**	-0.423 (0.642)	0.146 (0.215)	0.159 (0.317)
Infrastructure	1.699 (0.908)*	0.792 (0.533)	1.287 (0.562)**	0.808 (0.908)	0.766 (0.551)	1.318 (0.575)**
Legal origin	1.850 (1.789)	2.589 (0.909)***	2.089 (0.915)**	2.720 (1.790)	3.570 (0.879)***	2.126 (0.913)**
Rule of law	-4.071 (2.022)**	-0.491 (0.450)	-0.940 (0.930)	-3.423 (1.957)*	-1.397 (0.424)***	-1.289 (0.850)
Urban agglomeration	0.090 (0.327)	0.207 (0.338)	0.330 (0.332)	1.315 (0.315)***	1.541 (0.320)***	1.316 (0.322)***
Trade openness	1.411 (0.308)***	1.531 (0.326)***	1.281 (0.308)***	0.676 (0.308)**	0.604 (0.313)**	0.264 (0.303)
Real per capita GDP	0.050 (0.089)	0.209 (0.089)**	0.120 (0.087)	-0.163 (0.088)*	-0.038 (0.086)	-0.037 (0.086)
Real GDP growth rate	-3.233 (0.961)***	-3.463 (0.874)***	-2.848 (0.942)***	0.203 (0.944)	-0.132 (0.841)	0.890 (0.909)
Real interest rate	2.342 (0.687)***	1.888 (0.694)***	1.869 (0.700)***	1.419 (0.657)**	1.141 (0.631)*	0.955 (0.645)
Real exchange rate	-1.083 (0.403)***	-1.164 (0.403)***	-1.037 (0.374)***	-1.118 (0.382)***	-1.441 (0.365)***	-1.558 (0.347)***
Inflation	1.880 (0.807)**	2.039 (0.760)***	1.145 (0.763)	-0.928 (0.809)	-0.669 (0.734)	-1.050 (0.758)
Financial development × natural resources rent/GDP	0.271 (0.210)	-0.126 (0.106)	-0.315 (0.138)**	0.131 (0.131)	-0.106 (0.104)	-0.051 (0.134)

Table 4: (continued)

	Dependent variable=stock of inward FDI/GDP			Dependent variable=FDI inflows/gross capital formation		
	1	2	3	4	5	6
Financial	-0.032	0.166	0.044	0.153	0.156	0.045
development × infrastructure	(0.263)	(0.136)	(0.159)	(0.271)	(0.138)	(0.156)
Financial	-0.470	-1.023	-0.519	-0.601	-1.100	-0.423
development × legal origin	(0.554)	(0.360)***	(0.345)	(0.550)	(0.352)***	(0.346)
Financial	1.312	0.157	0.340	0.963	0.379	0.337
development × rule of law	(0.643)**	(0.209)	(0.382)	(0.619)	(0.194)**	(0.348)
Infrastructure × natural	0.061	0.236	0.251	0.071	0.206	0.059
resources rent/GDP	(0.096)	(0.102)**	(0.091)***	(0.096)	(0.101)**	(0.092)
Infrastructure × real	-0.220	-0.263	-0.306	-0.163	-0.222	-0.213
per capita GDP	(0.082)***	(0.084)***	(0.100)***	(0.091)*	(0.088)***	(0.105)
Wald χ^2	277.12	289.74	273.73	1506.65	1529.84	1371.64
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
AR(1)	-4.036	-4.146	-3.948	-3.288	-3.410	-3.249
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
AR(2)	0.225	0.194	-0.121	-1.028	-0.869	-0.992
	(0.822)	(0.846)	(0.904)	(0.304)	(0.385)	(0.321)
Sargan test	170.774	163.331	184.221	212.267	247.858	253.490
	(0.303)	(0.456)	(0.112)	(0.232)	(0.200)	(0.138)
No. of instruments	181	181	181	217	249	249
Observations	402	402	402	403	403	403

Notes: Standard errors are shown in parentheses. *, **, and *** represent statistical significance at 10%, 5%, and 1% level, respectively. For Models 1, 2, 4, and 5, consecutively, with the exception of rule of law and legal origin, all the other variables are in natural logarithm forms.

Source: Authors' calculations





play a substitutive role in enhancing investors' confidence, irrespective of the extent of financial development. Alternatively, a relatively active financial system operating in a country with weak governance institution (though rare) can be a confidence booster in terms of attracting foreign investments. This underscores the need for SSA countries of civil law origin to focus more on policies that strengthen domestic institutions in terms of property rights, and economic openness. The positive and fairly significant sign of the interactive term between financial development and rule of law (in Columns 1 and 5 of Table 4) can be interpreted to mean that the impact of the size of the financial system on FDI stock is only strongly felt when a country scores at least an average mark in terms of ranking in the measure for the security of property and contract rights. Also, the depth of the financial system matters significantly on FDI flows only when a country have attained above average score in rule of law. That is, when, according to Biswas (2002), a country's governance institutions averagely enjoy the confidence and support of the citizens, in terms of the requisite capacity to make and implement laws and adjudicate disputes.

The interactive impact of infrastructure on FDI, relative to market size is negative and mostly significant across the different estimations – implying that the positive impact of infrastructure on FDI, as has been theoretically postulated and empirically established, is actually moderated by the size of the economy. Larger and less infrastructurally developed economies might be more prone to market-seeking FDI as against the case of infrastructurally developed economies that are capable of attracting efficiency-seeking FDI. Contrary to the expectation, the coefficient of the interactive term between infrastructure and natural resource endowment is mostly positive and significant in few occasions, meaning that infrastructural development supports the positive role natural resources play in enhancing the stock of FDI.

Table 5 summarises the results of the comparative determinants in non-resource-rich and resource-rich SSA countries. The fact that the coefficient of the lagged value of FDI is significant at all conventional levels only in Columns 4, 5, and 6 suggests that the patterns of inward FDI stock are more dynamic in non-resource-rich SSA countries than they are in resource-rich SSA countries. Not surprising, the impact of natural resource endowment is more significant in resource-rich countries than in non-resource-rich countries. Similarly, the negative effects of real per capita income and real exchange rate are more pronounced in the case of resource-rich countries. On the other hand, the inverse relationship between real GDP growth and stock of FDI, as well as the positive impact of inflation is significantly more pronounced in non-resource-rich countries; whereas the negative impact of real interest rate is more pronounced in resource-rich countries.



Table 5: Allerro-Bover system GMM estimates of the comparable impact of finance, institution, and natural resources on FDI inflows between non-resource-rich and resource-rich SSA countries (dependent variable=stock of inward FDI/GDP)

	Resource-rich SSA countries			Non-resource-rich SSA countries		
	1	2	3	4	5	6
FDI _{t-1}	0.030 (0.082)	0.056 (0.083)	0.042 (0.082)	0.275 (0.051)***	0.244 (0.049)***	0.238 (0.058)***
M2/GDP	1.240 (0.465)***			-0.614 (0.273)**		
Quasi money/GDP		0.564 (0.351)*			0.320 (0.141)**	
Domestic credit/GDP			0.363 (0.297)			-0.165 (0.185)
Natural resources	0.390 (0.125)***	0.385 (0.132)**	0.273 (0.123)**	0.008 (0.117)	0.055 (0.117)	-0.031 (0.128)
Infrastructure	0.053 (0.280)	0.004 (0.273)	0.213 (0.298)	0.247 (0.165)	-0.097 (0.162)	0.037 (0.188)
Legal origin	-1.057 (0.561)*	-1.229 (0.827)	-1.093 (0.823)	0.848 (0.262)***	0.640 (0.255)**	1.004 (0.281)***
Rule of law	0.784 (0.423)*	0.963 (0.410)**	0.986 (0.426)**	0.043 (0.196)	0.023 (0.210)	0.042 (0.223)
Urban agglomeration	-0.385 (0.809)	-0.272 (0.934)	0.165 (0.746)	0.627 (0.278)**	0.725 (0.293)**	0.738 (0.313)**
Trade openness	2.351 (0.482)***	2.049 (0.497)***	-1.123 (0.446)***	0.577 (0.280)**	0.729 (0.289)**	0.505 (0.321)
Real per capita GDP	-0.223 (0.117)*	-0.249 (0.129)**	-0.377 (0.159)**	-0.017 (0.081)	-0.077 (0.083)	0.028 (0.090)
Real GDP growth rate	0.982 (1.100)	0.798 (1.114)	1.141 (1.120)	-2.398 (1.076)**	-2.924 (1.032)***	-2.430 (1.114)**
Real interest rate	1.717 (0.832)**	1.920 (0.864)**	2.033 (0.838)**	1.271 (0.819)	1.038 (0.827)	1.202 (0.850)
Real exchange rate	-1.301 (0.432)***	-1.090 (0.498)**	-1.154 (0.440)***	-0.597 (0.376)	-0.174 (0.40)	-1.413 (0.437)***
Inflation	-1.091 (1.122)	-0.810 (1.191)	-1.264 (1.172)	1.762 (0.816)**	1.545 (0.777)**	2.200 (0.836)***
Wald χ^2	226.41 (0.000)	182.23 (0.000)	209.50 (0.000)	202.06 (0.000)	206.72 (0.000)	158.79 (0.000)
AR(1)	-2.020 (0.043)	-2.049 (0.040)	-2.187 (0.029)	-3.404 (0.001)	-3.516 (0.000)	-3.525 (0.000)
AR(2)	-0.036 (0.971)	0.082 (0.935)	-0.041 (0.967)	-0.665 (0.506)	-0.799 (0.425)	-0.697 (0.486)
Sargan test	84.081 (0.758)	87.899 (0.658)	88.209 (0.649)	292.257 (0.138)	282.743 (0.149)	248.278 (0.127)
No. of instruments	107	107	107	280	272	237
Observations	119	119	119	283	283	283

Notes: Standard errors are shown in parentheses. *, **, and *** represent statistical significance at 10%, 5%, and 1% level, respectively. For Models 1, 2, 4, and 5, consecutively, with the exception of rule of law and legal origin, all the other variables are in natural logarithm forms.

Source: Authors' calculations



The benefits associated with having a commercial legal system that mirrors the English common law, in terms of enhancing the stock of FDI, is more in non-resource-rich countries than in resource-rich countries. Surprisingly, rule of law has more positive and significant impact on the stock of FDI in resource-rich SSA countries. Whereas the coefficient of urban agglomeration is significantly positive in non-resource-rich countries, it is mostly negative and generally non-significant at conventional levels in resource-rich countries across the different function regressions. This again implies that the benefits associated with urban agglomeration make more sense to market-seeking and perhaps efficiency-seeking foreign investors. Urban infrastructure, for instance, may not matter to resource-seeking foreign investors given that natural resources are in most cases located outside urban parts of a country, and because multinational investors may be capable of providing their own infrastructure.

The positive impact of financial development also seems to be more in resource-rich countries. This similarly can be an indication that the financial system plays crucial role in enhancing FDI stock in resource-rich countries, where according to the resource curse hypothesis advanced by Sachs and Warner (1995) and supported by Acemoglu and Johnson (2005), Acemoglu *et al.* (2001), La Porta *et al.* (1999) and others, the governance institutions are commonly weak. Comparatively, it can be argued that while foreign investors rely more on the efficiency of the governance institutions in non-resource-rich countries, they tend to rely on the formal financial system not only for managing the stock of existing FDI, but also for providing some requisite financial linkage roles in resource-rich countries.

Robustness test

It is possible that the main findings of this study might be influenced by the fact that only two countries in the SSA region (Nigeria and South Africa) account for about 36% of the total inward FDI and 48% of the total GDP in the region in 2009. South Africa alone is the only emerging and relatively industrialised country in the region, accounting for about three quarters of the region's total manufacturing outputs. Thus, including the two countries in a broad sample of SSA countries is a source of outliers in the baseline estimation model. To tackle the likelihood of such problem and draw a clearer picture of country effects on inward FDI in the region, the two are excluded from the overall sample. The results, represented in Table 6, indicate that the lagged FDI is rightly signed and significant at 1% level – confirming that on the whole, FDI stock and flows remain very dynamic in the region. As in the overall sample, the impact of financial development is not stable across the different functional regressions, whereas the impact of natural resource



Table 6: Allerro-Bover system GMM estimates of the comparable impact of finance, institution, and natural resources on FDI inflows across sub-samples and time periods (sub-sample excludes Nigeria and South Africa)

	FDI/GDP			FDICF			1995–1999	2000–2004	2005–2009
	1	2	3	4	5	6			
FDI _{t-1}	0.290 (0.054)***	0.273 (0.054)***	0.250 (0.052)***	0.347 (0.050)***	0.317 (0.049)***	0.317 (0.049)***	0.003 (0.158)	0.163 (0.090)*	0.424 (0.112)***
M2/GDP	-0.482 (0.307)			-0.859 (0.292)***			-0.399 (0.766)	-0.843 (0.696)	-0.681 (0.365)*
Quasi money/GDP		0.404 (0.195)**			-0.149 (0.174)				
Domestic credit/GDP		0.225 (0.205)			-0.213 (0.194)				
Natural resources	0.250 (0.103)**	0.316 (0.102)***	0.268 (0.094)***	0.046 (0.096)	0.030 (0.093)	0.063 (0.092)	0.577 (0.318)*	0.063 (0.279)	-0.068 (0.155)
Infrastructure	0.427 (0.208)**	0.013 (0.198)	0.105 (0.196)	0.546 (0.200)***	0.238 (0.176)	0.286 (0.192)	0.469 (0.709)	0.343 (0.536)	0.113 (0.313)
Legal origin	0.561 (0.259)**	0.342 (0.289)	0.690 (0.242)***	0.925 (0.262)***	1.117 (0.279)***	0.877 (0.247)***	-3.448 (1.124)***	0.926 (0.812)	1.001 (0.362)***
Rule of law	0.211 (0.234)	-0.012 (0.246)	-0.143 (0.232)	-0.417 (0.230)*	-0.644 (0.233)***	-0.497 (0.240)**	-1.137 (0.546)**	-0.461 (0.492)	-0.178 (0.335)
Urban agglomeration	0.276 (0.308)	0.340 (0.314)	0.487 (0.299)*	1.4670 (0.293)***	1.686 (0.304)***	1.454 (0.328)***	2.601 (1.414)*	0.531 (0.830)	1.184 (0.442)***
Trade openness	1.038 (0.288)***	1.266 (0.325)***	1.253 (0.299)***	0.281 (0.281)	0.230 (0.293)	0.321 (0.288)	1.796 (0.747)**	0.825 (0.611)	1.039 (0.474)**
Real per capita GDP	0.036 (0.081)	0.136 (0.078)*	0.103 (0.074)	-0.181 (0.080)**	-0.088 (0.076)	-0.156 (0.077)**	-0.377 (0.412)	0.470 (0.211)***	-0.153 (0.121)

Real GDP growth rate	-3.289 (0.955)***	-3.485 (0.861)***	-2.422 (0.913)***	0.346 (0.916)	0.025 (0.830)	1.512 (0.826)*	-5.172 (1.777)***	-6.756 (2.059)***	2.082 (2.099)
Real interest rate	2.627 (0.704)***	2.129 (0.700)***	2.149 (0.694)***	1.519 (0.661)**	1.107 (0.633)*	0.691 (0.655)	-0.809 (1.264)	4.450 (1.431)***	-1.023 (1.480)
Real exchange rate	-1.246 (0.406)***	-1.361 (0.401)***	-1.135 (0.362)***	-1.354 (0.386)***	-1.646 (0.360)***	-1.239 (0.345)***	1.970 (1.177)*	-1.567 (0.648)**	0.240 (0.767)
Inflation	2.039 (0.825)**	2.190 (0.765)***	0.852 (0.748)	-0.589 (0.821)	-0.357 (0.741)	-1.512 (0.826)*	2.793 (1.523)*	3.430 (1.600)**	-1.453 (1.685)
Wald χ^2	261.12 (0.000)	268.67 (0.000)	266.24 (0.000)	1391.82 (0.000)	1410.48 (0.000)	1229.72 (0.000)	76.00 (0.000)	50.05 (0.000)	179.54 (0.000)
AR(1)	-3.787 (0.000)	-3.801 (0.000)	-3.856 (0.000)	-2.868 (0.004)	-2.897 (0.004)	-2.789 (0.005)	-1.540 (0.124)	-3.550 (0.000)	-2.457 (0.014)
AR(2)	-0.046 (0.964)	-0.054 (0.958)	-0.097 (0.922)	-1.226 (0.220)	-1.153 (0.249)	-1.227 (0.220)	1.156 (0.248)	0.815 (0.415)	0.176 (0.860)
Sargan test	168.757 (0.302)	171.531 (0.252)	216.903 (0.146)	212.739 (0.196)	248.623 (0.166)	243.311 (0.232)	10.391 (0.733)	25.917 (0.468)	88.985 (0.129)
No. of instruments	173	173	209	202	241	241	27	39	88
Observations	376	376	376	377	377	377	121	169	112

Notes: Standard errors are shown in parentheses. *, **, and *** represent statistical significance at 10%, 5%, and 1% level, respectively. For Models 1, 2, 4, and 5, consecutively, with the exception of rule of law and legal origin, all the other variables are in natural logarithm forms.



endowment remains generally positive and significant only in stock equations (in Columns 1–3). This further confirms that the resource-seeking hypothesis and comparative advantage theory hold strongly even without the outliers. Among the other institutional and macroeconomic determinants, no clear difference is noticeable between the outcome of the overall sample and the sub-sample excluding the outliers.

The data set is split into three 5-year sub-samples (1995–1999, 2000–2004, and 2005–2009), with the stock of inward to GDP ratio (FDI/GDP) as the dependent variable. The essence is to test for the stability of the determinants of FDI in the wake of the changing patterns of foreign investments, as well as economic and political reforms in the SSA region. Focusing on the outstanding results, Table 6 reveals that the behaviour and patterns of the stock of inward FDI to the SSA region have become more dynamic over time; that the impact of economic growth intensified during 2005–2009 more than was the case in the previous years; and that the impact of natural resource endowment was more significant before 1999 indicating a gradual decline in the relevance of natural resources as a major source of attraction to foreign investors targeting the SSA markets. In general, unlike in the previous years, the role of institutions was more pronounced in the period 2005–2009. Thus, for the SSA countries, legal origin, trade openness, urban infrastructure, property right regimes and all other factors that define institutional quality could prove to be the main focus of policy reforms whose emphasis is to make a country attractive to the present crops of prospective foreign investors. The finding also indicates that the impact of macroeconomic conditions on stock of FDI have diminished over time, at least considering the loss of significance by the relevant proxies in the period 2000–2009. Of recent, as shown in Columns 8 and 9 of Table 6, the most important positive determinants of FDI include legal origin (which proxies the extent to which a country's legal system protects shareholders and creditors better, preserves property rights better, and allows for free market operations; La Porta *et al.*, 1999), urban agglomeration, and trade openness. Whereas, for instance, legal origin impacted negatively on FDI stock in the periods 1995–1999, its impact became positive and highly significant in the periods 2005–2009.

CONCLUSION

This study empirically examines the comparative impact of financial development, institutional development, and natural resource endowment on FDIs to the SSA region. Whereas the financial systems and institutional structures in Africa are generally held to be weak and considered as the major



constraints to growth (Asiedu, 2006; Hermes and Lensink, 2003; Levine *et al.*, 2000), the region is endowed with rich mineral resources that have historically been the source of attraction to foreign investors. Thus, a commonly found assumption in the literature is that investments in natural resources constitute an overwhelming driver of FDI to Africa, despite its prevalence of weak and inefficient institutions. This present study uses a dynamic panel estimation approach to test the validity of this assumption.

The findings suggest that indeed institutional quality, embodied in rule of law, trade openness, urban infrastructure, property right policy and others, matters most to prospective foreign investors targeting the African markets, especially for the non-resource-rich countries. Although no clear evidence emerges as to the specific relationship between financial development and inward FDI, the impact of the latter on the former appears to be sensitive to macroeconomic and institutional factors. On the other hand, the impact of natural resource endowment and the macroeconomic variables is more robust in the FDI stock equation than it is in the FDI flow equation. This suggests that whereas foreign investors already operating in the SSA countries place premium interest on the natural resource endowment and macroeconomic conditions prevailing in the affected countries, prospective investors targeting the region appear to be more conscious of the prevailing institutional characteristics of each country.

On the sensitivity of the impact of financial system development and institutional factors on inward FDI, the outcome of the study shows that the capacity of an SSA country's financial system to support foreign investments is dependent on the quality of her telecommunication infrastructure, and that the positive impact of financial development, as postulated in the literature, manifests better in countries that have greater degree of economic diversification. Also, in countries whose legal and governance structures are rooted in English common law system financial development appear to better support FDI. This results is in line with the theoretical view that English common law system have higher institutional quality because such system tends to protect shareholders and creditors better, preserve property rights, and are associated with less regulation of markets (Assane and Malamud, 2009; Acemoglu *et al.*, 2001; La Porta *et al.*, 1999). Similarly, the importance of infrastructure on inward FDI in the SSA countries is found to be moderated by the market size of each county, which in turn helps to define not only the volume but also the type of inward FDI each country attracts.

The study also provides reasonable evidence supporting that in the SSA region FDI determinants appear to depend on whether analytical emphasis is on the resource-rich or non-resource-rich countries, and on different timeframes. For example, inward FDI is found to be more dynamic in



non-resource-rich than in the resource-rich countries. Also in non-resource-rich countries, foreign investors rely more on the efficiency of the governance institutions, but in resource-rich countries the formal financial system provides alternative platform for managing the stock of existing FDI, as well as for providing financial allocative and intermediation roles. Across different timeframes, it is found that natural resource endowment constitutes the key determinant of inward FDI in the periods before 2000, but it is institutional factors and rate of economic growth that mainly account for the stock of inward FDI in the period 2005–2009. Specifically, whereas the impact of legal origin, in terms of whether a country is of English common law origin or not, has negative impact on FDI during the period 1995–1999, the impact turns significantly positive from 2005 to 2009.

Finally, that the impact of some of the determinants is sensitive to whether emphasis is on the stock or flow of FDI, on resource-rich or non-resource-rich countries, as well as on different timeframes, suggests that SSA countries require multidimensional policy strategies to be able to sustain existing stock of inward FDI and attract new ones. For instance, as highlighted above, for resource-rich countries, policy focus can be on managing the macroeconomic environments, whereas for non-resource-rich countries, in addition to handling macroeconomic concerns, they need to place premium emphasis on improving the quality of their legal and governance institutions.

This study has attempted to utilise a dynamic and robust panel estimation methods to comparatively determine the likely factors influencing the stock and flow of FDI in the SSA region, but reasonable care should be exercised in drawing inferences from the findings. This is so considering the inherent limitations of a dynamic estimation technique in a small-sample study like this. As more data on FDI and its theorised determinants become available, studies aimed at identifying the patterns and behaviour of inward FDI in Africa are encouraged. Again, this study has only examined the determinants and not the impact of FDI growth, although the latter is equally of interest to policymakers and economic managers in Africa. However, the consensus in both theoretical and empirical literature remains strongly in support of FDI aiding growth (see, for example, Lee and Chang, 2009; Neubaum, 2006; Hermes and Lensink, 2003).

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APPENDIX A

Table A1: OECD's operational distinction between FDI stock and FDI flow

FDI stock	FDI flow
<p>(a) <i>For subsidiary and associate companies:</i></p> <p>(i) The market value (or where market value is not available for statistical purposes, the book value – derived from the balance sheets – which is likely to be used by a number of countries for practical purposes) of their share capital and reserves attributable to the direct investor. (Reserves include retained profits. Share capital and reserves should be measured as the market value or written-down book value of the company's fixed assets and the market value or book value of its security holdings and other assets, less its liabilities and provisions);</p> <p>(ii) plus loans, trade credit, and debt securities (bonds, notes, money markets instruments, financial derivatives and so on) due from the subsidiaries and associates to the direct investor, including dividends declared but not yet paid to the direct investor;</p> <p>(iii) less loans, trade credit and other liabilities (including equity and debt securities) due to subsidiaries and associates from the direct investor</p>	<p>(a) <i>For subsidiary and associated companies:</i></p> <p>(i) The direct investor's share of the company's reinvested earnings;</p> <p>(ii) plus the direct investor's purchases less sales of the company's shares, debt securities (bonds, notes, money market, and financial derivative instruments), and loans (including non-cash acquisitions made against equipment, manufacturing rights and so on);</p> <p>(iii) less the company's purchases less sales of the direct investors' shares, debt securities (bonds, notes, money market, and financial derivative instruments), and loans;</p> <p>(iv) plus the increase, net of decreases, in trade and other credit (including debt securities) given by the direct investor to the company – usually measured as the net balance of trade and other credit outstanding at the end of the period owing to the direct investor, less the balance outstanding at the beginning of the period, and less the net increase between the opening and closing balances, which is due to revaluations and exchange rate movements</p>
<p>(b) <i>For branches, the net worth of these concerns to the direct investor measured as:</i></p> <p>(i) The market value (or, where market value is not available, written-down book value – derived from balance sheets) of the concern's fixed assets, and the market value (or, where market value is not available, the book value) of its investments and current assets, excluding amounts due from the direct investor;</p> <p>(ii) less the concern's liabilities to third parties</p>	<p>(b) <i>For branches:</i></p> <p>(i) The increase in unremitted profits;</p> <p>(ii) plus the net increase in funds received from the direct investor – measured as the increase in the net worth of the enterprise to the investor less increases (net of decreases) due to revaluations and exchange rate movements</p>

Source: OECD (1996, Paragraphs 22, 35)



APPENDIX B

Table B1: Variable definitions and sources

Variable	Definition	Source
Inward FDI	<ul style="list-style-type: none"> ● Ratio of inward stock of FDI to gross domestic products (in %) ● Ratio of inward flows of FDI/gross capital formation (in %) 	World Development Indicators (2010) UNCTAD World Investment Report (2010)
Financial development	<ul style="list-style-type: none"> ● Ratio of broad money supply (M2) to gross domestic products (in %) ● Ratio of domestic bank credits to the gross domestic products (in %) ● Ratio of quasi money to gross domestic products (in %) 	World Development Indicators (2010)
Natural resource endowment	Mineral rents (percentage of GDP)	World Development Indicators (2010)
Real per capita GDP	Annual per capita GDP adjusted for inflation as measured by the GDP deflator	World Development Indicators (2010)
Real GDP growth	Annual GDP growth adjusted for inflation as measured by the GDP deflator	World Development Indicators (2010)
Real interest rate	Real interest rate is the lending interest rate adjusted for inflation as measured by the GDP deflator	World Development Indicators (2010)
Real exchange rate	Real effective exchange rate index (2005=100)	World Development Indicators (2010)
Inflation	The annual percentage change in the cost to the average consumer of acquiring a basket of goods and services	World Development Indicators (2010)
Infrastructure	<ul style="list-style-type: none"> ● Infrastructural development measured as number of telephone lines per 100 population ● Gross fixed capital formation /GDP ratio 	World Development Indicators (2010)
Urban agglomeration	Percentage of urban population to total population	World Development Indicators (2010)
Trade openness	The sum of export and import scaled by the GDP	World Development Indicators (2010)
Rule of law	Ranking of the effectiveness of property and contract rights that takes a range -2.5 to 2.5, with higher values corresponding to better governance outcomes	World Governance Indicators (2010)
Legal origin	Dummy variable with value 1 if country has English common law origin and 0 if otherwise	La Porta <i>et al.</i> (1999)



APPENDIX C

Table C1: List of SSA countries in the sample

Mineral-rich		Non-resource-rich	
Oil	Non-oil	Coastal	Landlock
Cameroon	Botswana	Benin	Burkina Faso
Chad	Cote d'Ivoire	Cape Verde	Central African Republic
Congo, Republic of	Namibia	Comoros	Ethiopia
Equatorial Guinea	Serra Leone	Gambia	Lesotho
Gabon	Zambia	Ghana	Malawi
Nigeria		Guinea Bissau	Mali
		Kenya	Mauritania
		Madagascar	Niger
		Mauritius	Rwanda
		Mozambique	Swaziland
		Senegal	Uganda
		Seychelles	Zambia
		South Africa	
		Tanzania	
		Togo	

Source: IMF (2010)