Foreign Direct Investment, Openness and Economic Growth: Empirical Evidence from Sudan (1972-2011)

Ahmed Mohammed Khater Arabi

Department of Econometrics and Social Statistics, Faculty of Economic, University of Bakht Alruda, Alduiem, Sudan
Tel: 00249912252271; E-mail: ahmedkhatir@outlook.sa

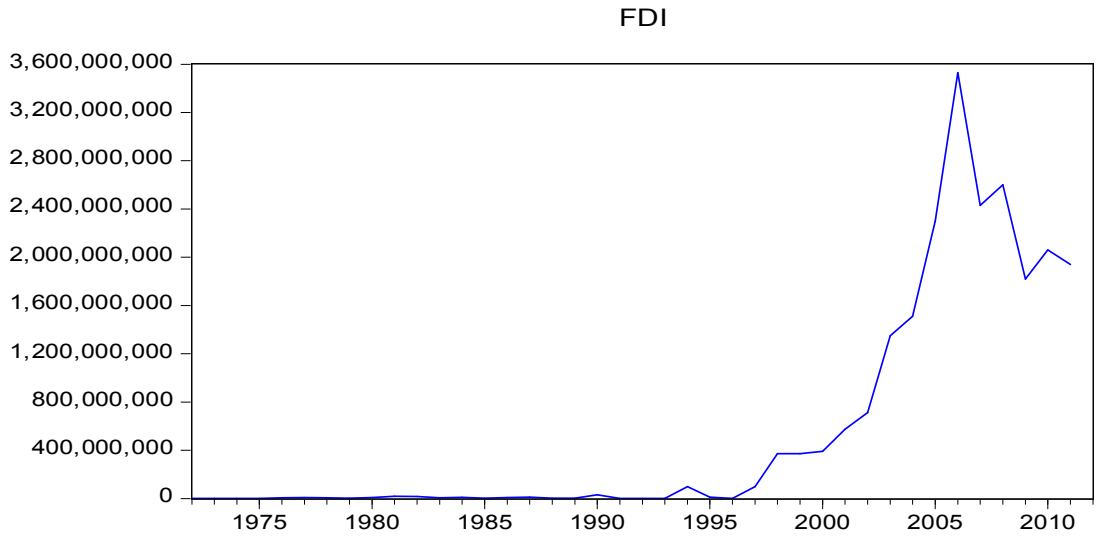
Abstract: This paper examines the relationship between foreign direct investment, openness and economic growth in Sudan during the period 1972-2011 using Granger causality and Johansen co-integration techniques to analyze the relationship and direction of causality between the variables. The study used autoregressive distributed lag (ARDL) approach to co- integration analysis proposed by Pesaran and Shin (1999) to estimate the short-run and long-run relationship between the variables. The co integration analysis suggests that there is a long run equilibrium relationship among the variables by considering relationship between gross domestic product (GDP), foreign direct investment (FDI) and openness of the trade policy regime. The results indicate that foreign direct investments exert an independent influence on economic growth and there is unidirectional causality running from foreign direct investment to economic growth. The government and policy makers should employ strategies to attract foreign investment so as to promote economic growth.
[Ahmed Mohammed Khater Arabi. **Foreign Direct Investment, Openness and Economic Growth: Empirical Evidence from Sudan (1972-2011).** *J Am Sci* 2014;10(9):30-35]. (ISSN: 1545-1003). http://www.jofamericanscience.org. 4

Keywords: Foreign Direct Investment, Economic Growth, Causality. ARDL.

1. Introduction

Foreign Direct Investment (FDI) has become a very important source of external financing for Sudan, to create employment opportunities and the quality of institutions, enhance skills of local labour, raise productivity, transfer managerial skills and technology and integration with rest of the world. FDI is considered to be an important source of foreign exchange to support the country's recent economic growth. In 2002, Organization for Economic Co-operation Development (OECD) suggested that FDI has the favorable climate in terms of economic growth, employment opportunities and poverty alleviation in an economy. But the achievements of the above mentioned favorable climate generally depend on the various economic, social and political factors. In the economic factors, the financial system stability, better integration of financial intermediaries, appropriate fiscal and monetary policy, interdependence between the economic sectors, well established connection between domestic and foreign trade are recognized as the influencing factors on the FDI. Understanding the causal relationship between economic variables is very important because it provides useful information on the variables government and its agencies need to control in order to achieve desired levels of targeted variables (Sajid and Sarfraz, 2008). For instance, if empirical analysis indicates that causality runs from foreign direct investment to economic growth, then government and policy makers would employ strategies to attract foreign investment so as to promote economic growth. On the other hand, if causality is found to run from economic growth to foreign direct investment, government would employ policies that accelerate economic growth in order to encourage foreign investment inflows.

According to the central bank of Sudan annual net FDI inflows rose from 371 million US$ in 1999 to its peak level of 3.53 billion US$ in 2006, largely because of foreign entrants in the telecommunications and banking sectors, in addition to FDI supporting foreign operators in the oil sector. However, net inflows subsequently declined, and reached its lowest level $1.94 billion in 2011, which is more than one-third less in relation to the peak in 2006. In addition, there is general concern that such flows are unlikely to be sustained without discovery of new oil sources or renewed privatization. The strong declining trend in the FDI flows influence the other macro economic variables as Gross Domestic Product (GDP), trade openness, fiscal and price level an economy. Sudan's investment climate could not be described as an attractive centripetal, conducive one. It might be argued that Sudan has many centrifugal factors, which may discourage foreign investment. In general, Sudan is characterized by economic and political instability a fact that could deter foreign investment especially when combined with the undeveloped nature of physical infrastructure and the lack of adequate qualified and efficient manpower. Figure (1) shows that FDI is sharply and steadily increased since 1999, due to starting production and exporting oil, and huge amount of foreign capital in the form of FDI invested in this sector.



The mean values of the GDP growth rate in Sudan fluctuated from 3.01% during 1982-1989 to 7.3% during 1999-2007. The mean value was about 4.1 percent for the whole period 1972-2012, which is biased by low growth rate in seventies and eighties. The mean low rates during the execution of the Structural Adjustment Programs in 1980,s recording a figure of 3.01 percent compared to 7.01 during the oil era. For example there is a huge increase during the last four years (2004-2007) before secession of south Sudan, which are 9.1%, 8.3%, 10.03% and 11.5% respectively. They are considered among highest rates in the world.

The objective of this study is to find out the direction of causality relationship between FDI, openness and economic growth in the context of Sudan economy. Furthermore, Autoregressive Distributed Lag (ARDL) used to capture the short-run and long-run relationship between the variables.

The rest of this paper is organized as follows. Section 2 presents literature review, provides a theoretical perspective on FDI and openness on economic growth. Section 3 contains data description and methodology. Section 4 covers Empirical Results and Discussion and Section 5 contains concluding remarks.

2. Literature review

There are several studies which are focused on the case of developing countries and the major part of them stress that FDI, adjusted to other determinants, have a significant positive effect on economic growth. With Some researchers indicating the unidirectional response while others indicating the bi-directional response. Chakraborty and Basu (2002) used co integration and error correction model method to investigate the causal relationship between economic growth and foreign direct investment (FDI) in India. The empirical results revealed that there is unidirectional relationship with causation running from GDP to FDI and not otherwise. Dritsaki, C. Dritsaki and A. Adamopoulos (2004) examined the analysis on how FDI, export and economic growth relate to each other in Greece for the period1960-2002 using co integration test and Granger causality. The results showed that the there is existence of a long run equilibrium relationship among the variables and bi-directional a causal relationship existed on those variables. Samad (2007) used data from 19 developing countries of South East Asia and Latin America to investigate the causal relationship between FDI and economic growth using co integration technique, Granger causality test and Error Correction Model (ECM). The results show that there is a unidirectional short run link running from GDP to FDI in Bangladesh which implies that GDP growth of Bangladesh provides market and attracts foreign investment. Ilhan Ozturk and Huseyin Kalyoncu (2007) have argued that using both Engle-Granger co-integration and Granger causality techniques to analyze the direction of causality between FDI and economic growth and Pakistan during the 1975-2004 period. The results indicated the GD causes FDI in the case of Pakistan, while bidirectional causal relationship showed between the variables in Turkey. Moreover, the results revealed that the variables are co-integrated for both Pakistan and Turkey. In their paper, Hansen and Rand (2004) tried to investigate the direction and causal relationship between FDI and GDP for 31 developing countries covering the 1970-

2000 period. The authors reported that there a bi-directional causality exists between FDI/GDP ratio and the level of GDP, furthermore FDI was shown to have a lasting effect on the level of GDP, while GDP has no long run impact on the FDI/GDP ratio. They therefore concluded that FDI causes growth through knowledge transfers and adoption of new technology. Emrah Bilgiç (2007) studied causal relationship between FDI and economic growth in Turkey, between the period 1992:2 and 2006:3. The results of the Johansen co-integration and granger Causality tests did not confirm the existence of any causal relationship between FDI and economic growth in Turkey. Dasgupta (2007) examined the links and the long run impact among export, imports and FDI inflows on the outflows of FDI in India. The empirical findings suggested the existence of unidirectional causality running from the export and import to FDI out flows and no causality existed from FDI inflows to the outflows. Oscar Eddy Kiiza (2007) investigated the causal relationship between foreign direct investment and economic growth in Uganda. The empirical results indicated that foreign direct investment granger causes economic growth, and that the variables are positively related. Issam A.W. and Magdy Alamin (2008) analyzed the existence and nature of impact of foreign direct investment on economic growth, if any, in Sudan during the period (1982-2007). The important findings are that FDI helps to promote economic growth in the Sudan, i.e. there is clear evidence of a one-way causality from FDI to economic growth for the whole period, in the sense that FDI have a significant positive effect on the GDP Growth, for it promotes exports and so balance of payments, provision of job opportunities and enhancing the quality of labor and production. Abu Nurudeen , Obida Wafure and Abdullahi (2010) examined the causal links between foreign direct investment and economic growth in Nigeria using Granger causality and Johansen co-integration techniques to analyze the relationship and direction of causality between the variables. The results showed a unidirectional causality running from foreign direct investment to economic growth. According to the study by Prepared by Syed Imran Ali Meerza (2012) suggested that there is causal linkage between trade FDI and economic growth of Bangladesh covering period 1973-2008. The empirical results found that in the co integration test there was a long run relationship between the variables as well as a unidirectional causal relation between FDI and export which runs from export to FDI. Moses Joseph and Yao Shen (2013) identified the causality relation between FDI, GDP growth and export of Tanzania using the annual data spanning from 1980 to 2012. The co integration test found that there is a long run association ship between FDI and economic growth. While the granger causality test results showed that there is a causality relationship which is unidirectional running from FDI to export and no causality was found between FDI and GDP growth suggesting that more policies to attract FDI is important to boost export, the results also implies that either FDI or GDPGR cannot be used to predict one another since no significant causal relationship was found between the two.

3. Data and Methodology

The analysis is based on annual time series data on FDI, openness and real GDP growth of Sudan, obtained from Central Bank of Sudan and central bureau of statistics covers the period from 1972 -2011. For the examination of long-run relationship among these variables, the study used test developed by Johansen (1988) and Johansen and Juselius (1990). For the direction of causality, Granger causality test has been used. In the context of this analysis the Granger method involves the estimation of the following equations:

$$\Delta RGDP_t = \alpha_0 + \sum_{i=1}^{q} \beta_{1i}\Delta FDI_{t-i} + \sum_{i=1}^{q} \beta_{2i}\Delta openess_{t-i} \sum_{i=1}^{q} \beta_{3i}\Delta RGDP_{t-i} + \epsilon_{1t}$$

$$\Delta FDI_t = \delta_0 + \sum_{i=1}^{r} \varphi_{1i}\Delta RGDP_{t-i} + \sum_{i=1}^{r} \varphi_{2i}\Delta openess_{t-i} \sum_{i=1}^{r} \varphi_{3i}\Delta FDI_{t-i} + \epsilon_{2t}$$

$$\Delta openess_t = \gamma_0 + \sum_{i=1}^{k} \gamma_{1i}\Delta RGDP_{t-i} + \sum_{i=1}^{k} \gamma_{2i}\Delta FDI_{t-i} + \sum_{i=1}^{k} \gamma_{3i}\Delta openess_{t-i} + \epsilon_{3t}$$

Where $RGDP_t$, FDI_t and $openess_t$ represent real growth domestic product, forgin direct investment and trade openness, respectively, ϵ_{1t} and ϵ_{2t} are uncorrelated stationary random process, and subscript t denotes the time period. Failing to reject: $H_0: \beta_{1i} = \beta_{2i} = 0$ implies that exports do not Granger cause industrial production activities. On the other hand, failing to reject: $H_0: \varphi_{1i} = \varphi_{2i} = 0$ implies that industrial production do not Granger cause exports.

To investigate a long-run relationship between each pair of variables under consideration, the bounds test for co-integration within ARDL (the autoregressive distributed lag) modeling approach was adopted in this study. This model was developed by Pesaran et al. (2001).

$$\Delta \ln RGDP_t = \phi_0 + \sum_{i=1}^{n} \phi_1 \Delta \ln RGDP_{t-i} + \sum_{i=0}^{n} \phi_2 \Delta \ln FDI_{t-i} + \sum_{i=0}^{n} \phi_3 \Delta Lnopeness_{t-i} + \sigma_1 \ln RGDP_{t-1} + \sigma_2 \ln FDI_{t-1} + \sigma_3 openess_{t-1} + \varepsilon_{1t}$$

$$\Delta \ln FDI_t = \beta_0 + \sum_{i=1}^{n} \beta_1 \Delta \ln FDI_{t-i} + \sum_{i=0}^{n} \beta_2 \Delta \ln RGDP_{t-i} + \sum_{t-i}^{n} \beta_3 \Delta \ln openes_{t-i} + \varpi_1 \ln FDI_{t-1} + \varpi_2 \ln RGDP_{t-i} + \varpi_3 \ln openes_{t-i} + \varepsilon_{2t}$$

4. Empirical Results and Discussion

The Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) Unit Root Tests are employed to test the integration level and the possible co-integration among the variables.

Table (1) unit root test

Variables	level	1st difference	order
FDI	-2.644301	-4.260716***	I(1)
GDP	-1.880714	-6.385174***	I(1)
OPNNESS	-1.968788	5.439104***	I(1)

The results of the stationarity tests are presented in table (1) shows that all the variables which are FDI Foreign Direct investment, GDP and openness were not stationary at level but they became stationary after the first differences. Johansen Co-integration test has been focused to find out the long run equilibrium relationship between FDI, openness and economic growth rate in terms of real GDP in this study. It means that, how FDI in the long run react to economic growth rate. The results of the co-integration analyses are shown in the table (2) below.

Table: (2): Johansen Co-integration test

Unrestricted co integration rank test (Trace)				
No of CEs	Eigen value	Trace statistics	5% critical value	Prob**
None*	0.787557	78.92490	29.79707	0.0000
At most 1*	0.363639	20.05974	15.49471	0.0095
At most 2	0.073090	2.884147	3.841466	0.0895
Unrestricted co integration rank test (Maximum Eigen value)				
No of CEs	Eigen value	Max-Eigen statistic	5% critical value	Prob**
None*	0.787557	58.86515	21.13162	0.0000
At most 1*	0.363639	17.17560	14.26460	0.0168
At most 2	0.073090	2.884147	3.841466	0.0895

*(**) denotes reject of the hypothesis at 5% and 1%. L.R. test indicates 2 co integrating equation(s) at 5% significance level

The co integration analysis captures the dynamic relationship among the variables. The multivariate co integration test based on Johansen-Juselius is used to determine the long run relationship (Miankhel, Thangavelu and Kalirajan 2009). Both maximum-Eigen statistic and trace statistic result indicated that there is a long run relationship between the variables at 1% significant level.

Table (3) granger causality tests

Null hypothesis	observations	F-statistic	Prob
FDI does not granger cause GDP	38	8.82152	0.0009
GDP does not granger cause FDI		2.01430	0.0987
FDI does not granger cause openness	38	19.2750	0.0000
Openness does not granger cause FDI		2.64130	0.0863
GDP does not granger cause openness	38	11.8833	0.0001
Openness does not granger cause GDP		0.18055	0.8356

The Granger causality test is utilized to check the direction of causality between three economic variables. The results in Table (3) show that there is a unidirectional relationship only running direct from FDI to economic growth. Moreover, unidirectional relationship is also found between FDI and openness where direction is from FDI to openness. It means that openness is not a good predictor of FDI Finally, there is also a bidirectional causal relationship between GDP and openness.

Table (4): DRDL results

Dependent variable D(GDP)				
Variables	Coefficient	Std. Error	t-statistic	Prob
Trend	-207364.1	153426.5	-1.351554	0.1860
D(FDI(-1))	0.038579	0.014790	2.608509	0.0137
D(openness(-1))	220039.2	94388.43	2.331209	0.0262
D(GDP(-1))	0.979077	0.496621	1.971478	0.0574
GDP(-1)	0.829336	0.248398	3.338743	0.0021
FDI(-1)	-0.030238	0.009078	-3.331000	0.0022
Openness(-1)	153317.8	62200.27	2.464905	0.0193
ECT(-1)	-0.836977	0.2922280	-3.650455	0.0009
R-squared	0.767344	Mean dependent var		538383.4
Adjusted R-squared	0.652471	S.D. dependent var		15046497
S.E. of regression	8870155	Akaikeinfo criterion		34.99543
Sum squared resid	2.52E+15	Schwarz criterion		35.29402
Log likelihood	-675.4109	Hannan-Quinncriter		35.10256
Durbin-Watson stat	2.279904			

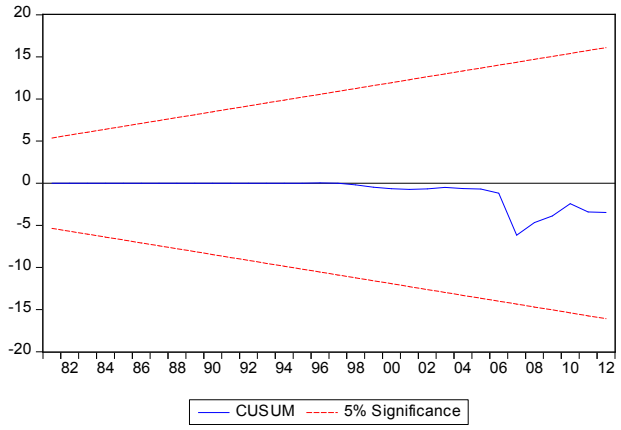


Figure (2) Plot of Cumulative Sum of Recursive Residuals

The above results revealed that at a significance level of 1%, a change in one period lagged value of foreign direct investment D(FDI(-1)) and trade openness D(openness(-1)) have a positive and statistically significant effect on changes in economic growth (D(GDP)). This means that the FDI and openness values of a previous year have a positive influence on the changes noticed in economic growth in the current year. Although, the one period lagged value of economic growth (D(GDP(-1))) is positive and statistically significant. Wald test, ARCH Test and Serial Correlation Test have been performed. Therefore it necessary to test whether the estimated stock return ARDL equation has shifted over time by CUSUM parameter stability tests, its show that the parameters are stable during the sample period (1972-2011) as presented in figure (2).

Conclusion

This paper investigated the causal relationship between FDI, trade openness and growth domestic product GDP in Sudan over the period of 1972–2011. The results of the ADF unit root tests indicated that all variables in the study were integrated in order one and Granger causality test demonstrated a causal effect exists running from foreign direct investment FDI to economic growth implying that FDI influences economic growth. The study also adopted the ARDL bounds testing co-integration approach to investigate the long run and short run dynamics between economic growth, FDI and openness the finding of ARDL show that there is positive short and long run relationship between FDI, openness and GDP. This implies that that FDI is a vital macroeconomic variable that accelerate economic growth. The government should improve the investment environment with the ensured political and economic stability in the country to accelerate the economic growth.

References

1. Abu Nurudeen, Obida Wafure and Abdullahi (2010) On The Causal Links Between Foreign Direct Investment And Economic Growth In Nigeria, 1970-2008: An Application Of Granger Causlity And Co-Integration Techniques. Romanian Statistical Review nr. 3 / 2010
2. Chakraborty, C. and Basu, P. (2002) Foreign direct investment and growth in India: a co-integration approach, Applied Economics, 34, 1061 – 73.
3. Dasgupta, N. (2009). Examining the long run effects of export, import and FDI inflows on the FDI outflows from India: A causality analysis. Journal of International Business and Economy, 10(1), 65–88.
4. Dritsaki, M., Dristaki, C., & Adamopoulos, A. (2004). A causal relationship between trade, foreign direct investment and economic growth of Greece. American Journal of Applied Sciences, 1, 230–235. http://dx.doi.org/10.3844/ajassp.2004.230.235
5. Issam A.W. and Magdy Alamin (2008) Modeling Effects of Foreign direct Investment on Macroeconomic Variables in Sudan, social science research network. Available at SSRN: http://ssrn.com/abstract=1988644 or http://dx.doi.org/10.2139/ssrn.1988644
6. Meerza, S. I. A. (2012). The causal links between trade, foreign direct investment and economic growth for Bangladesh. Working paper.
7. Moses Joseph and Yao Shen (2013) Causality Relationship between Foreign Direct Investment, GDP Growth and Export for Tanzania. International Journal of Economics and Finance; Vol. 5, No. 9; 2013, ISSN 1916-971X E-ISSN 1916-9728.
8. N. Balamurali and C. Bogahawatte (2004), Foreign Direct Investment and Economic Growth in Sri Lanka, Sri Lankan Journal of Agricultural Economics. Vol. 6, No. 1, 2004
9. Samad, A. (2007). Does FDI cause economic growth? Evidence from South-East Asia and Latin America. Working Paper 1-09, Woodbury School of Business, Utah Valley University.
10. Sajid, G. M. and M. Sarfraz (2008) "Savings and Economic Growth in Pakistan: An Issue of Causality," Pakistan Economic and Social Review Vol. 46, No. 1, pp. 17-36.

6/6/2014