Foreign direct investment and trade policy openness in Sub-Saharan Africa

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Abstract: In contrast to previous studies on the relationship between trade openness and FDI inflows, this study develops a new measure of trade openness. Principal component analysis was employed to generate an index to capture trade policy openness. The study used cost of exporting and importing as well as the number of days and the number of documentation it takes to complete a trade transaction (both import and export) in the doing business indicators dataset to create an index for trade policy openness. This provides a better measure of trade openness compared with the traditional measure of trade openness which takes into the volume of trade. The traditional measure of trade openness may be affected by more than ordinary trade policy of an economy. Other factors such as access to foreign markets, the size of the internal market and the size of the an ecnomy can probably affect the trade to GDP ratio. However trade policy openness is free of these problems. The study employed both static and dynamic pannel estimation technique to analyse the relationship between trade policy openness and FDI inflow for 29 sub Saharan African countries. The result from the study indicates that, policy openness affect FDI inflows positively. The study recommends that, more efforts should be targeted at reducing cost of trade and also increases the ease of cross boarder trading activities. This would ensure the flow of required level of FDI to the region for economic transformation.

Keywords: FDI, Policy openness, FDI and Openness, Sub-Saharan

Introduction

Foreign direct investment (FDI) as an important element of globalisation, is a major driver of economic transformation, employment creation, technological improvements, and eventually economic growth. FDIs plays a vital role of meeting the development, foreign exchange rate, investment, and tax revenue needs of developing countries (Smith, 1997; Quazi, 2007). Specifically, FDI can play a significant role in Sub-Saharan Africa's development agenda by enhancing domestic savings, employment creation and growth, integration into the global economy, transfer of technologies, enhancement of efficiency, and raising skills of local manpower (Anyanwu, 2006; Dupasquier & Osakwe, 2006).

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Despite the importance of FDI in promoting economic growth and development agenda, Sub-Saharan African countries continually attract low level of FDI. Over the years, the inflow of FDI into Sub-Saharan Africa compared with other regions has been low. Example, FDI inflows between 1980 and 1989 was 2.6% of the world average, 1.9% in the period 1990-1999; and 3.2% in the period 2000-2009. During the same periods, the Asian region received 14.2%, 19.1% and 19.1% respectively of the total world average FDI inflows (Anyanwu, 2011). As indicated by UNCTAD (2012) report, inflows of FDI to Africa declined in 2011 for the third successive year. An important question which arises from this is: Why can't Africa attract much FDI? The answer to this question is very important to both economists and policy makers.

The quest to find answers to this question over the past decades has culminated into a large body of empirical literature that seeks to identify the determinants of FDI inflows into Africa. These studies have identify a wide range of independent variables have been tested in the process (Seim, 2009). These comprise of macroeconomic factors (market size, openness, human capital, labour costs, cost of investment, trade deficit, exchange rate, total tax rate, inflation, budget deficit, domestic investment, external debt, government consumption expenditure, and energy use), business environment and institutional variables. Apart from market size however, there is still no strong consensus as to what variables are more robust determinants of FDI inflows. Although results vary in empirical studies, openness is one of the determinants identified as being more likely to be robust when compared to other potential determinants of FDI (Seim, 2009).

A large number of empirical works have therefore focused on the influence of trade openness on FDI inflows into Africa. Majority of these studies concentrated on *revealed openness'* (ratio of exports and imports to GDP*)* on FDI inflows (see: Anyanwu, 2011; Seim, 2009; Kandiero & Chitiga, 2006). However, there are a number of problems that may arise from the use of revealed openness. Access to foreign markets and the size of the internal market can probably affect the trade to GDP ratio. This implies that geographical position, conditions and the level of income might be correlated with the openness measure. Also, larger countries (in terms of economy size) might have a lower measure of openness due to their level of income and a higher level within-country trading activities and the economy size is believed to have a positive effect on FDI inflows (Seim, 2009). In addition, since the revealed measure of trade openness tends to consider volume of trading activities rather than ease with which trading activities take place, it does not really provide a clear picture of how open a country is.

On the other hand, *policy openness* takes into account barriers to trade, correcting for structural features and price distortions. Sachs and Wanner (1995), introduced a similar measure of trade openness using a dummy which was based on the fraction of years between 1965 and 1985 that a country was integrated with the global economy (a country is said to be integrated if it maintained reasonably low tariffs and quotas, and did not have an excessively high black market exchange rate premium). However, with the onset of trade libralisation in almost all African economies and given the level of progress in most economies, one will be unable to draw a clear distinction between an open economy and a closed economy based on the suggessted measures provided. Again dummy variables have the tendency to capture other policy effects which may not necessarily be the level of trade openness. Hence as contribution to the literature on the effect of trade openness on FDI inflows in Africa, this paper developed a trade openness variable from the doing business indicators that is published by the World Bank, within the circles of policy openness to analyse the effect of trade openness on the flow of FDI to Africa. The study is based on panel data set from 2006 to 2012 for 29 African economies. This paper differs from previous studies on FDI in Africa based on the fact that it uses a new data set from the doing business indicators of the World

Bank to create an index that captures the cost and ease to export and to import into an economy to capture trade openness within the circles of policy openness.

The rest of the paper is organised as follows: section 2 deals with FDI and current trends in FDI in Africa, section 3 also explores the theoretical and empirical literature related to the determinants of FDI in Africa, section 4 describes the econometric model employed and discusses the empirical approach and data used. The 5th section presents the econometric results and analysis as well as the findings. The last section concludes the study.

Foreign Direct Investment and Current Trends in Africa

Though FDI inflow to Sub-Sahara Africa increased from $29.5 billion to $36.9 billion in 2011, it is still relatively very low compared to other sub regions in the world with similar level of development as indicated in Figure 1. Most of these inflows have largely concentrated in Nigeria, South Africa and Ghana. Nigeria alone accounts for over one-fifth of all FDI flows to the continent (UNCTAD, 2012). As indicated in the Figure 1, most of the FDI inflows into the developing world mostly finds its way into East and South Asia, followed by Latin America. Inflow into Sub Saharan Africa though increasing, is still relatively low.

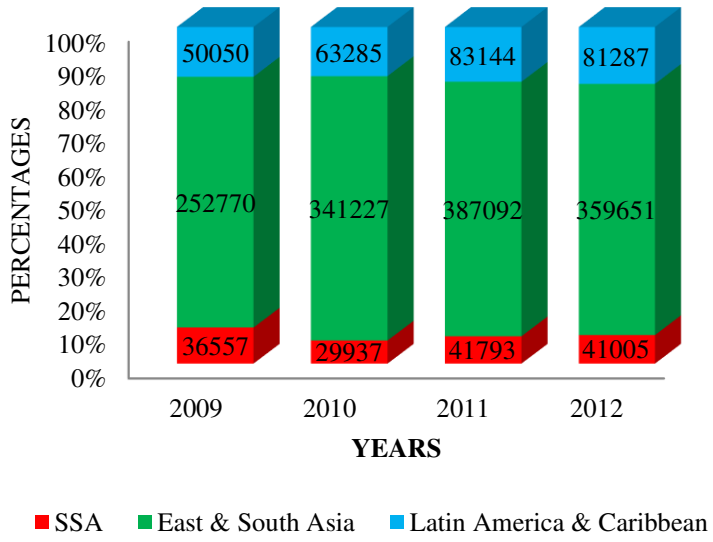

Figure 1: FDI inflow in three selected regions
Source: UNCTAD (2012)

Trade Openness

Major problems of great concern in most analytical works are those associated with the measurement of variables of interest. This problem is more acute for openness variables. This is because over the past, it has been difficult to find reliable systematic data on trade policies across most African countries. Many research works (including; Asiedu, 2002; Dupasquier and Osakwe, 2006 and Anyanwu, 2011) have simply included trade volumes (revealed openness) as a measure of trade openness. Kandiero and Wadhawan (2003) offer a comprehensive discussion on openness to trade and measurement problems related with this variable. Also, as indicated in the introduction, revealed openness does not provide a good measure of the ease with which cross-border trading activities takes place, as result, this study deviates from previous studies by employing the policy openness as a measure. A detailed explanation of this measure is provided in the methodology.

Turning to the data on openness in Sub Saharan Africa, mineral-rich countries such as Angola Congo Republic, and Equatorial Guinea, and smaller economies such as Lesotho, Mauritius, and Swaziland are ranked as the most open economies in the sub region using the revealed openness measure (see Table 2 in the appendix). The three most popular FDI destinations, Nigeria, South Africa and Ghana, are ranked 20, 21 and 12 respectively out of the 38 countries. However, when policy openness is used as a measure of trade openness, with the exception of Mauritius which is ranked 1, Angola Congo Republic, Equatorial Guinea, Lesotho and Swaziland all fall outside the first 20 of the most open economies in the sub region. Nigeria, South Africa and Ghana on the other hand were ranked 23, 15 and 5 respectively. A number of African countries liberalised their economies individually through structural adjustment programmes, and via regional arrangements and multilateral systems such as the World Trade Organization (WTO). This means that most economies on the continent to some extent will allow some level of trading activities with the rest of the world. As a result, the volume of trade cannot provide good measure of the level of trade liberalisation but rather the kind of trade policies that are related to the Tariff regimes, processing of exports and imports as well as the number of days it takes to carry out cross border trading activities as captured by our measure (policy openness) of trade openness is what provide a measure of openness.

Literature Review

The theoretical works on the determinant of FDI according to Sachei and Kinyondo (2012) started with the work of Hymer (1976). Base on the further development of the work of Hymer, four main paradigms in have emerged consisting of the *neoclassical*, *industrial organisation*, *eclectic*, and *portfolio choice* in an attempt to explain the flow of FDI to host nations (Adenutsi, 2007) have emerged. Conventionally, the *neoclassical paradigm* on capital flows is situated on the argument that capital flows among nations is driven by interest rate differentials under competition conditions. The paradigm posits that under unconstrained capital mobility condition, there mutual benefit in terms of welfare gains for countries involved in either capital export and capital import countries. This benefit however hinges on the peculiar factor endowment, political environment, expected rate of return, information asymmetries, economic policies pertaining to tax and other incentives.

Under *industrial organisation theor*y, foreign firms/enterprises are seen as oligopolistic in nature. Owning to this, these foreign markets assumed to have barriers to entry. Therefore, specific firm characteristics (product technology, managerial skills and economies of scale) gives foreign firms have advantages over their local counterparts. This theory place emphasis on market and asserts that, certain investments need special characteristics of firms to venture in. However, local enterprises are limited in terms of technology and skills needed in that regard, hence foreign flow capital investment in such specialised areas.

The *portfolio choice theory* takes into account the element of uncertainty in connection with capital flows such that investors are assumed to consider not only rates of return, but also risks associated with selecting a portfolio of foreign investment. This theory is based on the observation that fluctuations in rates of return on capital within, and more so between countries are not perfectly correlated. Hence risks might be reduced by a diversification of investment portfolios. This implies that the destination of new foreign capital is driven by the composition and location of current investment portfolio held.

The *eclectic theory* is formulated in line with the traditional Herscher-Ohlin-Samuelson trade model which explains the spatial differences of some varieties of output. The theory further explains trade in manufactured and skilled labour-intensive commodities across countries with factor endowment differentials (Dunning, 1983, 1988). The eclectic

theory tries to explain flow of FDI from three angels (Dunning, 1981, 2000, 2001) which are ownership advantage, locational advantage and internationalisation of MNEs. The emphasis of the present study was on the location advantages which includes favourable condition for business (conducive business and political environment) which ensures lower risk on investment and the level of openness (reduced trade restriction which allows for the flow of capital and returns)

In relation to the effect of trade openness on FDI inflows, proponents for trade openness (Nishimizu and Robinson, 1986; Nishimizu and Page, 1991; Tybout, 1992; Helleiner, 2002) contend that trade openness enhances competition which in turn increases efficiencies, technical change and product improvement, reduced costs of production, general economic growth via raising profits which encourage growth of foreign capital investment and inflows of expertise, and enhanced equal access to scarce resources which improves the overall resource allocation and eliminates corruption in the system.

The decision to invest in another country is usually influenced by a number of factors. Dunning and Lundan (2008) have identified four main reasons for FDIs inflows from industralised countries to developing economies. These are market seeking, efficiency-seeking, rent-seeking and strategic-asset seeking. Market-seeking FDI consist of foreign firms exporting or opening new markets in host countries in order to boost their sales. It provides another avenue for firms to bypass trade restrictions such as high transport costs and rules of origin. Efficiency searching firms basically have the objective of using some few economies to serve a larger market. The vital drivers of efficiency-seeking FDI are location, resource endowment and government regulations. The rent-seeking accumulation motive comprises foreign firms seeking inexpensive factors and inputs of production such as primary products. The final motive, strategic-asset seeking, is more focused on sustaining the foreign firms' international position and competitiveness. Since most countries in sub Saharan Africa are in the bracket of low income countries, FDI is likely to fall in the non-market-seeking category. This is due to the fact that non-market FDI goods are produced in the country and exported abroad whereas in the market-seeking case, goods are produced and sold internally. Asiedu (2002) noted that market-seeking FDI would thrive in large markets and high-income economies.

The focus of the present study was mainly on the effect of trade openness on the inflow of FDI. Despite the fact that trade openness can be considered as a socio-economic indicator, this study was interested only in economic dimension of openness. Trade openness encourages export-oriented FDI, whereas trade restriction entices "tariff-jumping" FDI, whose first objective is to capitalise on the existing domestic market (Kosteletou & Liargovas, 2000). Thus, the effect of variations in openness on the inflow of FDI to an economy diverges in accordance with the incentive for engaging in FDI activities (Brainard, 1997; Navaretti and Venables, 2004). Seim (2009) argues that foreign firms that have the objective to expand their market may resolve that in the face of a high degree of openness, little restriction and low trade costs; the market could be better served through an export rather than FDI. Hence, a high degree of openness can be linked with a low level of FDI inflow. Nevertheless, market-seeking FDIs can also be made to help serve nearby markets (with the host country offering an export platform for the foreign firm). Under such a condition a greater degree of openness would have a positive effect on FDI inflows.

On the other, foreign investors that are searching for skilled or semi-skilled labour or new technology that is less expensive than what is pertaining in their home country, will engage in efficiency-seeking investments. These investors usually want to get some benefits from the cost differentials in terms of natural factor endowments and exploit the economies of specialization and scale. As a result they disperse their chain of production all over different locations and countries. Hence, better degree of openness gives an indication of

little trade restrictions and lesser costs that add to the total cost of the products produced for export to other branches of the firm. Accordingly, a higher degree of openness will have a positive effect on investments of such investors. In addition, the level of trade openness can be associated with other forms of policy imperfections in an economy. Exchange rate controls, for example, reflects the ease with which foreign investors can work in the economy. This easiness of operation for foreign investors will most probable have a greater positive effect on efficiency-seeking, as opposed to market-seeking FDIs.

Brief Review of Empirical Literature

There are a number of empirical studies that include openness as one of the determinants of FDI. Caudros, Orts, and Alguacil (2004) employed quarterly data for Mexico, Brazil and Argentina, in which they used a vector autoregressive model to estimate the causal relationship among trade, inward FDI and output. Their empirical investigation produced mixed results. They found trade and FDI to be complements in Mexico, with causality running from FDI to exports. Contrary to this result, their study found that trade and FDI exhibited substitutive relationship in Brazil, whereas in Argentina they found no evidence of causal relationship.

Moosa and Cardak (2006) also carried out an extreme bound analysis and found that export as a percentage of GDP was probable to be a robust determinant that positively affected FDI inflows. Openness is observed to be positively and significantly associated to FDI inflows in studies such as Harms and Ursprung (2002) and Jensen (2003). Singh and Jun (1995) did a Granger causality test, and identified that causality runs from openness to FDI and not the other way around.

Others such as Busse and Hefeker (2007) and Globerman and Shapiro (2002) conclude that, there is no statistically significant relationship between FDI and trade openness hence trade openness has no effect on FDI inflows. However, results obtained by Goodspeed et al. (2006) turned out to be inconclusive with respect to openness. The result of Goodspeed et al. (2006) was generally mixed for the countries involved in the study. It had a positive significant effect on FDI inflow in some cases and was also insignificant in other specifications of the empirical model. Testing for the vertical, horizontal and knowledge capital models, Markusen and Maskus (2002) concluded that trade restrictions may be less significant as an incentive for horizontal tariff-jumping investments in developing economies. This implies that a higher degree of openness will have very little effect on market-seeking investments in developing economies relative to developed economies. Similarly Asiedu (2002) also identified that trade openness encourages FDI to a smaller extent in Sub-Saharan Africa when compared to other developing economies. On the other hand, Tøndel (2008) noted that the responsiveness to openness is actually larger for Sub-Saharan Africa than for other countries. There is also some proof with respect to differences within the group of transition economies. After economies first opened up for foreign involvement in the 90s, investments in Central Europe were vertical, while FDI activities in the Commonwealth of Independent States were either market or resource-seeking.

Liargovas and Skandalis (2012) also examined the significance of trade openness for attracting FDIs for 36 developing economies across the world for the period 1990-2008. The study found that there existed a positive long run relationship between trade openness and FDI inflows in developing countries.

The measure of openness in the empirical literature is mostly based on the revealed measure of trade openness. However, this measure may be affected more than ordinary trade policy of an economy. Such othere factors as proximity to other economies as well as the size and nature of internal market can affect the trade to GDP ratio. This implies that the geographical position, conditions and income levels may be correlated with the traditional

measure (revealed openness) as used in most of the empirical studies. Thus larger economies, in terms size of GDP, may have a lower measure of openness as a result of the level of income and a higher level of intra-country trade. More so, the size of the economy is usually believed to have a positive impact on the flow of FDI. The present study therefore attempts to use the policy measure of trade openness, which is devoid of the problems mentioned above. The next subsection describes the methodology employed for the study, giving detailed explanation on how the policy openness was measured.

Data

The data set used for the study range from the period 2006 to 2012 and a well balanced panel on 29 Sub-Saharan African countries obtained from WDI, and the world business indicators 2013. The objective of the study is to examine the effect of trade policy openness on FDI inflow in SSA. Given this, the study controlled for Market size (measured by Real GDP), Macroeconomic stability (captured by inflation rate), Real Exchange Rate, interest rates, and Natural resources. The WDI and the world business indicators provides a reliable data set for the time horizon under study. The time for the study.

Empirical Methodology and Variables

Utilizing panel data makes meaningful empirical research possible even in a case of data restrictions such as constrained time frames or missing data, inhibiting factors noted by Barro (1991) and Xavier Sala-i-Martin (1994). Also, the time-dimension of the panel is relatively small in compared to the number of countries, which helps to avoid some of the business-cycle complications that may arise in time series data. The Linear model to be estimated are equation 1 and 2:

$$LFDI = \alpha_i + \phi LFDI_{it-1} + \beta_1 LOPEN_{it} + \beta_2 LRGDP_{it} + \beta_3 LREXC_{it} + \beta_4 NAT_{it} + \beta_6 INF_{it} + \beta_6 SCH_{it} + \varepsilon_{it} \quad (1)$$

Where i=1,2,3….29 and t=1, 2, …6 and FDI, OPEN, RGDP, REXC, NAT, INF, SCH are foreign direct investmen, openness index, real GDP, real effective exchange, Natural resource, inflation and Schooling (measuered by secondary school enrolment as a proxy fo r human capital) respectively. *ε= error term which is IID (0, σ^2).* The α, β_i, and ϕ_i are coefficents to be estimated.

Trade Policy Openness

Choosing an appropriate indicator of trade openness is critical in analysing the relationship between FDI inflow and trade openness. Measures of trade openness have long been of interest to international and development economists due to the effect of trade openness on a country's ability to attract FDI how it affects economic growth. However, empirical on the relationship between FDI inflows and trade openness have been hampered by the lack of a suitable theoretically-derived measure of openness. Traditional measure of trade openness (revealed openness – (exports + imports)/GDP)) this measure of openness as indicated earlier has a number of weaknesses key among them is the; possible effect of resource endowments, size of economy, technology and the levels of trade restrictions.

In this paper we argue that, a measure of trade openness should be more concerned with ease at which international trade can take place in a country. Thus trade openness should not be about the volume of trade but rather the ease of trade. Hence, in this study the principal component analysis (PCA) approach is employed to create an index for trade openness that captures the ease with which cross-border trading activities takes place within an economy rather than the volume of cross-border trading activities. In creating the index on trade openness, this study used data set from the doing business indicators related to cost of

exporting (EXPCOST), cost of importing (IMPCOST), the number of days it takes to export (DAYEXP), number of days to import (DAYIMP), the number of documents it takes to complete an export transaction (DOEXP) and import (DOIMP).

Cost of export and import measures the fees imposed on a 20-foot container in U. S. dollars. It captures charges associated with completing the processes to export or import the goods such as cost of documentation, administrative cost of customs clearance, customs broker fees inland transport terminal and handling charges. Countries with lower cost of export and import are expected to be more open than those with higher cost. The number of days it takes to export and to import is measured by time recorded in calendar days. The time calculation for an export or import process starts from the moment it is started and runs until it is completed. All documents required per shipment to export or import goods are captured. This is based on the assumption that all contracts has already been agreed upon and signed by both parties. Documents needed for clearance by port and container terminal authorities, customs authorities, health and technical control agencies, banks and government ministries are taken into account (World Bank, 2013).

Principal Component Analysis

The central object of principal component analysis is to reduce the dimensionality in data. It is a procedure that attempts to maintain all the variation available in data even dealing with large set of variables. It transforms the data into fresh variables. The highest variation of the original variables is contained in first few principal components (Jolliffe, 2002). PCA is normally used as a technique of variable reduction or for the discovery of the structure of relationship among variables included. The information available in a group of variables is summed up by a number of mutually independent principal components. Each principal component is essentially the weighted average of the underlying variables. The first principal component usually has the maximum variance for any of the combination. The numbers of principal components generated are usually uncorrelated. In this case first principal component is used as an aggregate measure of trade openness. The main advantage for the construction of trade openness index by using the method of PCA is that the weights of the index are founded on the inner correlation of all the individual measures. Employing the PCA technique, we constructed a trade openness index for 28 Sub-Saharan African countries. The result of PCA is shown in appendix B. The eigenvalues of the first two principal components (PC1 and PC2) as indicated in appendix B, are greater than one. The first principal component has an eigenvalue of 3.9 and explains about 64.6 percent of the total variance. This component has relatively high positive coefficients. The second component has an eigenvalue of 1.1 and explains just 17.7 percent of the total variance. Collectively the two components explain 82.2 percent of the total variance in the original six variables. The Kaiser-Meyer-Olkin Measure (KMO) of Sampling Adequacy, was used to check for the appropriateness of the PCA was 0.70, this is greater than the minimum KMO criteria of 0.50 for PCA analysis. Since the first component explains more than 60 percent of the variation in the original variable, the study used the eigenvectors of the first principal component as weights in constructing an openness index. Hence higher score will give an indication of the difficulty involved in carrying out trading activities, implying lower levels of trade openness. Since most FDIs that comes to Africa are mainly non-market seeking FDIs as indicated by Asiedu (2002), we expect that, greater degree of openness will result in a higher FDI inflows. Hence we expect a negative relationship between openness and FDI inflows.

Real GDP

Almost all studies on FDI have found a positive relationship between GDP and FDI (Ramirez 2000; Chakrabarti 2001; Zhang 2001). This relationship is not unexpected. Aside

from having large domestic markets, high-growth economies usually implement stable and credible macroeconomic policies that attract foreign investors.

Inflation Rate

Another determinant of FDI is the rate of inflation. Inflation raises the user cost of capital, and consequently affects the profitability of FDI in an unfavourable way (de Mello 1997: 6). A high rate of inflation is the result of irresponsible monetary and fiscal policies, such as excessive budget deficits, ill managed exchange rate regime and too much money supply. It might also reflect poor economic environments in the country—environments that discourage the flow of FDI (Calvo, Leiderman, and Reinhart 1996: 127).

Natural Resources

Foreign direct investment in Africa is argued to move to resource rich countries. Therefore, the role of natural resources in influencing the level of FDI inflows to Africa cannot be downplayed. According to Barthel, Busse and Osei (2008) FDIs may come due to resource pool of the FDI destination country. Aseidu (2013) expresses that natural resources reduces FDI flow. The reasons assigned to this were that natural resources, in particular oil, are characterized by booms and busts, leading to increased volatility in the exchange rate (Sachs and Warner, 1995). Also, a less diversified export by a country which can be recognized by higher component of natural resource export makes the economy vulnerable to external shocks thereby making the economy less likely to be stable. All these factors generate macroeconomic instability and therefore reduce FDI. However, FDI in natural resource rich countries tend to be concentrated in the natural resource sector. Therefore, the effect of natural resource on FDI could be positive or negative.

Human capital development

Foreign investors are concerned with the quality of the labour force in addition to its cost because of the cost minimization objectives. Hence, they are more likely to move to locations where there are available human capital resources. Secondly, more educated makes learning and the adoption of new technology easy and faster. The implication is that, higher levels of human capital suggest the availability of good and quality labour. This serves as an added locational advantage to the economy and hence enhances the chances of FDI inflows.

Estimation Techniques

A panel model contains two subscript (i and t) which differentiate it from either cross-sectional (i) or time series (t). Thus a panel data can be seen as a time series of individual cross-sections and hence has the attributes of both time series and cross- sectional data. Panel data therefore has some superiority over pure cross sectional or time series data especially its ability to handle individual heterogeneity (Greene, 2003)

The estimation technique employed must therefore be able to handle both attribute to ensure efficient and consistent estimates. There are several specifications of a panel model but the type specified in both Equation (1) and (2) assume an individual varying effect which is constant over time (α_i). This specification allows the variations in the dependent variable to be attributed to the explanatory variables after controlling for individual effects (Greene, 2003).

The estimation of the dynamic model cannot be done the usual way of estimating static panel models because of the inclusion of the lag dependent variable as an explanatory variable. That is, the introduction of the lag-dependent variable as an explanatory variable has the tendency of creating endogeneity in the model.

To avoid the tendency of biasedness due to the problem of endogeneity an alternative estimator may be necessary to estimating the model in Equations (1) and (2). The available options are the GMM instrumental variable (IV) estimator and direct bias corrected estimators (Behr, 2003). In the case of endogenous predetermined regressors, the system-estimator proposed by Blundell and Bond (1998) is unbiased and most efficient, while the direct biased corrected estimators perform similar to the GMM-estimator proposed by Arellano and Bond in 1991 (Behr, 2003). The concept of instrumental variable estimations requires identifying an *instrument* that will be able to mitigate the problem of endogeneity in the model. However, a major drawback in the basic instrumental variable model has to do with the ease with which a valid and relevant instrument can be located and used (Wooldridge, 2002). To minimize the task of searching for an appropriate instrument; several authors have developed a variant of the IV estimator that uses the lags of the variables in the models (Anderson & Hsio, 1982; Arrelano & Bond, 1991; Arellano & Bover, 1995; Blundell & Bond, 1998).

According to Arellano-Bond (1991) as many as $\frac{1}{2}\left(T\left(T-1\right)\right)$ instruments can be generated from $N \times T$ panel data, where N is the number of individual observation and T is the maximum time period. The data for this study includes 7 **time periods (T=7)** and hence as many as 21 instruments can be generated from the dependent variable alone. According to Mileva (2007), the Arellano and Bond (1991) difference GMM estimator was first proposed by Holtz-Eakin et al. (1988) and later expanded by Arellano and Bond in 1991. Like in the case of other difference GMM estimators, the Arellano and Bond estimator perform poorly as the exogenous regressors in the model increases. That is, the Arellano and Bond estimator can perform poorly if the autoregressive parameters are too large or the ratio of the variance of the panel-level effect to the variance of idiosyncratic error is too large (STATA Inc., 2009).

An improved version of the Arellano and Bond panel data difference GMM estimator was outlined by Arellano and Bover (1995) and fully developed by Blundell and Bond (1998). Arellano and Bover (1995) construct a panel data GMM estimator in which the regression equations are in levels, and the additional instruments are expressed in lagged differences.

Blundell and Bond (1998) augment the original differences GMM estimator with the level-equation estimator to form a system of equations known as "system GMM". The resulting system of regression equations in differences and also levels has better asymptotic and finite sample properties than the Arellano-Bond (1991) differences GMM estimator (Blundell & Bond, 1998). The Blundell and Bond (1998) estimator accommodates exogenous variables by including instrument generated from the exogenous variables. The System-GMM estimator (Blundell-Bond estimator) uses both lagged levels as instruments for contemporaneous first-differences and lagged differences as instruments for contemporaneous levels, whereas the Difference-GMM (Arellano-Bond estimator) estimator uses only lagged levels as instruments for contemporaneous differences. The study therefore settled on the Blundell and Bond (1998) system GMM approach to estimate the dynamic model.

Post Estimation Tests

The GMM based estimators do not impose a lot of assumptions on the error term. As such very few post estimation tests are needed after a GMM based estimation (Wooldridge, 2002). Two popular tests are proposed after the Arrelano and Blundell estimation (Blundell & Bond, 2000). The first is the Arrelano and Bond test of autocorrelation (*AR-TEST*) which is built in the STATA 11 package as *estat abond*.

The *AR-TEST* report the test statistics for the first and second difference autocorrelation in default mode but the lag levels can be adjusted. It has a null hypothesis of no autocorrelation in the first difference error. Thus, it is require that the null hypothesis is not rejected. That is, the bigger the probability value of the *AR-TEST* the lesser the problem of autocorrelation in the model. A rectification to the autocorrelation problem is to estimate the two-step equation. In two-step estimation, the standard covariance matrix is robust to panel-specific autocorrelation and heteroskedasticity, but the standard errors are downward biased (Mileva, 2007). Two-step robust can be used in STATA to get the finite-sample corrected two-step covariance matrix (Drukker, 2008).

The second test is the Sargan test of valid over-identifying restriction. It has a null hypothesis of correct over-identifying restrictions which requires that we must fail to reject the null Just as in the case of the *AR-TEST*.

Results and Interpretations

The objective of the study was to find the effect of openness on FDI inflow. The study did construct an openness index. The study went on to estimate the Arrelano-Bover estimation using the GMM approach. To estimate this, the over identification restriction of the variable must pass. This test suggest that the over identification restrictions impose on during the estimation are valid.

Table 1: Dynamic Panel Data Results

VARIABLES	**(1) First stage**	**(2) GMM**
	LFDI	LFDI
$LFDI_{t-1}$	0.500**	0.814***
	(0.229)	(0.0119)
LOPEN	0.523	-0.384***
	(0.396)	(0.0655)
LREXC	0.315*	-0.182***
	(0.164)	(0.0540)
LRGDP	1.549***	0.133***
	(0.474)	(0.0282)
NAT	0.00224	0.002***
	(0.00237)	(0.0003)
SCH	-0.0137	-0.004
	(0.00891)	(0.0022)
INFL	-0.00219	-0.003*
	(0.00192)	(0.0016)
Constant	-35.65***	2.306***
	(11.22)	(0.8395)
Observations	77	114
Number of economy	26	29

		Z	Prob>Z
AR test for autocorrelation	1	-1.1178	0.2636
AR test for autocorrelation	2	1.0247	0.3055
Sargan over identification test		19.88991	0.7526

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

This gave us the urge to run a GMM based on the Arrelano-Bover/Bond—Bundell estimation. Though the GMM over identification test passed, autocorrelation may present a challenge and render the estimates invalid for inferences. Therefore, the Arrelano-Bond autocorrelation test was done. The test suggests that, there is there is no autocorrelation of the highest order

The effect of openness on FDI was found to be negative. The coefficient for openness is statistically significant at significant at 1 %. This suggests that openness is an important factor in explaining FDI inflows to SSA. From the results, a decrease in the level of openness by 1% would result in a decrease in openness by more than 0.38 percentage points. Since the openness used here captures cost, it implies that higher cost leads to less open economy Therefore, the result is similar to studies that has found positive effect using the traditional openness and is in consonance with both theoretical and empirical studies (Asiedu, 2010; Ayenawu, 2012; Seim, 2006). This study also found less open economies in SSA will experience less FDI inflows. This is because of the fact that most FDIs that come into the continent are non-market seeking FDIs that either involve the import or export of raw materials hence less open economies may find it difficult to attract the needed FDI to promote growth and development. This implies that more open economies are more likely to attract more FDIs than less open economies. Hence, if SSA countries become more open, in terms of policy openness, there will be international response to such policies by the flow of FDI from MNCs to the sub-region. This finding confirms the works of Asiedu, Siem and Ayenawu. The possible explanation for could be that, most FDIs are directed to region where they will benefit from an open economy. This is so because, a more open economy provide easy access to the international market by either exporting their products or importing raw materials. The implication is that, a less open economy would increase the cost of FDI sponsors activity and reduce their returns. Due to the profit motive of most MNCs, they would then head to regions with higher level of openness to gain from higher level of international engagement.

The existing size of the market of FDI host country or region presents an opportunity for business minded organizations to exploit. As a measure of market size, the log of GDP is statistically significant at 1 % in three equations. This confirms the works of Asiedu (2002; 2010). The implication of the result is that to attract FDI, the market should expand. That is an increase in the GDP of region is required to boost the rather slow pace of FDI flow to SSA in recent time. From the result, an increase in GDP by 1 percent, leads to an increase in FDI flow by 0.291. This result is very close to that of Seim (2009) result.

The effect of natural resource was found to be positive and statistically significant at less than 1 percent. Though positive, the effect on FDI is very low. The coefficient of natural resource is 0.0023. This means that FDI has a weak effect from natural resources. This is not surprising since most of the FDI inflows to Africa and SSA countries are natural resource-based sectors, as they are rich in minerals, oil and natural gas. Hence, the resource is in line with both theoretical and empirical literature that secure access to natural resources is one of the driving forces for MNCs to Africa, Looking at it from the eclectic model, resource availability also give an environmental advantage to MNCs. The results is in the lead of studies like Dupasquier and Osakwe (2006), Aseidu, (2002) and Deichmann et al., (2003), which had reported a positive and significant effect of natural resources on FDI inflows.

Macroeconomic stability is an essential to every economic activity. Like any economic activity, FDI is also influenced by the level of macroeconomic stability. The results depict that price level as a measure of macroeconomic stability is important in explaining FDI inflows to SSA. Log of CPI is statistically significant across all the models at 1 percent significant level except in the random effect result which was significant at 5 percent. There is a negative effect of instability on FDI inflows. That is economic instability discourages

foreign investor due to the high uncertainty that dampen investment activity. This confirms similar works done on FDI by Nnadozie and Osili (2004), Khair-UZ-Zaman et al. (2006), Aseidu (2010) and others.

The effect of human capital on inflow FDI is positively related. The results are statistically significant at 5%. A change in the level of enrolment to school by one is able to result in a change in FDI by 0.00283%. The positive effect of human capital is due to the fact that FDI looks for availability of skilled labour. Since secondary schools graduates have the ability to learn faster, it is no surprise that it yield a positive effect on FDI.

The lag of log of FDI is statistically significant at 1 percent. Thus, the previous FDI is important in explaining FDI inflow to SSA. The estimated coefficient of 0.74 means that, previous FDI would to an increase in current flow of FDI by 0.74 percent. The positive effect of the lag FDI could be explained by several reasons. The first would be on the success stories of FDI in the region. The success of earlier investments by an MNC is more likely to be followed by additional investments. Also, the success of initial FDI would serve as boast to other encourages other investor to follow the leads of previous investors into the region.

Conclusions and Policy implication

Using the revealed openness, the study concludes that, the use of traditional measure of openness does not present a clear picture of whether the economy is open or not. Considering the policy level openness, the measure used matches well with FDI flow to countries in the sub region. .The study finds that the degree of openness is positively related to FDI flow in SSA. The implication of this finding is that, for countries to attract foreign direct investment, the policy framework on openness should be geared toward a more opened economy in terms of policy. If this is done, the economies would be able to attract more FDI inflows into the region. This creates an enabling environment for global interaction which benefits the source of FDI into the region. Economic stability is necessary for FDI inflows. Instability leads to increased risk on investment returns. Ensuring economic stability leads to boast in investor confidence in economy. Ones investors perceive the economy to be stable; FDI will flow into the region. Again, private sector investment has negative relationship with FDI flow. Thus, well functioning financial sectors that grant credit to private sector for investment have the tendency to restrict FDI inflow. Thus FDI inflows are seen as substitutes rather than complement to private sector investment in Sub-Saharan Africa.

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Appendix

Table 2: Openness to trade (Average) and ranking in Sub-Saharan Africa 2004-2012

COUNTRY	Revealed Openness	Rank	COUNTRY	Policy Openness	Rank
Lesotho	1.516889	1	Sao Tome and Principe	583.2243	1
Swaziland	1.393116	2	Mauritius	625.0149	2
Mauritania	1.182682	3	Ghana	772.9591	3
Cape Verde	1.150287	4	Seychelles	784.35	4
Mauritius	1.142091	5	Guinea	849.2946	5
Togo	1.024352	6	Gambia, The	875.491	6
Ghana	0.973462	7	Togo	893.1179	7
Seychelles	0.868959	8	Cape Verde	910.2724	8
Namibia	0.860169	9	Mozambique	1083.006	9
Madagascar	0.772894	10	Madagascar	1168.682	10
Senegal	0.763782	11	Tanzania	1225.235	11
Gambia, The	0.760931	12	Senegal	1241.251	12
Mali	0.72509	13	Lesotho	1283.349	13
Botswana	0.703321	14	Mauritania	1311.541	14
Malawi	0.68191	15	Namibia	1373.835	15
Niger	0.658986	16	Cameroon	1416.484	16
Mozambique	0.65611	17	Swaziland	1609.211	17
Cameroon	0.592043	18	Kenya	1833.889	18
Kenya	0.58253	19	Malawi	1881.123	19
Sao Tome and Principe	0.5408	20	Mali	2051.191	20
Guinea	0.536388	21	Botswana	2083.795	21
Tanzania	0.527001	22	Ethiopia	2157.164	22
Uganda	0.442664	23	Uganda	2262.753	23
Burkina Faso	0.425913	24	Burkina Faso	2716.232	24
Burundi	0.424487	25	Niger	2896.343	25
Rwanda	0.389061	26	Burundi	2985.685	26
Ethiopia	0.378936	27	Rwanda	3574.818	27
Central African Republic	0.363569	28	Central African Republic	4698.647	28

Source: Authors estimate

Appendix B: Principal Component Analysis for Financial Development

	PC1	PC2	PC3	PC4	PC5	PC6	
Eigenvalues	3.87383	1.05986	0.51896	0.39822	0.0899	0.05919	
Variance proportion	0.6456	0.1766	0.0865	0.0664	0.0150	0.0099	
Cumulative proportion	0.6456	0.8223	0.9088	0.9751	0.9901	1.0000	
			Eigenvectors				
Indicators	**Vector 1**	**Vector 2**	**Vector 3**	**Vector 3**	**Vector 3**		**KMO**
IMPCOST	0.4373	-0.3163	0.3872	0.3272	-0.4433	-0.5052	**0.69**
EXPCOST	0.4357	-0.3739	0.3817	0.0823	0.489	0.5279	**0.67**
DOEXP	0.2732	0.726	0.0053	0.6156	0.0846	0.1105	**0.60**
DOIMP	0.3563	0.4715	0.3925	-0.6936	-0.0127	-0.1241	**0.73**
DAYEXP	0.4510	-0.0884	-0.5672	-0.0745	0.4918	-0.4687	**0.72**
DAYIMP	0.4625	-0.0547	-0.4782	-0.1435	-0.5613	0.4677	**0.74**
Overall KMO							**0.70**

Source: Authors estimate