Trade Openness, Infrastructure, FDI and Growth in Sub-Saharan African Countries

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This study explores the relationship between trade openness, infrastructure, foreign direct investment (FDI) and economic growth using a panel of forty two sub Saharan Africa (SSA) countries over the period 1980-2003. The results show that FDI depends on trade openness and GDP per capita. Further results show that the interaction between trade openness and infrastructure leads to a slight increase in FDI inflows. The results also indicate that FDI has a positive and significant effect on growth. This study will assist policy makers to further increase efforts towards trade openness and infrastructural development to enhance the level of FDI inflow for sustainable growth.

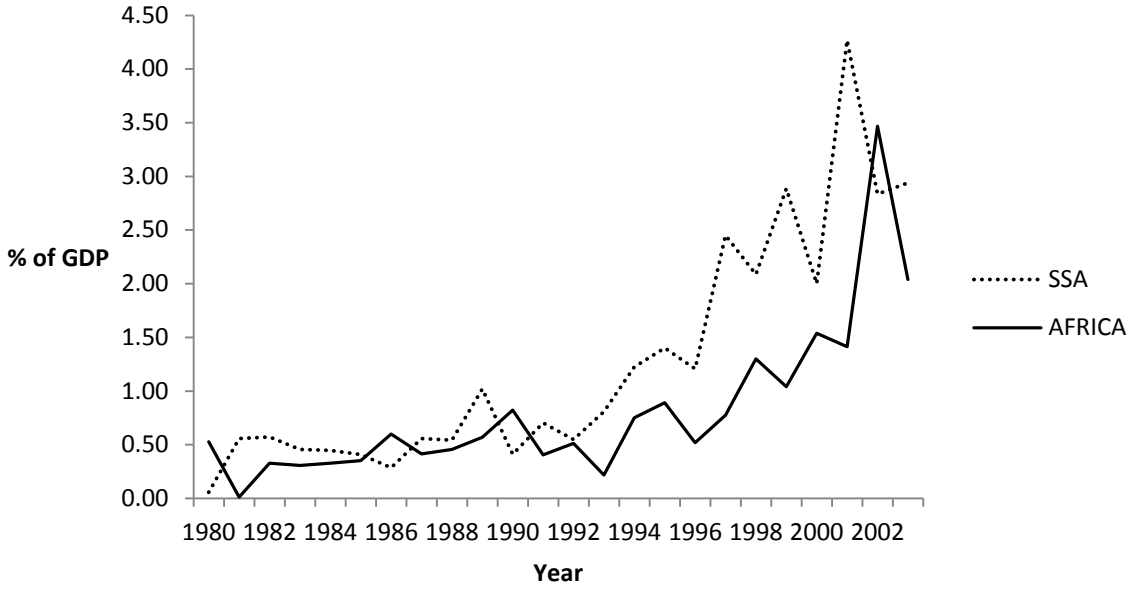
INTRODUCTION

The slow/stagnant economic performance of the sub Saharan African (SSA) countries has received considerable attention in recent years such that Easterly and Levine (1997) summarised it as 'potentials unfulfilled with disastrous consequences'. This region consists of 47 countries, 34 of which are ranked as the world's poorest countries making it difficult for foreign investors to invest as they are perceived as 'risky' because of bad business climate (Mahamet, 2006). Although the countries are differently endowed with natural resources (crude oil, minerals and metals) which in effect should contribute to economic success and development, nevertheless, corruption, unemployment, poor leadership, lack of political legitimacy, bad policies, ethnic diversity, inadequate infrastructure and underdevelopment among others makes it difficult for the countries to realise their full potential. Recent empirical evidence suggests that to achieve sustainable economic growth and to alleviate poverty from the region, there is a need to encourage domestic and foreign investment (FDI) and to develop and modernise the financial markets as deeper and better functioning financial markets can stimulate economic growth (Collier and Gunning, 1999; Agarwal, 2001, Ndikumana, 2001 and Kumo, 2008).

In its survey of FDI, the World Investment Report (2006) by UNCTAD confirms that total FDI inflow into developing countries jumped by 22 per cent to $334 billion in 2005. In addition, total FDI inflow to developing economies reached $499 billion in 2007 of which SSA received about $33 billion. According to figure i, the average inflow of FDI as a per cent of GDP to the SSA between 1980 and 2003 was 1.27 per cent with the highest share recorded in 2003 at 2.94 per cent. Several empirical studies have shown that the role of trade openness and good infrastructure cannot be ignored in the attraction of FDI (Ng'ang'a, 2005 and Asiedu, 2002, 2003 and 2006). Many authors argue that international trade or FDI enables host countries to achieve higher levels of investment beyond their own domestic savings level. More importantly, current literature emphasises its role in transferring modern technology and innovation from developed to developing countries (see for example, Mankiw et al., 1992; Feenstra and Hanson,

1997; Zhang, 2001a and b). However, there is convincing evidence that FDI inflow is sensitive to the level of openness and the investment climate in host countries. Previous studies (such as Wheeler and Mody, 1992; Frankel and Romer, 1999; Kumar, 1994; Dunning, 1988; Neumayer and de Soysa, 2005; Kandiero and Chitiga, 2006 and Asiedu, 2005) demonstrate the positive effects of trade and infrastructure in the attraction of FDI. Nevertheless, empirical evidence show that the growth effect of FDI varies from country to country and in some cases, the inflow of FDI has a positive (Balasubramanyam et al., 1996 and Borensztein et al., 1995 and 1998), negative (Boyd and Smith, 1995 and Mencinger, 2003) or insignificant (Carkovic and Levine, 2002) effect on economic growth.

FIGURE 1
TOTAL FDI INFLOW TO AFRICA AND SSA BETWEEN 1980 AND 2003



Source: World Bank (2008), World Development Indicators, ESDS International, University of Manchester.

Apart from recognising the effect of trade openness in attracting FDI, several authors have stressed the importance of other policy variables such as macroeconomic stability and infrastructural development as a determinant of FDI inflow (e.g. Makki and Somwaru, 2004). The literature emphasised that countries benefit from FDI inflow in the presence of suitable infrastructure and that in many developing countries, and in particular the SSA, the absence of such infrastructure may lead to the countries unattractiveness to FDI. However, Cheng and Kwan (2000) cite that the quality of infrastructure does not matter in the distribution of FDI in China. According to this statement, substantial investment in infrastructure may not lead to the inflow of FDI. In view of the foregoing, this paper attempts to answer two questions: First, whether trade openness in the SSA region can help improve their record in terms of FDI attractiveness, and second, can improvement of other aspects of the business climate (physical infrastructures and macroeconomic stability) further increase FDI attractiveness in the region, and if so, to what extent.

Empirical Literature

A number of studies have been carried out on empirically testing the link between trade openness, infrastructure and FDI and its impact on economic growth in developing countries (Tsai, 1994; Asiedu, 2002 and Mottaleb, 2007). The literature demonstrates that the benefits of FDI are strongly dependent on

how open a country is to globalisation. In addition, the positive effect of trade on FDI has been found to be quite robust to the type of econometric method used and countries considered. Using time series data for the period 1960-2005, Ang (2008) studied the determinant of FDI in Malaysia. The author concludes that financial development, infrastructure development and trade openness promotes FDI inflow. The implication of this result is that trade liberalisation leads to more FDI inflow in a host country. This is further emphasised by Neumayer and de Soysa, (2005) who pointed out that countries that are more open to trade have higher inflow of FDI. The positive impact of trade openness on FDI varies across regions and is relatively small in SSA countries compared with non SSA countries (see Addison and Heshmati, 2003 and Asiedu, 2002). One plausible explanation for this could be that countries in Asia and Latin America have large consumer market potential due to their large populations.

Asiedu (2002) studied the determinant of FDI in 70 developing countries between 1988 and 1997 using OLS estimation technique. Thirty five of the countries belong to the SSA region. The results show that infrastructure development and a higher return on investment are important factors that drive the attraction of FDI in the sample. It also shows that economic openness is an important determinant of FDI however SSA will receive less FDI inflow due to its geographical location. One of the problems associated with the technique used by Asiedu (2002) is that OLS assumes that each country's intercept value is identical and it does not control for country specific characteristics, therefore, one need to be cautious when interpreting results. Examining the determinants of FDI to 29 Chinese regions from 1985 to 1995, Cheng and Kwan (2000) find the relationship between FDI and infrastructure to be positive. The authors argue that good infrastructure (density of roads) determine FDI to the regions studied. They note that the quality of the roads is not a priority in determining which regions hosted the most FDI.

Empirical Framework

To assess the relationship between trade openness, infrastructure, FDI and economic growth in SSA, a panel data technique is used following the recent empirical literature such as Asiedu (2002, 2003) and Ng'ang'a (2005). The analysis is based on the information from an unbalanced panel between 1980 and 2003 for 42 SSA countries, and the empirical specifications are as follows:

$$FDI_{it} = \alpha_0 + \alpha_1 TRADE_{it} + \alpha_2 \log(TEL)_{it} + \alpha_3 gGDPpc_{it} + \alpha_4 (TRADE * \ln TEL)_{it} + \alpha_5 CPI_{it} + \mu_{it} \quad (1)$$

where

FDI_{it}:	net inflow of FDI as a per cent of GDP in a particular country *i,* at time *t*
TRADE:	Trade (total exports plus imports) as a per cent of GDP
Log TEL:	natural log of total number of mobiles and fixed telephone lines available in the host country
gGDPpc:	annual growth rate of real per capita GDP
*TRADE*lnTEL*:	interaction between trade and infrastructural development
CPI:	annual consumer price index, which measures macroeconomic stability
μ:	white noise.

Trade relates to the openness of the economy to the rest of the world. However, due to lack of time series data for the measure of openness, the sum of import and export as a ratio of GDP is used to proxy trade. This is justified by arguing that the more open a country is to globalization, the more attractive it is to FDI. A priori, it is expected that trade will be positively related to FDI.

TEL denotes infrastructural development. Many studies such as Root and Ahmed, (1979); Schneider and Frey, (1985); Asiedu, (2002) and Mottaleb, (2007) find a positive relationship between FDI and infrastructure. According to the literature, countries with better infrastructural development tend to attract more FDI when compared with others, which implies the positive effect. Following Morisset (2000) infrastructural development is measured using the number of telephone lines (landlines and mobiles) in a country. A positive relationship between FDI and infrastructure development is expected.

ANNUAL GROWTH RATE OF GDP PER CAPITA captures the potential of the host country's internal market. A higher GDP per capita growth is assumed to imply better market opportunity and increases the attractiveness for FDI, thus a positive relationship is expected. The interaction of trade and log of TEL is the variable of interest and its relationship with FDI is uncertain. CPI, consumer price index denotes macroeconomic stability. According to Asiedu (2003), countries with high (low) inflation rate tend to be unattractive (attractive) to FDI, hence, a negative relationship with FDI is expected. Finally, *i* stand for individual countries and *t,* the sample years.

Equation (1) is estimated using an appropriate estimation technique (either fixed or random effect model). However, equation (1) might suffer from the simultaneity bias problem. This is probably because a large size of GDP per capita not only attracts FDI, but FDI inflow also affects the size and growth of GDP per capita as well as trade. Thus, it might also be necessary to estimate the following equation:

$$gGDPpc_{it} = \alpha_0 + \alpha_1 FDI_{it} + \alpha_2 TRADE_{it} + \alpha_3 \log(TEL)_{it} + \alpha_4 \left(TRADE * \ln TEL\right)_{it} + \alpha_5 CPI_{it} + \mu_{it} \qquad (2)$$

Data

The data for the analysis contains information from an unbalanced panel data for 42 SSA countries which covers the period from 1980 to 2003, obtained from African Development Indicators (ADI) published by the World Bank. The net inflow of FDI as a per cent of GDP that is employed is obtained from ADI and updated using data from UNCTAD (United Nations Conference on Trade and Development). The inflation data is obtained from International Financial Statistics, International Monetary Fund and compiled by Dr. Matthew Shane (2009).

TABLE 1
LIST OF SSA COUNTRIES IN THE SAMPLE

Benin	Gambia, The	Mauritania	South Africa
Botswana	Ghana	Mauritius	Sudan
Burkina Faso	Guinea	Morocco	Swaziland
Burundi	Guinea-Bissau	Mozambique	Tanzania
Cameroon	Kenya	Namibia	Togo
Congo, Rep.	Lesotho	Niger	Tunisia
Cote d'Ivoire	Liberia	Nigeria	Uganda
Egypt, Arab Rep.	Libya	Rwanda	Zambia
Equatorial Guinea	Madagascar	Senegal	Zimbabwe
Ethiopia	Malawi	Seychelles	
Gabon	Mali	Sierra Leone	

Empirical Results

Table 2 shows the regression results of Model 1. The Hausman test result suggests that the fixed effects method is preferred to the random effects method. The overall performance of the various specifications is satisfactory, with the coefficients correctly signed. According to Model 1, trade is significantly positive at the 1 per cent level in specifications 1-3. The result is consistent with empirical literature such as Asiedu (2002), who worked on the determinant of FDI in SSA countries. However, this is contrary to Anyanwu, (1998) and Ayanwale (2007).

Furthermore, the elasticity of TEL is significant and positive in the attraction of FDI. This is consistent with previous studies such as Asiedu, (2006), Ayanwale, (2007) and Ng'ang'a, (2005) suggesting that infrastructural development will encourage FDI inflows. The results show that the annual growth rate of GDP per capita is positive and statistically significant in promoting FDI. This suggests that, the effect of FDI increases as countries get richer. Moreover, the empirical results show that the

coefficients on the interaction between trade and the log of TEL are negative and insignificant. However, this result is positive and significant at the 5 per cent level in specification 4. This implies that the effect of trade openness improves with the increase in infrastructural development. A plausible explanation for this could be that the more a country spends on infrastructure such as transportation networks, electricity and telecommunications, the more attractive they are to foreign investors. This result is contrary to Ng'ang'a (2005) who finds a significant and negative impact of the interaction between trade and log of TEL in low income countries such as those belonging to the group of countries in the present study.

TABLE 2
EMPIRICAL RESULTS FOR MODEL 1

Dependent variable: FDI inflow as a per cent of GDP				
Variables	Specification 1	Specification 2	Specification 3	Specification 4
TRADE	0.265***	0.265***	0.263***	
	(2.93)	(2.90)	(2.91)	
Log(TEL)	0.006	0.007		-0.012
	(1.30)	(0.74)		(-1.31)
GDP per capita growth	0.089**	0.089**	0.089**	0.1043**
	(2.12)	(2.12)	(2.12)	(1.97)
TRADE*Log of TEL		-0.0001	0.0001	0.0004**
		(-0.11)	(1.17)	(1.97)
CPI (inflation)	-0.003***	-0.003***	-0.003***	-0.0021**
	(2.98)	(-2.98)	(-2.98)	(-1.97)
Constant	-3.181*	-3.191*	-3.103*	1.870***
	(-1.92)	(-1.89)	(-1.88)	(12.59)
Observations	858	858	858	858
F ratio	0.011	0.018	0.008	0.035
R-squared				
Within	0.172	0.172	0.171	0.036
Between	0.224	0.224	0.223	0.091
Overall	0.159	0.159	0.158	0.049

Notes: t statistics are in parenthesis and are heteroscadastic consistent. *, ** and *** represent significant level at 10%, 5% and the 1% level respectively.
Source: Authors' estimation.

The coefficient of inflation is negative and statistically significant at 1 per cent across all specifications. The results suggest that an increase in inflation decreases the attraction of FDI. This result is consistent with our expectations as during the 1980s and 1990s most developing countries, and in particular countries in the SSA, exhibited high inflation rate and excessive budget deficit. Moreover, the history of high inflation signals to investors how unreliable the government in these economies are.

Next, Table 3 shows the regression results of Model 2 using RE method. The results show that FDI is positive and statistically significant in promoting economic growth in the sample of countries. The positive relationship is consistent with the literature (see De Gregorio, 1992; Borensztein et al., 1995 and 1998).

From these results, trade has a positive but not significant relationship with economic growth. This suggests that the type of trade policies used in SSA do not encourage economic growth. For any significant contribution of trade openness to economic growth, there is a need for official policy on trade relations (Ayanwale, 2007). Li and Liu (2004) also report a positive influence of trade on economic growth in 84 developed and developing countries. The implication of this finding is that trade openness has a positive overall effect on economic growth. Further, the result indicates that the coefficient of log of TEL is significantly positive at 5 per cent level in specifications 2 and 4. The result indicates that infrastructural development promotes economic growth.

TABLE 3
EMPIRICAL RESULTS FOR MODEL 2

Dependent variable: GDP				
Variables	Specification 1	Specification 2	Specification 3	Specification 4
FDI	0.2352***	0.2303***	0.2330***	0.2443***
	(4.92)	(4.80)	(4.85)	(5.54)
TRADE	0.0068	0.0208	0.0114	
	(0.27)	(0.69)	(0.40)	
Log(TEL)	0.0052	0.0187**		0.0161**
	(1.05)	(2.14)		(1.96)
TRADE* Log of TEL		-0.0003	0.0000	-0.0002
		(-1.40)	(0.12)	(-1.18)
CPI (inflation)	0.0007	0.0007	0.0007	0.0008
	(0.42)	(0.40)	(0.40)	(0.45)
Constant	-0.2425	-0.5649	-0.2302	-0.2161
	(-0.45)	(-0.86)	(-0.40)	(-0.56)
Observations	858	858	858	858
F ratio	0.0000	0.0000	0.0000	0.0000
R-squared				
Within	0.0236	0.0239	0.0241	0.0238
Between	0.3072	0.3189	0.219	0.3099
Overall	0.048	0.0525	0.0442	0.0515

Notes: t statistics are in parenthesis and are heteroscadastic consistent. *, ** and *** represent significant level at 10%, 5% and the 1% level respectively.
Source: Authors' estimation.

The interaction between trade and the log of TEL is negative and insignificant in specifications 2 and 4. In specification 3, the interaction term is positive, however it is insignificant. The results indicate that although trade and the log of TEL by themselves have a positive effect on economic growth, the effect of its interaction on economic growth is insignificant. It can be argued that investing in infrastructural facilities (such as telecommunication) has not had much favour in the sample countries in respect to globalisation.

The positive but insignificant relationship of inflation is contrary to the expectation. Though a positive sign of inflation is quite surprising, the result provides support to theoretical vagueness regarding the impact of inflation on economic growth. According to the literature, regions with low and stable rates

of inflation are expected to grow faster when compared to other regions with high inflation rate (such as the countries in this sample). The non-significance of the inflation variable indicates the need for constructive attention to be given to monetary and fiscal policies in order to control inflation so as to encourage growth. The result is contrary to the findings of Li and Liu, (2004), Akinlo (2006) and Ayanwale (2007) who report an indirect relationship between inflation and growth. However, it is consistent with Basu et al (2000) who found that some countries in the SSA region observed a positive economic growth rate between 1995 and 1997 due to a decline in the average rate of inflation.

Conclusion and Policy Recommendation

This paper examines the role of the interaction between trade openness and infrastructural development in the attraction of FDI in SSA countries. The results indicate that trade openness and infrastructural development encourages the inflow of FDI in the sample of countries and that there is a positive and statistically significant relationship between the interaction of trade openness with infrastructural development and FDI. It further looked at the impact of FDI on economic growth and found that FDI and infrastructural development contribute towards enhancing economic growth in the sample of countries. Based on the empirical findings, it is suggested that developing countries in SSA should not only develop macroeconomic policies and structural reform programs that would encourage economic openness, infrastructural development and the reduction of inflation rate, but they should ensure that these policies are implemented in order to attract foreign investments for sustainable growth.

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