The Relationship between Foreign Direct Investment, Trade Openness and Growth in Cote d'Ivoire

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Abstract

This study examines the long-run impact of foreign direct investment and trade openness on economic growth in Cote d'Ivoire. To assess this purpose, the study uses the more recent data analysis technique the bounds testing cointegration approach (Pesaran *et al*, 2001) and the VAR Granger causality/Block Exogeneity Wald tests. The data span for the study is from 1980-2007. Amongst the key results it is found: a long run relationship between the foreign direct investment, trade openness and output; and the VAR Granger causality/Block Exogeneity Wald tests reveals unidirectional causal relationship running from foreign direct investment, trade openness to output and from output, foreign direct investment to trade openness. Both foreign direct investment and trade openness are significant in explaining output growth in Cote d'Ivoire. Therefore this study concludes by recommending, among other things, the Cote d'Ivoire by the opportunities offered by world markets have to manage a good combination with a domestic investment and institution-building strategy to attract more inflows of foreign direct investment for output growth dynamics.

Keywords: Cote d'Ivoire, FDI, Trade Openness, ARDL cointegration, VAR Granger causality/Block Exogeneity Wald tests

1. Introduction

One of the most notorious features trend toward globalization in recent years has been the increased importance of foreign direct investment around the world. There have been different strands of theoretical and empirical studies aimed to investigating the relationship between Foreign Direct Investment (FDI) and growth both in developed and developing countries.FDI is believed as a pulsating implement for the growth of the income and employment, technological advancement, socio-economic development parallel to improve income distribution or poverty reduction especially for the developing countries of the world like Cote d'Ivoire. According to Mason and Baptist (1996), in the large agrarian economies it is only the agriculture sector interventions serve to reduce poverty. In addition, it requires labor intensive economic growth in the host country so that Foreign Direct Investment can bring towards productive employment generation. As Moran (1998) highlights an important fact that exposure to foreign competition plays vital role in skill up gradation.FDI is considered as an important agent in establishing link between trade liberalization and economic growth argued by Taylor (1998) and Wacziarg(2001).Furthermore, the study of Atkinson and Brandolini (2003) asserted that trade benefit will not be realized if countries investment creates domestic income inequality. The impact of FDI on poverty and other social goals of development depend principally on many factors, such as the host country policies and institutions, the quality of investment, the nature of the regulatory framework, the flexibility of the labor market, and many others (Mayne, 1997).

Also trade openness as FDI has emerged as one of the main argument among economist and policy makers in explaining the growth phenomena in developing countries (Dawson, 2006; Dutta&Ahmed, 2001; Ruiz Estrada Yap, 2006).The positive contribution of trade openness towards growth stemmed from the notion that liberalization increases specialization and division of the labor thus improving productivity and export capability as well as economic performance. In addition, with greater efficiency as a result of trade openness, many of the

developing countries followed suit with the export-led strategies. It is widely recognized that trade openness has a positive effect towards economic growth. It is found that countries with more trade openness relatively outperformed their economy compared to the less opened countries (World Bank, 1993).The studies by Lloyd and MacLaren (2000); Jonsson and Subramanian (2001) among the Asian economies supported a similar opinion that the rapid growth was largely caused by Asia's countries openness. However, the empirical evidence is rather not unanimous. In contrast, some scholars like Harrison (1996) and Rodriguez& Rodrik (2001) have been more reserve in supporting the openness-led growth nexus.

More specifically, both together the role of foreign direct investment and trade openness in explaining growth have been widely recognized as a very important factors in the economic growth process. Past empirical studies, both in cross-country and country specific, of trade-FDI interaction on growth (Kohpaiboon, 2004; Mansouri, 2005; Karbasi *et al,* 2005), FDI-growth nexus and trade-growth nexus (Lipsey, 2000 and Pahlavani *et al*, 2005) have as a rule concluded that both FDI inflows and trade openness promote economic growth. Nevertheless, there are clear indications that the growth enhancing effects from FDI inflows and trade openness vary from country to country. To this point, there have been diverse and sometime conflicting empirical evidences in both cross-country and country specific FDI-growth nexus and trade-growth nexus analysis. Among other factors, differences in data used, data measurement and definitions, methodological approaches and time frame have been identified as major responsible for these differences.

In Cote d'Ivoire a very few research have been made in this specific topic. Bedia F.Aka (2007) investigated the impact of public and private investment on Cote d'Ivoire economic performance over the period 1969-2001, using an autoregressive-distributed lag (ARDL) Error Correction Model (ECM). He found that in the short run an increase in private investment by 1 per cent enhance economic growth by 28 per cent, while a 1 per cent increase in public investment leads to only 7 per cent increase in real GDP. In the long run nevertheless the impact of public investment on GDP growth has been higher than private investment, a 1 per cent increase in private investment leads to 25 per cent increase in GDP, while public investment impacts growth by 37 per cent. On the other hand, a 1 per cent increase in employment leads to 38 per cent increase in long run GDP growth. His main findings indicated that while the short run efficiency of public capital can be further improved in Cote d'Ivoire, in the same time the efficiency of private investment can be improved in the long run.

From the above background, this study is guided by the following specific research objectives: to remedy the neglect of the specific research on this topic and to examine the long-run interrelationship among FDI, trade openness and growth in Cote d'Ivoire. To assess this purpose, the study uses the more recent data analysis technique the bounds testing cointegration approach (Pesaran *et al*, 2001) and the VAR Granger causality/Block Exogeneity Wald tests. The rest of the paper is structured as follow: in section 2 we provide the analytical framework. The methodology specification is described in section 3.Section4 presents the empirical results and discussions. Section 5 concludes the paper.

2. Analytical Framework and Data

2.1 Data definitions and sources:

In order to examine the relationship between foreign direct investment, trade openness and economic growth in Cote d'Ivoire, this study employs the Cote d'Ivoire annual time series from 1980-2007. These variables are output (Y) defined as real GDP per capita, Foreign Direct Investment (FDI) is the value of real gross foreign direct investment, Trade Openness (TR) is the sum of export and import values to GDP ratio, Labor stock(L) measured in terms of labor force and capital stock (K), since capital stock is not available for Cote d'Ivoire (K) is proxy by the real value of gross fixed capital formation (GFCF) see Kohpaiboon (2004) and Mansouri (2004). The variables employed are sourced from World Development Indicator (WDI, 2008).

2.2 Model specification

In order to investigate the possible growth promoting of both FDI and Trade Openness, our data analysis is modeled in an Aggregate Production Function (APF) framework. This standard Aggregate Production Function (APF) has been extensively used in the analysis of the impacts of FDI inflows and Trade Openness on growth, see Kohpaiboon (2004); Mansouri (2005) and Olusegun Omisakin, Oluwatosin Adeniyi and Ayoola Omojolaibi (2009) among others.

The approach used in this study follows that Olusegun Omisakin, Oluwatosin Adeniyi and Ayoola Omojolaibi (2009).

The aggregate production function to be estimated is specified thus:

$$Y_t = A_t K_t^{\alpha} L_t^{\beta} \tag{1}$$

Where Y_t denotes the aggregate production of the economy at time t, and A_t, K_t and L_t also denote the total factor productivity (TFP) the capital stock, and the stock of labor at time t respectively. Following the Bhagwati's hypothesis, it is assumed in this study that foreign direct investment, trade openness and others factors, which are exogenously determined all influence the behavior of TFP (Bhagwati, 1978, Ewards, 1998).

Thus:

$$A_t = f\left[FDI_t^{\phi}, TR_t^{\delta}, C_t\right] \tag{2}$$

Equation (2) can thus be expressed as:

$$A_t - FDI_t^{\phi} TR_t^{\delta} C_t \tag{3}$$

Equation 1 and 3 therefore, give:

$$Y_t = C_t K_t^{\alpha} L_t^{\beta} FDI_t^{\phi} TR_t^{\delta} \tag{4}$$

We include a dummy variable D representing economic liberalization to take account of the trade regime switches in Cote d'Ivoire. D= 0 1980-1994 and 1 from 1995-2007.Equation (4) becomes:

$$Y_t = C_t K_t^{\alpha} L_t^{\beta} FDI_t^{\phi} TR_t^{\delta} D_t^{\psi} \tag{5}$$

To estimate equation (5) we take the natural logs of both sides, which result in the following equation (6):

$$Y_t = c_t + \alpha ln K_t + \beta ln L_t + \phi ln FDI_t + \delta ln TR_t + \psi D_t + \mu_t \tag{6}$$

Where $\alpha, \beta, \phi, \delta, and\ \psi$ are constant elasticity coefficients of output with respect to the

$K_t, L_t, FDI_t, TR_t,$ and D_t. Also c_t is a constant parameter and μ_t represent the white noise error term. All

coefficients are expected to be positive:

$$f_K \geq 0, f_L \geq 0, f_{TR} \geq 0, and\ f_D \geq 0$$

3. Methodology

3.1 Cointegration test

To empirically analyze the long-run and short-run relationships and dynamic interactions among the variables of interest, the model has been estimated by using the bounds testing cointegration procedure .Pesaran *et al.* (2001) proposed an Autoregressive Distributed Lag ARDL) bounds testing approach to investigating the existence of cointegration relationship among variables.

The choice of this methodology is based on several considerations. Firstly, the ARDL methodology circumvents the problem of the order of integration associated with the Johansen likelihood approach (1990).Secondly, unlike most of the conventional multivariate cointegration procedures, which are valid for the large sample size, the bound test is suitable for small sample size study (Pesaran,*et al.*, 2001).Thirdly ,this technique generally provides unbiased estimates of the long-run model and valid t-statistics even when some of the regressors are endogenous (Harris and Sollis,2003).Hence to apply the bounds procedure, the following autoregressive distributed lag (ARDL) model will be estimated in order to test the cointegration relationship between economic growth, foreign direct investment, trade openness, labor stock and capital stock:

$$\Delta ln Y_t = c + \eta ln Y_{t-1} + \alpha ln K_{t-1} + \beta ln L_{t-1} + \phi ln FDI_{t-1} + \delta ln TR_{t-1} + \sum_{i=1}^{p} \eta_{2i} \Delta ln Y_{t-1}$$

$$+ \sum_{i=1}^{q} \alpha ln\Delta K_{t-1} + \sum_{i=1}^{r} \beta ln\Delta L_{t-1} + \sum_{i=1}^{s} \phi ln\Delta FDI_{t-1} + \sum_{i=1}^{w} \delta ln\Delta TR_{t-1} + \mu_t \qquad (7)$$

The first step in the ARDL approach is to estimate Equation (7) using the ordinary least square (OLS).The second is to trace the presence of cointegration by restricting all estimated coefficients of lagged level variables equal to zero. That is, the null hypothesis of no cointegration ($H_0: \eta = \alpha = \beta = \delta = 0$) against the alternative ($H_i: \eta \neq \alpha \neq \beta \neq \delta \neq 0$).

Consequently, the computed F-statistic is then compared to the non-standard critical bounds values reported by Pesaran *et al*. (2001). If the computed F-statistic exceeds the critical upper bounds value, then the null hypothesis of no cointegration is rejected. If the computed F-statistic falls below the critical lower bounds value, then the null hypothesis of no cointegration is not rejected. However, when the computed F-statistic falls between the critical lower and upper bounds values, then the knowledge of integration of the variables of under consideration is required or else, no conclusion can be reached about cointegration status.

Once cointegration relationship is established, the next step is to estimate Equation (7) using the ARDL procedure i.e. selecting the orders of the model using the Akaike Information Criteria (AIC) and obtain the short-run dynamic parameters from Equation (8) specified:

$$\Delta lnY_t = c_0 + \sum_{i=1}^{k} \alpha_i ln\Delta K_{t-i} + \sum_{i=1}^{k} \beta_i ln\Delta L_{t-i} + \sum_{i=1}^{k} \phi_i \Delta ln FDI_{t-i}$$

$$+ \sum_{i=1}^{k} \delta_i ln\Delta TR_{t-i} + \sum_{i=1}^{k} \psi_i \Delta D_{t-i} + ECM_{t-i} + \mu_t \qquad (8)$$

3.2 Granger Causality

Once we have established the long run relationship between foreign direct investment, trade openness and growth, the next step for our purpose is to examine the Granger-causal relationship among the variables. X is said to ''Granger-cause'' Y if and only if the forecast of Y is improved by using the past values of X together with the past values of Y, than by not doing so (Granger 1969).Granger causality distinguishes between unidirectional and bi-directional causality. Unidirectional causality is said to exist from X to Y if X causes Y but Y does not cause X. If neither of them causes the other, then the two time series are statistically independent. If each of the variables causes the other, then a mutual feedback is said to exist between the variables. In order to test for Granger causality, we estimate a five variables VAR model as follows, where all are initially considered symmetrically and endogenously. This is shown by equation system 9 below.

$$\begin{bmatrix} Y_t \\ K_t \\ L_t \\ FDI_t \\ TR_t \end{bmatrix} = \alpha_0 + \alpha_1 \begin{bmatrix} Y_{t-1} \\ K_{t-1} \\ L_{t-1} \\ FDI_{t-1} \\ TR_{t-1} \end{bmatrix} + \alpha_2 \begin{bmatrix} Y_{t-2} \\ K_{t-2} \\ L_{t-2} \\ FDI_{t-2} \\ TR_{t-2} \end{bmatrix} + \cdots + \alpha_p \begin{bmatrix} Y_{t-p} \\ K_{t-p} \\ L_{t-p} \\ FDI_{t-p} \\ TR_{t-p} \end{bmatrix} + \begin{bmatrix} u_{1t} \\ u_{2t} \\ u_{3t} \\ u_{4t} \\ u_{5t} \end{bmatrix} \qquad (9)$$

Where t is the time subscript, p is the number of lags for the VAR,α_0 is the vector of constants and $\alpha_1, \alpha_2, \ldots\ldots\ldots\ldots,\alpha_p$ are all parameter matrices and the variables have their usual meanings.

We have adopted the VAR Granger/Block Exogeneity Wald Tests to examine the causal relationship among the variables. Under this system, an endogenous variable can be treated as exogenous. We used the chi-square (Wald) statistics to test the joint significance of the other lagged endogenous variables in each equation of the model and also for joint significance of all other lagged endogenous variables in each equation of the model.

4. Results and Discussion

4.1 Unit root test

Before we proceed with the ARDL bounds test, we test for the stationary status of all variables to determine their order of integration. This is necessary for the purpose of determining the underlying properties of the process that generate these time series variables. Ng and Perron (2001) modified unit root tests are employed in order to test the order on integration of the variables under consideration. The test regression included both a constant for the log-levels and for the first differences of the variables. The result (in table1) shows that all the time series data employed in this study are stationary at first difference.

4.2 Cointegration test results

The result reveals that there exists a long-run (cointegration) relationship among foreign direct investment, trade openness, capital, labor and output growth in Cote d'Ivoire. The calculated F-statistic $F_y(Y/FDI, TR, K, L)$

=5.665878 is higher than the upper bound critical value 4.781 at the 1 per cent level. Thus, the null hypothesis of no cointegration is rejected (table 2).

Once we found that there existed a long-run cointegration relationship among the variables of our study, the next step was to select the orders of the ARDL using the AIC criteria, we selected a maximum lag order of 2. The results obtained by normalizing the output (Y_t), in the long-run are reported in table 3. The estimated coefficients of the long-run relationship show that trade openness, foreign direct investment and trade liberalization respectively have a high significant impact on the output judging by their probability values and positive signs except for trade liberalization. The table reveals that about 10% increase in trade openness would lead to 97% growth of output. Also, increasing the foreign direct investment by 10% would lead to 1% in the growth of output. However, the result fails to establish any meaningful relationship between the adoption of trade liberalization and the level of output growth in Cote d'Ivoire. In fact, the adoption of trade liberalization leads to the decline of 0.02 % of Cote d'Ivoire growth output. This can be explained by the fact that the Cote d'Ivoire has not managed to combine the opportunities offered by world markets with a domestic investment and institution-building strategy to stimulate the animal spirits of the domestic entrepreneurs.

The results of the short-run dynamic coefficients associated with the long-run relationships obtained from the ECM equation (8) are given in table 4. The result of the estimated ARDL output model this time refutes any short-run significance of the explanatory variables under consideration. The equilibrium correction coefficient, estimated -0.009264 (0.5191) is not significant (though rightly signed).

4.3 Causality test results

In table 5, causality result is depicted .The essence of this test is to investigate and test for causality relationship among the foreign direct investment, trade openness and growth. This test is important in the sense that it informs us about the direction of the causality among these variables. There are basically three possibilities of this test. There could be a unidirectional, bi-directional or neutrality relationship.

A chi-square statistics of 13.82 for FDI with reference to Y (output) represents the hypothesis that a lagged coefficient of FDI in the regression equation of Y is equal to zero (0.0010) However, when TR is taken as exogenous variable a chi-square statistic of 3.62 for TR is not significant (0.16).Thus FDI is Granger Causal for Y at 0.0010; in another word Y is influenced by FDI. However, the null hypothesis of block exogeneity is refused when Y is taken as dependent variable (0.0001). This suggests that Y is influenced by FDI and TR when they are taken all together. The null hypothesis of block exogeneity is accepted when the FDI is taken as a dependent variable. This means that FDI is not influenced by Y and TR. When the TR is taken as a dependent variable the results reveals that TR is influenced by Y and FDI. The results point out a unidirectional causal relationship running from foreign direct investment, trade openness to output and from output, foreign direct investment to trade openness.

5. Conclusion

The objective of this paper was to empirically examine the long-run inter interrelationship among FDI, trade openness and growth in Cote d'Ivoire. To assess this purpose, the study used the more recent data analysis technique the bounds testing cointegration approach (Pesaran *et al*, 2001) and the VAR Granger causality/Block Exogeneity Wald tests. Our results show that an evidence of a long-run relationship between the variables under consideration namely foreign direct investment, trade openness and output over 1980 through 2007. The VAR Granger causality/Block Exogeneity Wald tests reveals unidirectional causal relationship running from foreign direct investment, trade openness to output and from output, foreign direct investment to trade openness. Both foreign direct investment and trade openness are significant in explaining output growth in Cote d'Ivoire. Based on the results of this study, about 10% increase in trade openness would lead to about 97% growth of output. Again, increasing foreign direct investment by 10% would result in about 1% in the growth of output. These results come to confirm the aims of the government to attract foreign direct investment in order to achieve an economic growth. Therefore this study concludes by recommending, among other things, the Cote d'Ivoire by the opportunities offered by world markets have to manage a good combination with a domestic investment and institution-building strategy to attract more inflows of foreign direct investment for output growth dynamics.

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Table 1. Ng-Perron unit root test result

Variables	MZa	MZt	MSB	MPT
Y	-0.95071	-0.53376	0.56144	18.1497
ΔY	-11.9629*	-2.39935*	0.20050**	2.22503**
K	-1.61422	-0.75648	0.46863	12.7253
ΔK	-13.2434*	-2.55995*	0.19330**	1.90049**
L	-7.19728	-1.80318	0.25054	3.72687
ΔL	-12.0433*	-2.45390*	0.20376**	2.03434**
FDI	-13.3987*	-2.58415*	0.19287**	1.84435**
ΔFDI	-10.3446*	-2.27365*	0.21979**	2.37075**
TR	0.56986	0.50606	0.88805	51.4602
ΔTR	-13.8512**	-2.57167**	0.18566**	1.99289**
Asymptotic critical values				
1%	-13.80000	-2.58000	0.17400	1.78000
5%	-8.10000	-1.98000	0.23300	3.17000

The variables are expressed in their natural logarithms. While Δ symbolizes first difference, ** (*) denotes the rejection of the null hypothesis at 1 (5%) significance level. The asymptotic critical values for each of the test for 1 and 5% level of significance are specified.

Table 2. Results from Bounds Test on equation (7)

Dependent Variable	AIC Lags	F-statistic	Probability	Outcome
$F_j(Y/FDI,TR,K,L)$	2	5.665878	0.0083	cointegration

Notes: Asymptotic critical value bounds are obtained from Table F in appendix C, Case II: intercept and no trend for k=5 (Pesaran and Pesaran, 1997, p478). Lower bound I(0) =3.516 and Upper bound I(1) =4.781 at 1% significance level.

Table 3. The Estimated (ARDL) output model (Y)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-20.48678	11.59841	-1.766344	0.1078
Y(-1)	-0.270393	0.439920	-0.614642	0.5525
Y(-2)	-0.124836	0.198836	-0.627836	0.5442
K	0.633034	0.156591	4.042596	0.0024***
K(-1)	0.152228	0.194002	0.784674	0.4508
K(-2)	-0.018170	0.125941	-0.144275	0.8881
L	24.28476	12.06344	2.013087	0.0718*
L(-1)	-36.90177	24.14464	-1.528362	0.1574
L(-2)	13.46999	13.13783	1.025283	0.3294
FDI	0.001573	0.004763	0.330216	0.7481
FDI(-1)	0.013346	0.004840	2.757751	0.0202**
FDI(-2)	0.025966	0.009953	2.608965	0.0261
TR	-0.516044	0.429799	-1.200663	0.2576
TR(-1)	0.977368	0.467777	2.089387	0.0632*
TR(-2)	-0.770656	0.386374	-1.994587	0.0741
DUMMY	-0.026589	0.358270	-2.865410	0.0168***

R-squared	0.991639	Mean dependent var		6.833060
Adjusted R-squared	0.979098	S.D. dependent var		0.407765
S.E. of regression	0.058953	Akaike info criterion		-2.548893
Sum squared resid	0.034755	Schwarz criterion		-1.774680
Log likelihood	49.13561	F-statistic		79.06967
Durbin-Watson stat	2.813049	Prob(F-statistic)		0.000000

*** (**) and * denotes 1 (5) and 10% level of the significance

Table 4. Short run estimated (ARDL) output

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.431997	0.762299	-0.566702	0.5793
DY(-1)	0.486136	0.264446	1.838323	0.0859
DY(-2)	-0.118323	0.271193	-0.436305	0.6688
DL(-1)	0.861738	20.66834	0.041694	0.9673
DL(-2)	-1.633563	22.35236	-0.073082	0.9427
DFDI(-1)	-0.008560	0.012640	-0.677235	0.5086
DFDI(-2)	0.023935	0.012939	1.849862	0.0841
DTR(-1)	0.203509	0.950060	0.214206	0.8333
DTR(-2)	-0.135730	0.699870	-0.193936	0.8488
ECM	-0.009264	0.014031	-0.660260	0.5191

R-squared	0.675231	Mean dependent var	-0.034857
Adjusted R-squared	0.480369	S.D. dependent var	0.180531
S.E. of regression	0.130137	Akaike info criterion	-0.951289
Sum squared resid	0.254033	Schwarz criterion	-0.463738
Log likelihood	21.89111	F-statistic	3.465180
Durbin-Watson stat	1.830858	Prob(F-statistic)	0.016455

Table 5. VAR Granger Causality/ Block Exogeneity Wald Test Results

Dependent	Excluded Variables	Chi-Square	Degrees of Freedom	P-Value
	TR	3.628534	2	0.1630
Y	FDI	13.82943	2	0.0010***
	All value taken together	23.41101	4	0.0001***
	Y	4.671971	2	0.0967*
TR	FDI	16.21494	2	0.0003***
	All value taken together	28.61647	4	0.0000***
	Y	0.173639	2	0.9168
FDI	TR	1.859314	2	0.3947
	All value taken together	4.450954	4	0.3484

*** (**) and * indicate the rejection of null hypothesis at 1(5) and 10% level of significance, respectively.