THE EXPORTS AND ECONOMIC GROWTH NEXUS IN COTE D'IVOIRE: EVIDENCE FROM A MULTIVARIATE TIME SERIES ANALYSIS

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ABSTRACT

In recent years, there has been much attention devoted to the relationship between exports and economic growth. The evidence is, however, mixed and inconclusive. This might be attributed to the fact that most existing studies adopt a bivariate framework ignoring the role of capital stock and labor force. Therefore, this paper examines this issue for Cote d'Ivoire over the period 1965-2014. It applies the ARDL bounds test to cointegration and Granger causality tests. The results confirm the export-led growth hypothesis in the long run when total GDP is used. On the contrary, when non-export GDP is considered, exports cause economic growth both in the short and long run. These findings suggest that export promotion policies will contribute to economic growth in Cote d'Ivoire.

Contribution/ Originality: This study contributes to the existing literature by analyzing the impact of exports on economic growth in Cote d'Ivoire. It is also one of very few studies which use a multivariate framework by incorporating exports in the production function along with capital and labor force.

1. INTRODUCTION

The relationship between exports and economic growth has been a subject of intense attention in the economic literature. From this literature, there is no consensus on whether or not export growth leads to economic growth. A number of studies found that exports drive economic growth (see, (Mamun and Nath, 2005; Jordaan and Eita, 2007; Rangasamy, 2009; Kumari and Malhotra, 2015)) while others support the reverse, *i.e*, economic growth causes exports (see, (Chandra and Love, 2005; Hassan and Murtala, 2016)). Further studies still found a bidirectional causal linkage between exports and economic growth (Chandra, 2003; Mahadevan, 2007; Tsen, 2010; Kumari and Malhotra, 2014; Lam, 2016) while others found no significant causal relationship between the two variables (Bahmani-Oskooee and Economidou, 2009; Udah, 2012). Despite this mixed empirical evidence, the common belief is that exports

stimulate economic growth. The tremendous success in the export-oriented industrialization policy has been cited as an explanation for the spectacular economic growth of East Asian countries over the past three decades (Bank., 1993; Stiglitz, 1996). It is mainly in view of this belief that African countries have adopted export-oriented policies as part of their development strategies.

Most existing studies mainly relied on a bivariate framework and have largely ignored the role capital stock and labor in the export-growth nexus. It is well-known that causality tests are sensitive to omitted variables (Lütkepohl, 1982) and hence studies using bivariate models may be subject to misspecification bias. In addition, these studies mostly focused on total GDP as measure of economic growth and do not control for simultaneity bias associated with the fact that exports are a part of GDP. The present study addresses these shortcomings in the case of Cote d'Ivoire by adopting a multivariate modeling framework. Cote d'Ivoire had high economic growth rates over the period 1960-1980, with an average growth rate of 6% and exports representing 37% of GDP. This significant economic performance has been attributed to its stability and favorable climatic conditions and terms of trade. The 1980s brought with a decline in economic growth. Over the period 1981-1994, economic growth averaged -0.3% and exports accounted for about 35% of GDP. From 1999, the country entered a period of political uncertainty leading to political tension that lasted from 2002 to 2011. The economy has suffered from this situation; the economic growth rate averaged 0.5% over the period 1999-2011. With the end of conflict in 2011 and the return of political stability and peace, the country is experiencing a strong economic revival and a rebuilding of the capital stock. The economic growth rate and export performance averaged 9% and 45% respectively over the period 2012-2014. The recent performance in both economic growth and exports spark some questions: is a significant part of Cote d'Ivoire's GDP export-led? If yes, is export-led growth a long run or short run phenomenon? This paper addresses these questions in a multivariate framework.

This study differs from most existing works in three important respects. First, it calculates and uses physical capital stock instead of gross investment. Second, it estimates the impact of exports on both total GDP and non-export GDP. Third, it employs the ARDL approach that is more reliable in studies involving variables integrated of different orders and relatively shorter sample sizes.

The rest of this paper is organized as follows. Section 2 provides a review of the empirical literature regarding the export-growth relationship. Section 3 describes the analytical framework and methodological issues. Section 4 presents the empirical results, while section 5 provides summary and gives some policy implications.

2. LITERATURE REVIEW

There exists a large literature examining the relationship between exports and economic growth. Four different hypotheses emerge from this literature. The first is the well-known export-led growth hypothesis that identifies exports as a driver of economic growth. If this hypothesis is true then export-oriented strategy is relevant and countries with more trade openness will grow faster than less opened economies. Theoretically, exports contribute to economic growth through different ways. They relax foreign exchange constraints allowing importation of capital and intermediate goods for domestic production (McKinnon, 1964; Chenery and Strout, 1966). Exports also allow countries to benefit from economies of scale and improve efficiency in resource allocation owing to competition in world markets (Balassa, 1978; Krueger, 1980). Furthermore, exports give access to advanced technologies and better management practices that lead to technological improvement in the economy (Helpman and Krugman, 1985). The second view posits a causality running from economic growth to exports, which is known as the growth-led exports hypothesis. Under this hypothesis, inward-looking development strategy is appropriate to enhance economic growth. The third view suggests a bidirectional causal relationship between exports and economic. The fourth one posits that there is no causal relationship between the two variables.

A growing body of empirical studies has tested the validity of these hypotheses. The empirical evidence from this literature is however mixed and controversial across countries and methodologies. Giles and Williams (2000) provide

an extensive survey of the empirical evidence. Al-Yousif (1999) examined the export-growth relationship for Malaysia using a multivariate model incorporating exchange rate, labor force and capital over the period 1955-1996. Using the Johansen methodology, He found evidence supporting the export-led growth hypothesis in the short-run. In the long-run economic growth is caused by non-export factors. Baharumshah and Rashid (1999) used the Johansen methodology to examine the relationship between exports, imports and GDP in Malaysia for the period 1970-1994. They found evidence of a two-way causal relationship between exports and economic growth for both manufacturing and agricultural exports. Dhawan and Biswal (1999) analyzed the case of India for the period 1961-1993 and found evidence of economic growth causing exports in the long run while the reverse causality from exports to GDP holds in the short run. Ekanayake (1999) tested the export-growth nexus for eight Asian countries over the period 1960 to 1997. Using a bivariate framework, the author found two-way causality between exports and economic growth in seven countries, namely: India, Indonesia, Korea, Pakistan, the Philippines, Sri Lanka and Thailand. He also found short run causality from economic growth to exports in all countries except Sri Lanka. The export-led growth hypothesis was confirmed only in Malaysia. Khalafalla and Webb (2001) confirmed the export-led growth hypothesis in Malaysia for the period 1965-1980 while the growth-led exports hypothesis holds for the period 1981-1996. In the case of India, Chandra (2002) found bidirectional causal relationship between export growth and GDP growth only in short run, while Chandra (2003) found bidirectional causal relationship between the two variables in the long run. Chandra and Love (2005) applied the Johansen method to test the export-led growth in Bangladesh for the period 1972 to 2002. They found both long run and short run causality from economic growth to exports. Choong et al. (2005) used the bounds testing approach in a multivariate framework including real GDP, real exports, real imports, labor force and exchange rate, and confirmed the export-led growth hypothesis in Malaysia for the period 1960-2001. Mamun and Nath (2005) found export-led growth for Bangladesh for the period 1976 to 2003. Sharma and Panagiotidis (2005) failed to find support for the export-led growth hypothesis for India for the period 1971-2001. Bahmani-Oskooee and Oyolola (2007) employed the bounds testing approach to study the export-growth nexus for 44 countries for the period 1960-2002. They found that in a majority of the countries there is a short-run causal relationship between exports and economic growth in both directions. However, in the long run the export-led growth hypothesis holds in only 60% of the countries while the growth-led exports hypothesis is supported in 40% of the countries. These findings are obtained using a two-variable framework. In a study of Malaysia (1970-2004), Furuoka (2007) used the Johansen methodology and Granger causality test within a bivariate framework and detected bi-directional long-run causal relationship between exports and GDP. He also found unidirectional short-run causality from GDP to exports, but not vice versa. Recognizing the omitted variable bias, the author suggested a closer look at other important variables that may explain economic growth in Malaysia.

Mahadevan (2007) used the Toda and Yamamoto (1995) causality test and found evidence of two-way causality between exports and trade-adjusted GDP in Malaysia for the period 1974-2003. Parida and Sahoo (2007) examined the impact of exports on both total GDP and non-export GDP on four South Asian countries, namely, India, Pakistan, Bangladesh and Sri Lanka. Using panel cointegration technique for the period 1980-2002, they found evidence supporting the export-led growth hypothesis. Furuoka and Munir (2010) did not find evidence in support of the export-led growth hypothesis in the case of Singapore. They found a negative impact of exports on economic growth in the long-run, and a short-run causality running from economic growth to exports. They recognized that their results may suffer from variable omission bias and thus suggested incorporating financial development or other important variable that may affect economic growth and the degree of the diversification of the economy. Tsen (2010) found bidirectional causality between exports, domestic demand and economic growth in Chine for the period 1978-2002. Hye et al. (2013) examined the export-led growth nexus for six Asian countries. They found evidence supporting the export-led growth hypothesis for all countries except Pakistan, while the import-led growth hypothesis holds for all countries. The growth-led export hypothesis holds to all countries except Bangladesh and Nepal while the growth-led import applies to all countries. However, these results are obtained from bivariate models. Paul (2014) used the

ARDL bounds test approach to investigate the nexus between exports, imports and GDP in Bangladesh for the period 1979-2010. He found supporting evidence on export-led growth both in the short and long run.

More recently, Bashir *et al.* (2015) confirmed the export-led growth model for Pakistan for the period 1972-2012 using a multivariate model including real GDP, gross capital formation, labor force, exports, consumer price index and terms of trade. In a study of four south Asian countries, Kumari and Malhotra (2015) found evidence supporting the export-led growth hypothesis for Bangladesh and Sri Lanka only in the long-run and for India in the short-run. They found no causal relationship for Pakistan. Saleem and Sial (2015) used the ARDL approach to find long-run positive effects of exports, human capital and capital formation on GDP in Pakistan for the period 1973-2013. The Granger causality analysis revealed bidirectional causality between exports and GDP both in the short and long run. Hassan and Murtala (2016) used the Toda and Yamamoto augmented causality test to provide evidence confirming the growth-led exports hypothesis for Malaysia (1970-2012). Lam (2016) analyzed the export-GDP nexus for four ASEAN countries (Indonesia, Malaysia, Thailand and the Philippines). He found short-run bidirectional causality for Malaysia, the Philippines and Thailand and unidirectional causality from economic growth to exports for Indonesia. In the long-run, bidirectional causality is found for Malaysia and Thailand, unidirectional causality from economic growth to exports for Indonesia.

Studies concerning African countries are relatively limited and again provide mixed evidences. Fosu (1990) studied the impact of exports on economic growth in 28 African countries using an augmented production function including labor, capital formation, and exports. Using a pooled cross-sectional time series estimation of 1960-1970 and 1970-1980 average annual growth rates, he found that exports exert a positive impact on economic growth. Ahmed and Kwan (1991) found support for the growth-led export hypothesis but not for the export-led growth hypothesis in a study of 47 African countries over the period 1981-1987. In a study of Nigeria, Ekpo and Egwaikhide (1994) provided support for the export-led growth hypothesis. Ukpolo (1994) found a positive relationship between the growth of non-fuel primary exports and economic growth for a sample of low-income African countries. Abdulai and Jaquet (2002) studied the relationship between exports and economic growth in Cote d'Ivoire for the period 1961-1997. While controlling for investment and labor force, they found evidence supporting the export-led growth hypothesis both in the short and long run. Reppas and Christopoulos (2005) used fully modified OLS techniques to address the export-growth nexus for a sample of 22 African and Asian countries over the period 1968-1999. They found evidence supporting the growth-led export and not the export-led growth hypothesis for 12 countries (Cote d'Ivoire, Gabon, Mauritius, South Africa, India, Korea, Malaysia, Nepal, Pakistan, Singapore, Sri Lanka and Thailand). For the other countries of the sample, there is no significant relationship between exports and output. Foster (2006) employed threshold regression techniques to examine the relationship between exports and per capita income growth in a sample of 43 African countries over the period 1960-1999. He found a positive relationship between the two variables. Jordaan and Eita (2007) used cointegration techniques to provide support for the export-led growth hypothesis in Namibia for the period 1970-2005. Jordaan and Eita (2007) used cointegration techniques to provide support for the export-led growth hypothesis in Namibia for the period 1970-2005. Bahmani-Oskooee and Economidou (2009) in a study of 61 countries over the period 1960-1999 concluded that there is no clear support for neither of the two hypotheses and the results are country-specific. Rangasamy (2009) examined the export-led growth hypothesis for South Africa using the terms of trade as additional variable. The results revealed a unidirectional causality running from exports to GDP or non-export GDP both in the short and long run. Chimobi and Uche (2010) examined the relationship between exports, domestic demand and economic growth in Nigeria over the period 1970-2005. The results of the Johansen tests revealed that the variables do not have a long-run relationship. The results of the Granger causality tests showed that economic growth causes both exports and domestic demand while exports cause government consumption.

Bbaale and Mutenyo (2011) used the GMM estimator to analyze the impact of export composition on economic growth for a panel of 35 Sub-Saharan African countries. The variables used include exports, GDP per capita, labor

force, credit to the private sector, government consumption and gross capital formation. They found that agricultural exports, and not manufactured exports, are significantly associated with per capita economic growth. Tekin (2012) examined the causal relationship among real exports, real net foreign direct investment inflows and real GDP for a sample of 18 least developed countries over the period 1970-2009. He did not find any causality for Central African Republic and Liberia. The results provided evidence of exports Granger-causing GDP in Haiti, Rwanda and Sierra Leone, and GDP Granger-causing exports in Angola, Chad and Zambia. In particular, no causality exists between exports and economic growth for Benin, Burkina Faso, Gambia, Niger, Senegal and Togo. Udah (2012) investigated the relationship between exports, imports, gross domestic investment, labor force and GDP in Nigeria over the period 1970-2006. Using the Johansen methodology and Granger causality test, he found no evidence supporting the export-led growth hypothesis. The results also revealed a causality running from imports to exports and from economic growth to imports. Alimi and Muse (2013) used the Johansen approach in a two-variable framework and found supportive evidence of the growth-led export in Nigeria for the period 1970-2009.

Dreger and Herzer (2013) used various panel data regression methods to examine the impact of exports on non-export GDP for a panel of 45 developing countries over the period 1971-2005. They found that exports have a positive short-run effect on non-export GDP while the long-run effect of exports on non-export GDP is negative. Nevertheless, there are large differences in the long-run effect of exports across countries. Muhoro and Otieno (2014) confirmed the export-led growth for Kenya during the period from 1976 to 2011. He employed a seven-variable model including GDP, exports, imports, household consumption, government consumption, gross fixed capital formation and foreign direct investment. Except foreign direct investment, all variables are found to be integrated of order one, but a formal cointegration test has not been performed to depict the long run relationship between the variables. Ee (2016) carried out a panel data study of export-led growth hypothesis for Botswana, Equatorial Guinea and Mauritius for the period of 1980 to 2014. Applying the FMOLS and DOLS estimations he found a positive impact of investment, government expenditure and exports on economic growth, providing support for the export-led growth hypothesis.

From this literature review it is clear that the evidence regarding the exports and economic growth nexus is not conclusive and therefore remains an empirical issue. This paper examines the case of Cote d'Ivoire using a multivariate framework. We next describe the empirical methodology used in the study.

3. MODEL, DATA AND METHODOLOGY
3.1. Model and Data

We estimate the augmented production function incorporating exports as follows:

$$y_t = \theta_0 + \theta_1 k_t + \theta_2 l_t + \theta_3 x_t + \mu_t \qquad (1)$$

Where y stands for the log of real GDP, k, l, and x represent the log of real capital stock, labor force, and real exports, respectively.

A problem with (1) is that exports are a component of GDP and hence there will be an obvious positive relationship between exports and GDP. In order to avoid this simultaneity bias, we consider GDP net of exports by subtracting exports from GDP. The analysis is then reduced to examining the relationship between exports and non-export GDP.

The empirical analysis uses annual data covering the period from 1965 to 2014. The data set, except capital stock, is sourced from the 2015 World Development Indicators. Real exports have been computed on the basis of their share in GDP. All the variables are in natural logarithms. There are no official statistics about the capital stock in Cote d'Ivoire. We calculate this number by using the perpetual inventory method linking capital stock (K_t) with gross fixed capital formation (I_t), which is: $K_t=I_t+(1-\delta)K_{t-1}$, where δ is the annual rate of depreciation of physical capital that we take equal to 6%. To apply the recursive equation one need to have initial capital stock K_0. We calculated K_0 as

$K_0 = I_0/(\rho + \delta)$ where I_0 is initial investment and ρ is the growth rate of real gross fixed capital formation. Gross fixed capital formation has been computed from its share in GDP.

Table-1.Descriptive statistics 1964-2014.

Variables	lnGDP	lnK	lnL	lnX
Panel A: Summary statistics				
Mean	29.71	30.27	15.57	28.78
Median	29.75	30.49	15.65	28.78
Maximum	30.31	30.66	16.30	29.48
Minimum	28.70	29.12	14.65	27.70
Std. dev.	0.368	0.431	0.504	0.461
Skewness	-1.059	-1.473	-0.317	-0.482
Kurtosis	3.627	3.708	1.789	2.543
Jarque-Bera	10.18	19.13	3.893	2.371
Probability	0.006	0.000	0.142	0.305
Panel B: Correlation matrix				
lnGDP	1.000			
lnK	0.934	1.000		
lnL	0.929	0.844	1.000	
lnX	0.952	0.843	0.920	1.000

Table 1 provides descriptive statistics and correlations of the variables. The correlation matrix indicates a positive relationship between exports and GDP. However, correlation does not mean causality. A positive correlation between exports and GDP can be compatible with the export-led growth hypothesis, the growth-led export hypothesis or a two-way causality between exports and GDP. Is there any evidence of the export-led growth hypothesis or the reverse in Cote d'Ivoire? Does any causality exist between exports and GDP after controlling for capital and labor force? Our empirical analysis will address these questions following three steps. The first step is to test for unit root in the data. The second step is to test for cointegration between the variables. The third step is to carry out causal links among the variables using the Granger causality test.

3.2. Testing for Cointegration

This study uses the Autoregressive Distributed Lag (ARDL) bounds testing approach to cointegration to depict the long run relationship among the variables. The advantages of this method over other alternative methods are as follows. First, the technique allows the use of variables which differ from order integration (I (0) and I (1)). Second, the bounds test solves the endogeneity problem of explanatory variables and the inability to test hypotheses on the estimated coefficients in the long-run. This is an important issue in the case of export-economic growth nexus, because the empirical literature presents mixed results on the direction of causality between exports and economic growth. Third, the technique estimates both long-run and short-run parameters simultaneously. Fourth, it has better small sample properties in comparison to other widely alternatives (Cheung and Lai, 1993; Inder, 1993; Pesaran *et al.*, 2001). The bounds testing procedure is based on the following ARDL-ECM equation:

$$\Delta y_t = \phi_0 + \phi_1 y_{t-1} + \phi_2 x_{t-1} + \phi_3 z_{t-1} + \sum_{i=1}^{m} \gamma_{1i} \Delta y_{t-i} + \sum_{i=0}^{n} \gamma_{2i} \Delta x_{t-i} + \sum_{i=0}^{p} \gamma_{3i} \Delta z_{t-i} + e_t \qquad (2)$$

where Δ is the difference operator, y is the dependent variable (log of GDP or non-export GDP) and z the exogenous variables $z = (k, l)$. Coefficients ϕ_1, ϕ_2 and ϕ_3 are long-run multipliers and ϕ_0 is the drift constant, while γ_{1i}, γ_{2i} and γ_{3i} are the short-run dynamics of the variables. It should be noted that (2) is estimated using each variable as the dependent variable.

The presence of long-run relationship is tested by restricting coefficients of lagged level variables equal to zero. That is, the null hypothesis of no long run relationship is $\phi_1 = \phi_2 = \phi_3 = 0$. This hypothesis is tested by the mean of an *F*-test. The asymptotic critical values are provided by Pesaran *et al.* (2001). The bounds testing procedure is sensitive to the selection of the lag structure *(m, n)*. In this study, lag length on each variable was selected using the general-to-specific approach with maximum lag set to five. As cointegration indicates only whether or not a long-run relationship exists between the variables, we provide information on the direction of causal relationships through Granger causality tests.

3.3. Testing For Granger-Causality

To test for Granger causality between the variables, we estimate an ECM specification as follows:

$$
\begin{bmatrix} \Delta y_t \\ \Delta x_t \\ \Delta z_t \end{bmatrix} = \begin{bmatrix} \alpha_1 \\ \alpha_2 \\ \alpha_3 \end{bmatrix} + \sum_{i=1}^{p} \begin{bmatrix} \beta_{1i} & \gamma_{1i} & \delta_{1i} \\ \beta_{2i} & \gamma_{2i} & \delta_{2i} \\ \beta_{3i} & \gamma_{3i} & \delta_{3i} \end{bmatrix} \times \begin{bmatrix} \Delta y_{t-i} \\ \Delta x_{t-i} \\ \Delta z_{t-i} \end{bmatrix} + \begin{bmatrix} \lambda_1 \\ \lambda_2 \\ \lambda_3 \end{bmatrix} ECT_{t-1} + \begin{bmatrix} e_{1t} \\ e_{2t} \\ e_{3t} \end{bmatrix} \quad (3)
$$

where $z=(k, l)$ and ECT_{t-1} denotes the lagged residuals of the long-run relationship. The lag length *p* is determined using the Akaike Information Criterion (AIC). The significance of the differenced explanatory variables indicates the short-run causality, whereas the significance of ECT_{t-1} confirms the long-run causal relationship. For example, exports do not cause GDP in the short-run if $\gamma_{11}=\gamma_{12}=\ldots=\gamma_{1p}=0$. Similarly, GDP does not cause exports if none of β_{2i} is statistically different from zero.

4. EMPIRICAL RESULTS AND DISCUSSION

As a first step of our empirical analysis, we test for the order of integration of the series by means of unit root tests. To that end, we apply two well-known unit root tests—the PP test of Phillips and Perron (1988) and the KPSS test of Kwiatkowski *et al.* (1992). This step is necessary because the bounds test requires the dependent variable to be integrated of order one and the explanatory variables to be I(0) or I(1). If any variable is found to be I(2) then the F-test provides biased results. The results displayed in Table 2 suggest that the variables are non-stationary in their level but achieve stationary status after taking the first difference. This implies the possibility of long-run relationship among the variables.

Table-2. Results of unit root tests

Series	Level			First difference	
	PP	KPSS		PP	KPSS
GDP	-3.209	0.159		-4.249	0.331
Non-export GDP	-2.839	0.187		-6.330	0.119
Capital	-2.988	0.209		-1.521	0.157
Labor	-0.048	0.234		-3.736	0.120
Exports	-2.746	0.090		-7.437	0.143

In the empirical analysis, two models are estimated. The first model considers total GDP as measure of economic growth, while the second model considers non-export GDP. The results of the ARDL bounds test are displayed in Table 3. From the table we see that the computed F-statistic exceeds the upper critical value at 5% level of significance suggesting that there is a long-run relationship among the variables.

Table-3. Results of bounds test for cointegration

Model	ARDL	F_stat.	5% Critical bounds		10% Critical bounds	
			I(0)	I(1)	I(0)	I(1)
Model with total GDP						
y=f(k, l, x)	ARDL(1,3,3,2)	7.79*	2.79	3.67	2.37	3.20
x=f(y, k, l)	ARDL(5,5,5,5)	4.52*	2.79	3.67	2.37	3.20
Model with non-export GDP						
y=f(k, l, x)	ARDL(1,1,3,2)	6.59*	2.79	3.67	2.37	3.20
x=f(y, k, l)	ARDL(1,2,2,2)	4.81*	2.79	3.67	2.37	3.20

Note: Lag length on each variable is selected using the AIC criterion with maximum lag set to 5. * indicates the rejection of the null hypothesis of no cointegration at 5% level of significance.

The results of the long run estimates are presented in Table 4. As expected all the signs are positive indicating that capital, labor and exports contribute positively to economic growth, labor having the larger impact. Furthermore, a 1% increase in real exports leads to 0.23% increase in real GDP in the long run. This finding provides empirical support for the export-led growth hypothesis that is expansion of export activities leads to higher level of GDP.

As mentioned earlier, the positive relationship between exports and GDP was expected because exports are a part of total GDP. The results from the model with non-export GDP show that exports are negatively related to non-export GDP. This means that the trend of total GDP is driven by exports.

Table-4. Long run ARDL estimates

Regressor	Dependent variable			
	Log of GDP		Log of non-export GDP	
	Coefficient	t-statistics	Coefficient	t-statistics
Capital	0.236*	3.066	0.548*	4.845
Labor	0.363*	5.895	0.690*	6.632
Exports	0.233*	2.890	-0.464*	-4.221
Constant	10.07*	10.69	15.06*	9.180
Diagnostic test statistics (p-values)				
χ^2 (Serial correlation)	0.400 (0.526)		1.208 (0.271)	
χ^2 (Normality)	2.099 (0.350)		0.378 (0.827)	
χ^2 (Heteroscedasticity)	10.976 (0.530)		8.974 (0.534)	

Note: The asterisks * denotes statistical significance at the 5% level.

The results of the Granger-causality tests are presented in Table 5. The point estimates of the error correction terms show that exports Granger-cause economic growth (GDP) in the long run. Further, both capital and labor cause economic growth in the long run. With respect to the short-run causality, there is no evidence of causality among the variableswhen total GDP is considered. On the contrary, causality emerges when non-export GDP is used. In this case, exports cause non-export GDP in the short run.

The findings of this study suggest that the export-led growth hypothesis is a long-run phenomenon in Cote d'Ivoire when total GDP is used. However, when non-export GDP is considered, exports cause economic growth both in the short and long run, but exports have a negative long-run effect and a positive short-run effect on non-export GDP. All this shows that exports are a key factor in promoting economic growth in Cote d'Ivoire. The fact is that Ivorian economy is mostly dependent on external trade with exports accounting for 40% of GDP over the period 1965-2014. This share reached 46% over the period 2000-2014.

Table-5. Results of Granger causality tests

Dep. var.		Short-run causal variable			Long-run causality
	Lag	GDP	Exports	Capital	ECT$_{t-1}$=0
Model with total GDP					
GDP	1	-	0.799 (0.371)	10.35* (0.000)	-0.615* [-1.921]
Exports	1	0.005 (0.939)	-	0.165 (0.683)	-0.150 [-0.312]
Capital	1	3.225** (0.072)	0.038 (0.844)	-	-0.108** [-1.732]
Model with non-export GDP					
GDP	1	-	3.455** (0.063)	2.580** (0.100)	-0.514* [-1.959]
Exports	1	0.045 (0.830)	-	0.718 (0.396)	-0.291 [-0.824]
Capital	1	3.853* (0.049)	4.612* (0.031)	-	-0.047 [-1.001]

Note: Statistics for Short-run causality are Chi-square statistics with *p-values* in parentheses. Statistics for long-run causality are coefficients on ECT$_{t-1}$ with *t-statistics* in brackets. The asterisks * and ** denote statistical significance at the 5% and 10% levels, respectively.

5. CONCLUSION

This study has used a multivariate modeling framework to examine the relationship between exports and economic growth in Cote d'Ivoire over the period 1965-2014. The study differs from most existing works in four respects. First, it explicitly used a multivariate framework accounting for physical capital and labor force into the analysis. Second, it calculated and used physical capital stock instead of gross investment which is a flow and not a stock. Third, the study used non-export GDP as measure of economic growth and compares the results with those obtained with total GDP. Using non-export GDP, we control for simultaneity bias associated with the fact that exports are a component of GDP. Fourth, the study employed the ARDL approach that is more reliable in studies involving relatively shorter sample sizes.

When total GDP is used the results confirm the export-led growth hypothesis in the long run. In the short run, however, there is no evidence of causal relationship between exports and economic growth. On the contrary, when non-export GDP is considered, exports cause economic growth both in the short and long-run. These findings confirm that exports are a major driver of the economic growth of Cote d'Ivoire. The study therefore recommends further liberalization of trade policy in favour of export expansion.

This study has been conducted using exports at the aggregate level. A disaggregate analysis can provide useful information about what underpins the positive relationship between exports and output. Cote d'Ivoire is dependent on agricultural exports accounting for 47% of its total exports. An analysis at the disaggregate level can throw light on whether the export-led growth in Cote d'Ivoire is due to agricultural exports or non-agricultural exports.

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