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Foreign Direct Investment, Exports and Economic Growth: Some African Evidence

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Abstract

This paper analyses the relationships among foreign direct investment, exports and economic growth in 12 selected sub-Saharan African countries over the period 1970 to 2013. The multivariate co-integration approach of Johansen was applied and the results suggest that the three variables are co-integrated in ten countries. Economic growth has a positive long-run effect on FDI in five countries and exports are positively related to FDI in four countries. The results of Granger causality tests are also mixed across countries. The results reveal a short-run bidirectional causality between FDI and GDP and unidirectional causality running from GDP to exports in Ghana. Bidirectional causality exists between FDI and exports in Benin. GDP causes exports in Benin, Congo Democratic and Gabon. FDI causes exports in Cote d'Ivoire and Kenya. In the long-run, both GDP and exports cause FDI in Benin, Burkina Faso, Gabon and Senegal. Bidirectional causality exists between FDI and GDP in Cameroon, Cote d'Ivoire and South Africa, and between FDI, GDP and exports in Congo Democratic. There is bidirectional causality between GDP and exports in Ghana, and between FDI and exports in Kenya. Overall, the results provide an empirical basis for FDI and exports-promoting policies.

Keywords: *Exports, Foreign direct investment, Economic Growth, Granger causality*

JEL classification: C32, F10, F21, O55

1. Introduction

The relationships between exports and output, as well as foreign direct investment and output, have been the subject of intense academic research. Exports have been considered as one of the main determinants of economic growth. Export-led growth hypothesis postulates that exports are the principal channel through which the liberalisation process can affect the economy's output and eventually its growth rate. Countries with more trade openness relatively outperformed their economy compared to the less opened economies. Many observers have identified outward trade orientation as an explanation for the Asian countries' economic performance (World Bank, 1993, Stiglitz, 1996, Dowling and Ray, 2000). On the other hand, foreign direct investment is also viewed as a major factor in promoting economic growth, especially in developing countries where the saving rates are relatively low. FDI contributes to the integration of developing economies into the world as it provides not only capital but also technology and management know-how necessary for restructuring the firms in the host countries (Borensztein *et al*. 1998; Chao and Yu, 1994). Nevertheless the empirical evidence regarding the causal links among foreign direct investment, exports and growth remains mixed and controversial across countries, data and methodologies (see Balassa, 1985; Fosu, 1990; Islam, 1998; Giles and Williams, 2000; Ericsson and Irandoust, 2001; Zhang, 2001). An analysis of this literature shows that most studies focus either on the nexus of

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exports-output or FDI-output where little effort has been made to test these two links under the same framework. Thus, empirical results from these studies may be biased and less useful for effective economic policies, since they have been obtained from a bivariate framework.

A strand of the literature suggests that exports and FDI may be related. Higher FDI increase the host country's export capacity and higher trade openness attract more FDI inflows for faster growth. This latter effect occurs because firms' ability to successfully export may justify their making more permanent investment in the host country. It has been argued that the growth enhancing effect of FDI is not automatic but depends upon a set of conditions in the host country economy. The beneficial impact of FDI is enhanced in an environment characterized by an export promoting regime (Balasubramanyam *et al.* 1996). This suggests that the interrelationship between foreign direct investment, exports and economic growth has yet to be analyzed in the same framework.

Some empirical studies have investigated this interrelationship for Asian and non-African countries. For instance, Liu *et al.* (2002) reported evidence of bidirectional causality between each pair of real GDP, real exports, and real FDI for China over the period 1981 to 1997. Dritsaki *et al*. (2004) investigated the relationship between exports, FDI and GDP of Greece over the period of 196072002. They found bidirectional causality between real GDP and real exports, unidirectional causality from FDI to exports, and FDI to GDP. Cuadros *et al.* (2004) found unidirectional causality from FDI and exports to economic growth in Mexico and Argentina, and unidirectional causality from economic growth to exports in Brazil for the period 1970 to 2000. Hsiao and Hsiao (2006) examined the causality between GDP, exports and FDI for eight Asian countries. Using time-series and panel data from 1986 to 2004 they found that the causality results are mixed across countries. The panel data causality results revealed that FDI causes GDP directly and also indirectly through exports, and there also exists bidirectional causality between exports and GDP for the group. Mehmet (2012) examined the relationship between FDI, exports, and GDP for Turkey for the period of 2000-2010. The results of the study showed that there is a long term relationship between FDI and export, FDI and GDP, and export and GDP. Empirical studies on African countries are rather rare. Shawa and Shen (2013) have examined the causal link between FDI, GDP and export in Tanzania using annual data covering the period 1980 to 2013. They found a causal relationship running from FDI to export and no causality between FDI and GDP.

The aim of this study is to fill the gap in the literature by investigating the relationships among foreign direct investment, exports and GDP for a sample of 12 selected sub-Saharan African countries over the period 1970 to 2013. In contrast with much of the empirical studies, we prefer a country case study regression-based approach since it appears to be more promising in terms of policy recommendations than a panel data analysis. Such an approach is relevant because the common assumption of constant coefficients is unlikely to hold across countries. African countries show differences with respect to their economic structure and trade policies, and hence, it is unlikely that findings from a panel analysis apply to all countries in the same way. From an econometric point of view, we estimate a vector error-correction model using the full-information maximum likelihood method of Johansen (1988). In addition, we perform causality tests to shed light on the causal relationships among the three variables. We first perform the ECM-based Granger causality tests. We next complement the analysis with the Granger –causality test proposed by Toda and Yamamoto (1995).

The remainder of the study is organized as follows. Section 2 describes the econometric methodology. Section 3 presents the data and descriptive statistics of the variables, and analyses the empirical results. Finally, Section 4 provides summary and gives some policy implications.

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2. Data and methodology

2.1 Data

The empirical investigation uses annual time series data for a sample of 12 sub-Saharan African countries, namely Benin, Burkina Faso, Cameroon, Congo Democratic, Congo Republic, Cote d'Ivoire, Gabon, Ghana, Kenya, Nigeria, Senegal, and South Africa. The choice of the sample countries is dictated by the availability of long-term time series data. The variables under study include Gross Domestic Product (GDP), Foreign Direct Investment (FDI) and exports (X). Data cover the period 1970 to 2013 and are sourced from the World Bank's *World Development Indicators*. Data are in real terms and are expressed in constant 2005 US dollars. All variables are converted into natural logarithms.

2.2 Model specification

For the empirical analysis, we formulate the following functional relationship:

$$GDP_t = \beta_0 + \beta_1 X_t + \beta_2 FDI_t + \mu_t \quad (1)$$

where GDP is real gross domestic product, X is real exports and FDI is real foreign direct investment inflows, β_0 denotes the intercept term, β_1 and β_2 are slope coefficients representing parameters to be estimated, and μ_t is the disturbance term assumed to be purely random.

The relationship between FDI, exports and GDP described by Eq. (1) suggests that their long-run movements may be related. Furthermore, if we allow for short-run dynamics in right-side variables behaviour, the analysis would also suggest that past changes in exports and FDI could contain useful information for predicting the future changes of output, ceteris paribus. These implications can be easily examined using the techniques of multivariate cointegration and Granger causality.

2.3 Cointegration and causality tests

Our empirical investigation has two objectives. The first is to examine how the variables are related in the long-run. The second is to examine the causal relationships between the variables. The empirical analysis involves three steps. We begin by performing an integration analysis using unit root tests. The second step is to test for cointegration between the variables. If cointegration is detected, the third step examines the causal relationships between the variables.

To test for the presence of long-run relationships, the maximum likelihood method developed by Johansen (1988) is utilised. This technique is based on the vector autoregressive (VAR) models and therefore controls for the possibility of multiple cointegrating relationships among variables. In contrast to the Engle-Granger two-step method for cointegration testing, the Johansen procedure is invariant to the choice of the variable selected for normalization. The econometric procedure of the test is as follows. Let Z_t be a (nx1) vector of I(1) variables. These variables are linked in a level VAR system as follows:

$$Z_t = \sum_{i=1}^{\ell} \pi_i Z_{t-i} + \Phi D_t + e_t, \qquad e_t \sim \mathrm{NI}(0, \Omega) \quad (2)$$

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where ℓ is the maximal lag length; Φ is a n ×*d* matrix of coefficients on D_t, a vector of *d* deterministic variables (such as a constant term and a trend); e_t is a vector of *n* unobserved, sequentially independent, jointly normal errors with mean zero and constant covariance matrix Σ. The VAR in Eq. (2) may be rewritten as a vector error correction model:

$$\Delta Z_t = \pi Z_{t-1} + \sum_{i=1}^{\ell-1} \Gamma_i \Delta Z_{t-i} + \Phi D_t + e_t \qquad (3)$$

where Δ is the first difference operator defined as $\Delta Z_t = Z_t - Z_{t-1}$. For any specified number of cointegrating vectors *r* ($0 \le r \le n$), the matrix π is of (potentially reduced) rank *r* and may be rewritten as $\pi = \alpha\beta'$, where α and β are n×*r* matrices of full rank of adjustment coefficients and cointegrating vectors, respectively. The cointegrating vectors β have the property that $\beta' Z_{t-1} = ecm_{t-1}$ is stationary.

The cointegration analysis is only able to indicate whether or not a long-run relationship exists between the variables. It does not indicate the direction of the causal relationship among variables. Hence, to investigate the direction of causality between foreign direct investment, exports and economic growth, we perform the ECM-based Granger causality tests. Following Granger (1969), a variable Y is said to be "Granger-caused" by a variable X if the information in the past and present values of X helps to improve the forecast of Y, *i.e.*, if $MSE\left(Y_t \middle| \Omega_t\right) < MSE\left(Y_t \middle| \Omega_t^*\right)$, where MSE is the conditional mean square root of the forecast of Y_t, Ω_t denotes the set of all relevant information up to time t, and Ω_t^* excludes the information in the past and present values of X_t. In the presence of cointegration, Granger-causality test requires the inclusion of a lagged error correction term within an error correction model in order to capture the short-run dynamics of the variables. Thus, on expanding out Eq. (3), the error correction model can be expressed as follows:

$$\Delta GDP_t = \varphi_1 + \sum_{j=1}^{p} \beta_{1j} \Delta GDP_{t-i} + \sum_{j=1}^{p} \gamma_{1j} \Delta X_{t-j} + \sum_{j=1}^{p} \phi_{1j} \Delta FDI_{t-j} + \alpha_1 ecm_{t-1} + e_{1t} \qquad (4)$$

$$\Delta X_t = \varphi_2 + \sum_{j=1}^{p} \beta_{2j} \Delta GDP_{t-i} + \sum_{j=1}^{p} \gamma_{2j} \Delta X_{t-j} + \sum_{j=1}^{p} \phi_{2j} \Delta FDI_{t-j} + \alpha_2 ecm_{t-1} + e_{2t} \qquad (5)$$

$$\Delta FDI_t = \varphi_3 + \sum_{j=1}^{p} \beta_{3j} \Delta GDP_{t-i} + \sum_{j=1}^{p} \gamma_{3j} \Delta X_{t-j} + \sum_{j=1}^{p} \phi_{3j} \Delta FDI_{t-j} + \alpha_3 ecm_{t-1} + e_{3t} \qquad (6)$$

An error correction model enables one to distinguish between long-run and short-run Granger causality, and identify two different sources of causality. The long-run non-causality (or weak exogeneity) is performed by testing the significance of the coefficient on ecm_{t-1} while the short-run non-causality examines the significance of the lagged dynamic terms. For Eq. (4), FDI does not cause, in the Granger sense, GDP in the short-run if $\phi_{11} = \phi_{12} = ... = \phi_{1p} = 0$. Similarly, for Eq. (6), GDP does not cause FDI if none of β_{3j} is statistically different from zero. There is a bi-directional causality when ϕ_{1j} and β_{3j} in both regressions are statistically significantly different from zero. These hypotheses are tested through Wald tests.

To complement the causality analysis, we also implement the Granger –causality test proposed by Toda and Yamamoto (1995) as an alternative approach to test for long-run causality. This approach has the advantage of not requiring pre-testing for cointegration

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properties of the system. Another advantage of this procedure is that causality tests can be implemented regardless of whether the variables are mixed integrated or integrated of an order more than two. Performed directly on the coefficients of the levels VAR, Toda and Yamamoto methodology minimizes the risk associated with possibly wrongly identifying the orders of integration of the series and the presence of cointegration relationship.

The basic idea of this approach is to artificially augment the correct VAR order, *p*, with *d* extra lags, where *d* is the maximum likely order of integration of the series in the system. Thus, the model VAR to be estimated is as follows:

$$GDP_t = \varphi_1 + \sum_{j=1}^{p+d} \beta_{1j} GDP_{t-i} + \sum_{j=1}^{p+d} \gamma_{1j} X_{t-j} + \sum_{j=1}^{p+d} \phi_{1j} FDI_{t-j} + e_{1t} \quad (7)$$

$$X_t = \varphi_2 + \sum_{j=1}^{p+d} \beta_{2j} GDP_{t-i} + \sum_{j=1}^{p+d} \gamma_{2j} X_{t-j} + \sum_{j=1}^{p+d} \phi_{2j} FDI_{t-j} + e_{2t} \quad (8)$$

$$FDI_t = \varphi_3 + \sum_{j=1}^{p+d} \beta_{3j} GDP_{t-i} + \sum_{j=1}^{p+d} \gamma_{3j} X_{t-j} + \sum_{j=1}^{p+d} \phi_{3j} FDI_{t-j} + e_{3t} \quad (9)$$

Once this augmented level VAR is estimated, a standard Wald test is applied to the first lagged *p* explanatory variables to make causal inference. The last lagged *d* coefficients are ignored because the inclusion of extra lags is to ensure that the computed Wald-statistic has an asymptotic chi-square distribution with the degree of freedom equal to the number of constraints.

In conducting the cointegration and Granger-causality tests the number of lags is very important. Results are quite sensitive to the choice of this number. In this study, we select the number of lags *p* using Akaike information criterion and Schwarz information criterion with maximal lag set to five.

3. Empirical results and discussion

Table 1 reports some descriptive statistics on the three variables. The most striking feature is the low level of FDI in most countries. Nigeria has the highest average level of FDI over the period followed by South Africa. The statistics also indicate disparity in GDP, with South Africa having the highest level of real GDP followed by Nigeria. The standard deviations of variables indicate significant fluctuations over the time period under study.

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Table 1: Descriptive statistics of variables (in millions of constant 2005 US dollars)

Country	GDP		FDI		Exports	
	Mean	Sd.	Mean	Sd.	Mean	Sd.
Benin	2889.1	1408.2	39.8	56.8	530.6	354.7
Burkina Faso	3375.5	2076.9	25.9	56.9	525.4	597.0
Cameroon	12408.2	4561.6	148.4	200.4	2326.9	1032.2
Congo Dem.	15043.4	2938.4	243.2	510.7	1525.4	769.4
Congo Rep.	4466.1	1909.1	420.4	582.7	3536.7	1757.5
Cote d'Ivoire	14528.6	3278.3	193.9	162.7	60278.2	21351.3
Gabon	7184.2	2003.9	101.5	260.1	4964.8	1587.4
Ghana	7585.7	4191.3	262.7	440.3	2181.3	2146.7
Kenya	13542.9	6113.1	79.6	90.8	3423.5	1626.4
Nigeria	76206.2	39864.4	2067.7	1787.2	22400.0	14726.5
Senegal	6062.1	2363.8	84.2	99.1	1680.9	495.9
South Africa	195250.7	60444.3	1920.7	3055.1	45884.3	18096.2

As a first step of our empirical analysis, we test for the order of integration of the series by means of the Phillips-Perron (PP) test. The test has been performed under the models with constant and trend for the level series and with constant for series in first difference. The results displayed in Table 2 show that all the variables are non-stationary in their level but become stationary in first difference. Hence, we conclude that the series are all integrated of order one or I (1).

Table 2: Results of Unit Root Tests

Country	Level			First difference		
	GDP	X	FDI	ΔGDP	ΔX	ΔFDI
Benin	-2.690	-2.464	-3.148	-7.071	-5.887	-7.399
Burkina Faso	-1.163	0.059	0.005	-7.239	-5.495	-5.729
Cameroon	-1.902	-1.609	-3.506	-4.233	-6.220	-19.975
Congo Dem.	-0.729	-2.187	-3.133	-5.440	-5.901	-21.616
Congo Rep.	-2.087	-1.518	-3.147	-3.750	-4.434	-11.563
Cote d'Ivoire	-3.025	-2.485	-3.247	-4.347	-6.828	-8.919
Gabon	-3.465	-2.073	-2.659	-4.465	-4.684	-10.264
Ghana	-0.223	-2.174	-1.306	-4.111	-4.328	-4.848
Kenya	-2.239	-2.581	-1.249	-5.417	-6.821	-34.061
Nigeria	-0.458	-3.725	-3.919	-5.682	-8.320	-10.792
Senegal	-1.652	-4.479	-3.895	-8.253	-19.446	-11.383
South Africa	-1.407	-2.172	-3.435	-4.477	-5.547	-17.344

Note: Critical values at the 5% level are -3.518 for level and -2.933 for first difference.

Given the results of unit root tests, we perform Johansen cointegration test to assess the evidence of cointegration. The test is applied under the hypothesis that there is linear deterministic trend in data. Hence, the test procedure includes a constant term in both the cointegrating equation and the VAR. The outcomes of the test are reported in Table 3. As we can see from this Table, the test statistic suggests the acceptance of the hypothesis that a cointegration vector is present in our model for all countries except Congo Republic and Nigeria. For Congo Republic and Nigeria, the hypothesis on the existence of a long-run relationship among the variables cannot be accepted. In the case of Cote d'Ivoire, results suggest the existence of two cointegrating relationships among the variables.

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Table 3: Johansen Cointegration Tests

Country	Null hypothesis			Cointegration ?
	r=0	*r=1*	*r=2*	
Benin	30.21* (29.79)	13.45 (15.49)	2.75 (3.84)	Yes
Burkina Faso	30.50* (29.79)	10.35 (15.49)	0.42 (3.84)	Yes
Cameroon	32.47* (29.79)	7.72 (15.49)	2.08 (3.84)	Yes
Congo Dem.	53.32* (42.91)	22.52 (25.87)	4.97 (12.51)	Yes
Congo Rep.	16.39 (29.79)	6.60 (15.49)	0.84 (3.84)	No
Cote d'Ivoire	34.85* (29.79)	17.12* (15.49)	1.49 (3.84)	Yes
Gabon	32.02* (29.79)	10.44 (15.49)	1.42 (3.84)	Yes
Ghana	65.33* (42.91)	18.07 (25.87)	3.02 (12.51)	Yes
Kenya	49.94* (42.91)	13.60 (25.87)	6.06 (12.51)	Yes
Nigeria	27.20 (29.79)	11.54 (15.49)	0.28 (3.84)	No
Senegal	47.77* (42.91)	24.90 (25.87)	4.77 (12.51)	Yes
South Africa	69.30* (42.91)	25.74 (25.87)	6.10 (12.51)	Yes

Notes: r is the number of cointegrating vectors. Figures in (.) are the 5% critical values. * indicates that the null hypothesis is rejected at the 5% level.

Given the evidence of cointegration, we further present the estimates of the long-run coefficients. Results are disclosed in Table 4. Results for Congo Democratic and Ghana indicate that foreign direct investment and exports are positively related to GDP in the long-run. This suggests that FDI and exports contribute to economic expansion in these two countries. Economic policies that promote foreign direct investment and exports have positive long run effects on economic growth. In the case of Cote d'Ivoire export is growth-promoting and also contributes to increase in foreign direct investment inflows. Economic growth has a positive long-run effect on foreign direct investment in Benin, Cameroon, Gabon, Kenya, and Senegal. Unexpectedly, exports are negatively related to FDI in Gabon, suggesting that export growth contributes to a decrease in FDI inflows.

Table 4: Long-run relationships

Country	Dependent variable	GDP	X	FDI
Benin	FDI	0.517 (2.070)	-0.229 (-1.329)	-
Burkina Faso	FDI	-0.258 (-3.346)	0.398 (5.025)	-
Cameroon	FDI	0.335 (2.339)	-0.039 (-0.399)	-
Congo Dem.	GDP	-	1.208 (5.420)	3.802 (3.876)
Congo Rep.	-	-	-	-
Cote d'Ivoire	GDP	-	0.578 (9.690)	-
	FDI	-	0.362 (4.182)	-
Gabon	FDI	1.120 (5.240)	-1.108 (-6.167)	-
Ghana	GDP	-	0.125 (11.047)	0.796 (14.531)
Kenya	FDI	0.471 (2.752)	0.293 (3.119)	-
Nigeria	-	-	-	-
Senegal	FDI	1.336 (3.819)	0.071 (0.369)	-
South Africa	FDI	0.123 (0.484)	0.748 (6.179)	-

Note: Figures in (.) are t-statistics.

Evidence of cointegration implies the existence of a causal relationship between the variables, at least in one direction. The results of the ECM-based Granger causality tests are reported in Table 5. The results show strong evidence of bidirectional causality between FDI and GDP and a causal relationship running from GDP to exports in Ghana. Also, bidirectional

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causality exists between FDI and exports in Benin. GDP cause exports in Benin, Congo Democratic and Gabon. FDI causes exports in Cote d'Ivoire and Kenya. This finding suggests that most of multinational firms' investment in these countries are export-oriented investments, as they have benefited from FDI-led export growth. In Gabon, GDP causes FDI directly and indirectly through exports.

With respect to the long-run causality, both GDP and exports cause FDI in Benin, Burkina Faso, Gabon and Senegal. Bidirectional causality exists between FDI and GDP in Cameroon, Cote d'Ivoire and South Africa, and between FDI, GDP and exports in Congo Democratic. Also, bidirectional causality is found between GDP and exports in Ghana, and between FDI and exports in Kenya. Our finding of causal relationship from FDI to GDP is in line with Esso (2010) for Cote d'Ivoire, Jayachandran and Seilan (2010) for India, Dritsaki *et al.* (2004) for Greece and Hsiao and Hsiao (2006) for East and Southeast Asian economies. The evidence that FDI contributes significantly to export expansion is consistent with the findings of De Mello and Fukasaku (2000) for the Latin American experience, Zhang and Song (2000) and Liu *et al*. (2001) for China, Alguacil *et al.* (2002) for Mexico, and Cuadros *et al*. (2004) for Argentina, Brazil and Mexico.

As indicated in the econometric section, we complement the ECM-based causality tests by implementing the Toda and Yamamoto Granger causality. The results are presented in Table 6. The results support that exports cause economic growth in Benin and Cote d'Ivoire. Exports cause FDI in Burkina Faso, Ghana and Kenya. The reverse causality running from FDI to exports is found in Benin, Burkina Faso and Cote d'Ivoire, meaning that FDI contributes to the integration of these economies into the global world. FDI causes GDP in Cameroon and South Africa.

Table 5: Results of Granger causality tests

	Short-run causality						**Long-run causality (ECT_{t-1}=0)**		
Country	**FDI → GDP**	**GDP→FDI**	**FDI→X**	**X→FDI**	**X→GDP**	**GDP→X**	**GDP**	**X**	**FDI**
Benin	1.366 (0.242)	0.364 (0.545)	1.578 (0.209)	0.816 (0.366)	7.435 (0.006)*	6.350 (0.011)*	0.075 (0.782)	0.173 (0.676)	15.925 (0.000)*
Burkina	0.267 (0.605)	0.888 (0.345)	0.978 (0.322)	0.171 (0.678)	1.773 (0.182)	0.643 (0.422)	0.040 (0.841)	1.910 (0.167)	15.080 (0.000)*
Cameroon	3.830 (0.147)	3.596 (0.165)	0.195 (0.907)	0.036 (0.981)	1.638 (0.440)	1.193 (0.550)	9.137 (0.002)*	0.435 (0.509)	8.765 (0.003)*
Congo Dem.	5.118 (0.275)	0.601 (0.962)	2.809 (0.590)	0.842 (0.932)	1.233 (0.872)	19.503 (0.000)*	5.187 (0.022)*	3.707 (0.054)**	5.767 (0.016)*
Congo Rep.	0.033 (0.854)	0.286 (0.592)	2.687 (0.101)	0.157 (0.691)	0.255 (0.613)	0.159 (0.689)	-	-	-
Cote d'Ivoire	0.758 (0.383)	0.620 (0.430)	4.077 (0.043)*	0.624 (0.429)	0.047 (0.827)	0.178 (0.673)	8.686 (0.013)*	1.974 (0.372)	6.304 (0.042)*
Gabon	0.012 (0.910)	4.268 (0.038)*	0.104 (0.746)	3.436 (0.063)**	0.818 (0.365)	3.291 (0.069)**	0.111 (0.739)	0.046 (0.828)	23.172 (0.000)*
Ghana	8.728 (0.068)**	9.810 (0.043)*	1.813 (0.769)	1.948 (0.745)	6.642 (0.156)	14.675 (0.005)*	12.718 (0.000)*	3.800 (0.051)*	1.138 (0.286)
Kenya	0.371 (0.542)	0.187 (0.664)	11.755 (0.000)*	4.050 (0.044)*	0.0001 (0.988)	1.114 (0.291)	0.011 (0.915)	9.543 (0.002)*	45.038 (0.000)*
Nigeria	1.061 (0.302)	0.795 (0.372)	0.270 (0.602)	0.656 (0.417)	1.168 (0.279)	0.358 (0.549)	-	-	-
Senegal	0.062 (0.802)	0.281 (0.595)	0.271 (0.602)	0.016 (0.896)	0.182 (0.669)	0.372 (0.541)	1.543 (0.214)	0.759 (0.383)	5.752 (0.016)*
South Africa	1.071 (0.300)	0.265 (0.606)	0.0001 (0.992)	0.882 (0.347)	0.606 (0.436)	0.669 (0.413)	4.520 (0.033)*	0.145 (0.702)	30.403 (0.000)*

Note: Statistics reported are Chi2 with *p-values* in parentheses. * and ** denote statistical significance at the 5% and 10% levels, respectively.

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Table 6: Results of Toda and Yamamoto Granger non-causality test

Country	FDI → GDP	GDP→FDI	FDI→X	X→FDI	X→GDP	GDP→X
Benin	2.258 (0.132)	1.525 (0.216)	3.178 (0.074)**	0.229 (0.632)	11.797 (0.000)*	2.445 (0.117)
Burkina	0.000 (0.982)	0.011 (0.913)	3.404 (0.065)**	6.229 (0.012)*	1.131 (0.287)	1.197 (0.273)
Cameroon	6.955 (0.030)*	4.537 (0.103)	0.370 (0.831)	0.163 (0.921)	1.229 (0.540)	1.068 (0.586)
Congo Dem.	3.490 (0.479)	0.542 (0.969)	6.834 (0.144)	0.665 (0.955)	1.298 (0.861)	16.828 (0.002)*
Congo Rep.	0.436 (0.803)	1.027 (0.598)	3.212 (0.200)	0.044 (0.978)	1.425 (0.490)	0.372 (0.830)
Cote d'Ivoire	0.193 (0.659)	0.312 (0.575)	11.015 (0.000)*	2.482 (0.115)	3.969 (0.046)*	0.167 (0.682)
Gabon	0.118 (0.730)	1.324 (0.249)	0.017 (0.894)	1.854 (0.173)	0.804 (0.369)	2.568 (0.100)**
Ghana	2.815 (0.728)	10.948 (0.052)*	4.729 (0.449)	12.443 (0.029)*	4.445 (0.487)	21.558 (0.005)*
Kenya	1.936 (0.585)	3.308 (0.346)	3.375 (0.337)	10.490 (0.014)*	0.164 (0.983)	0.878 (0.830)
Nigeria	1.573 (0.209)	1.931 (0.164)	0.002 (0.959)	0.306 (0.579)	0.508 (0.475)	0.686 (0.407)
Senegal	1.342 (0.246)	0.193 (0.660)	0.189 (0.663)	0.141 (0.706)	0.214 (0.643)	0.409 (0.522)
South Africa	4.044 (0.044)*	0.075 (0.783)	0.700 (0.402)	1.493 (0.221)	0.084 (0.771)	0.072 (0.787)

Note: Statistics reported are Chi2 with *p-values* in parentheses. * and ** denote statistical significance at the 5% and 10% levels, respectively.

Overall, the results suggest that trade reforms are less effective in attracting FDI in most countries. A plausible explanation for the non response of FDI to trade liberalization is that foreign investors always perceive trade reforms in Africa as transitory and non credible. Most of the time, Sub-Saharan African countries embark on reforms as part of aid conditionality, where a donor, such as the World Bank or European Union, offers temporary aid or facilities during reforms. Once aid and facilities end, there is little incentive for these countries to continue reforms, and most countries do abandon reforms. Thus, even when the conditions for FDI seem favourable, foreign investors may have powerful incentives to adopt a wait-and-see attitude as they perceive reforms as transitory and therefore subject to reversal.

4. Conclusion and policy implications

This study examines the cointegrating and causal relationships between foreign direct investment, exports and GDP in 12 selected sub-Saharan African countries over the period 1970 to 2013. To this end, we first perform unit root tests and then apply the multivariate cointegration test of Johansen (1988) and Granger causality tests. The empirical analysis showed evidence of cointegration among the variables in ten countries with GDP having a positive long-run effect on FDI in five countries, and exports having a positive effect on FDI in four countries. The results of Granger causality tests are mixed across countries. The results show evidence of short-run bidirectional causality between FDI and GDP and unidirectional causality running from GDP to exports in Ghana. Also, bidirectional causality exists between FDI and exports in Benin. GDP causes exports in Benin, Congo Democratic and Gabon. FDI causes exports in Cote d'Ivoire and Kenya. This finding suggests that FDI contributes to economic growth and exports. In the long-run, both GDP and exports cause FDI in Benin, Burkina Faso, Gabon and Senegal. Bidirectional causality exists between FDI and GDP for Cameroon, Cote d'Ivoire and South Africa, and between FDI, GDP and exports for Congo Democratic. Results indicate bidirectional causality between GDP and exports for Ghana, and between FDI and exports for Kenya. Overall, the findings provide an empirical basis for promoting Growth and exports. To gain sustainable economic growth, African countries should make the economic environment conducive to FDI and trade through appropriate regulatory and policy reforms. This can be achieved by reducing the cost of doing business and improving public infrastructures. It should, however, be noticed that the full benefits of trade policies and other reforms will be realized only if investors perceive reforms as credible and not subject to reversal. Therefore, African countries should also improve the political stability.

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The mixed results of this study show that studies based on panel data would provide fragile results. They also bring home the usefulness of country case studies in order to address heterogeneity and offer more relevant policy recommendations. Before closing, one must stress that the absence of cointegration or causality for some countries could be due to the existence of nonlinearity. Indeed, some news arguments suggest that FDI may have asymmetric effects on macroeconomic variables, depending on the initial conditions in which policy actions take place (see Balasubramanyam *et al.*, 1996). Conventional cointegration and Granger causality tests do not take into account asymmetric adjustment in the long-run relationships among variables. Using threshold or regime shift models to examine the GDP, FDI and trade nexus would be an interesting topic for further research.

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