Export-Led growth hypothesis: Evidence from Cote d'Ivoire

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Abstract

This paper re-examine the export-led growth hypothesis for Cote d'Ivoire using the Bounds test analysis: unrestricted error correction model (UECM) for the period 1980-2007. Based on the model, exports, labor force and economic liberalization policies have stimulated economic growth, whereas, imports and exchange rate negatively impacted on economic growth. The results indicate that there exists a long-term relationship between economic growth and its determinants in our model. In addition, the VAR Granger/Block-exogeneity Wald tests reveal an evidence of bi-directional causality between exports and economic growth. Thus findings have important messages for policy makers given that export sector dominance in Cote d'Ivoire economy.

Keywords: Cote d'Ivoire, Economy growth, Cointegration, Causality test, Exports.

1. Introduction

The relationship between exports and growth has been broadly investigated in the recent years. This is because there is no consensus on the export-led growth debate and there are various ways through which export expansion can generally contribute to increased economic growth. Historically, many developing countries like Cote d'Ivoire (Lawrence R. Alschuler, 1988) pursued import-substitution strategy for growth and development but with the spectacular success of the East Asian countries like Hong Kong, South Korea, Taiwan, Singapore and the Latino-American countries like Mexico and Brazil over the past three decades, many developing countries made a decisive shift away from import-substitution to export-led growth strategy (Torado, 1997). Many of these countries, however, continued to promote primary exports as an engine of growth (Baldwin, 1996; Hirschman, 1958; Roemer, 1970; and Watkins, 1963). Cote d'Ivoire is the world's largest producer and exporter of cocoa beans and a significant producer and exporter of coffee and palm oil. Consequently, the economy is highly sensitive to fluctuations in international prices for these products, and, to a lesser extent, in climatic conditions. Despite government attempts to diversify the economy, it is still heavily dependent on agriculture and related activities, engaging roughly 68% of the population. Since 2006, oil and gas production have become more important engines of economic activity than cocoa. According to the International Monetary Funds (IMF) recent statistics, earnings from oil and refined products were $1.3 billion in 2006, while cocoa-related revenues were $1 billion during the same period. The European Union (especially EU-27) is the major market for Cote d'Ivoire's exports, followed by the United States, Nigeria and China (IMF, DOTS 2009).

Many empirical studies have sought to test the validity of the export-led growth hypothesis (ELG), which tests whether export growth driven by export promotion policies promotes overall economic growth. The early work in this area adopted a cross-sectional framework and a country specific time-series studies, adopting both bivariate and multivariate models to test the validity of the ELG hypothesis; however, the empirical evidence based on those studies is mixed and often contradictory. In part, differences in the measures of exports used, the sampling period, and methodologies adopted explain the mixed results.

This paper was guided by three research objectives: to re-examine the integrational properties of GDP, exports, imports, labor force and exchange rate for Cote d'Ivoire using the KPSS unit root test. In the second step, we use the bounds testing approach to cointegration to investigate evidence for any long-run relationships among the variables for Cote d'Ivoire. In the third step we undertake the causality test using the VAR Granger/Block-exogeneity Wald tests to unravel the direction of causation, allowing us to gauge whether or not the export-led growth hypothesis hold for Cote d'Ivoire.

The balance of this paper is organized as follow. In the next section, we provide an overview of the empirical literature of the export-led growth hypothesis for African countries. In section 3, we discuss the econometric methodology. In section 4, we discuss the results, and in the final section we conclude with some policy implications.

2. Empirical literature

There exist several empirical studies that provide rational framework for discussion and analyzing the export led growth hypothesis. Giles and Williams (2000) for example, provide a comprehensive review of some empirical studies. However, our review was just focused on existing studies on African countries.

Sentsho (2002) tested the causal relationship between exports and economic growth in the mining sector in Botswana for the period 1976-1997. The objective of the study was to see whether revenues derived from the primary exports sector (i.e., mining) could lead to positive and significant economic growth in Botswana. The author based the study on evidence from statistical data and an econometric analysis of Botswana's economy. To investigate the contribution of exports to Botswana's economic growth, the author used two aggregate production function models. These models assume that along with the conventional inputs used in the neoclassical production function, unconventional inputs may be added into the model to identify their contribution to economic growth. Along with the conventional inputs of production, the following unconventional variables were included: aggregate exports, primary exports, manufactured (non-traditional) exports, imports, private sector, government sector, previous period growth in real GDP, and world GDP. The author estimated the models through OLS procedures. He found an evidence supporting the statistical analysis, suggesting that capital, labor force, primary exports, manufactured(nontraditional) exports, imports, government sector, previous period growth in real GDP, and world GDP are important factors affecting Botswana's economic growth. The country is still dependent on primary exports because of the positive impact of traditional exports and the negative impact of nontraditional exports on the nation's economic growth. The results showed that primary export revenues can lead to positive and significant economic growth in Botswana.

Abdulai and Jaquet (2002) tested the ELG hypothesis for Cote d'Ivoire. For the period 1961-1997, the authors examined the short-run and long-run relationship between economic growth, exports, real investments, and labor force. Time series techniques used were cointegration and ECM. The authors found evidence of one long-run equilibrium relationship among all variables. They also found causality, both in the short-run and in the long-run, flowing from exports to economic growth. Bidirectional causation between the variables was also found. It was concluded that Cote d'Ivoire's recent trade reforms
(i.e., promoting domestic investment and recovering international competitiveness) contribute to export expansion, diversification, and, potentially, future economic growth in the nation.

Hachicha (2003) tested the dynamic relationship between exports and economic growth in Tunisia using annual data for the period 1961-1995. He specified a system consistent of an export augmented Cobb-Douglas production function, and export demand supply functions. Unit root tests were conducted for all series using the ADF test, and found all series to be I(1). Cointegration testing was conducted using Johansen and Juselius's procedure (1980, 1990). He estimated the cointegrated VAR models using either one or two lags, according to the Akaike Information Criterion (AIC). The variables in the production function and those in the export demand and supply functions were found to be cointegrated. Granger-causality testing was conducted using the maximum-likelihood estimator to estimate the long-run relationship between the variables. The results showed a strong association between exports and economic growth, supporting the ELG hypothesis.

Njikam (2003) tested the ELG hypothesis in 21 Sub-Saharan African countries: The objectives of the study were to test the causal relationship between exports (agricultural and manufactured) and economic growth, to determine if there is evidence of such relationships, determine the direction of causality, and to examine whether the direction of causation is reversed when countries change from import substitution strategies (IS) to exports promotion (EP) strategies. He developed autoregressive models to determine whether agriculture and manufactured exports cause economic growth or vise versa in all countries. All variables were in logarithmic form. Stationary testing on the series was conducted using the ADF test to avoid instantaneous causation. To determine the optimum lag-length of past information, the minimum final prediction error (FPE) and Schwarz-Bayesian (SBC) criteria were used. The Hsiao's (1979) version (known as the stepwise Granger-causality technique) was used to look at the direction of causation. He also used the Wald test and the likelihood ratio test to verify the direction of causation and to test the significance of the restricted coefficients. It was found that, during the EP period, real GDP and real exports were stationary in all countries. The optimum lag length for all variables was found to vary across countries. Unidirectional causation was found from agricultural exports to economic growth in nine countries (Cameroon, Côte-d'Ivoire, Ghana, Burkina-Faso, DRC, Madagascar, Malawi, Zambia, and Gabon). Unidirectional causation was found from manufactured exports to real GDP growth in three countries (Cameroon, Mali, and Malawi). Unidirectional causation from real GDP to agricultural exports was found in five countries (Mali, Senegal, Nigeria, Kenya, and Tanzania). The author found unidirectional causation from real GDP to manufactured exports in six countries (Cote- d'Ivoire, Ghana, Madagascar, Gabon, Benin, and Togo), implying that total export growth depends on the economic growth in these countries. Bidirectional causation between economic growth and agricultural exports was found in three countries (Burkina-Faso, DRC, and Madagascar), leading to an acceptance of the economic-led export and the ELG hypotheses in these countries.

Abou-Stait (2005) tested the ELG hypothesis by applying a cointegration and causality tests for Egypt for the span of period 1977-2003. Cointegration testing was conducted using Johansen and Juselius's procedure. The test indicated no cointegration between net GDP, exports and imports for

Egypt. However, the findings support the validity of the export led growth hypothesis. The study also analyzed a vector autoregression (VAR) model to show the dynamic effect of the impact of unitary shocks on a variety of macroeconomic variables. Based on this VAR model, the analysis was extended to include the impulse response functions (IRFs). In summary, the results support the hypothesis that exports, imports and GDP are not cointegrated, and that exports Granger cause GDP growth. Moreover, the results also show that exports of goods remain one important source of economic growth and that shocks to export lead to a significant response in GDP, which also gives acceptance to the export led growth hypothesis.

Douglason Godwin Omotor (2008) tested the ELG hypothesis by applying the bounds test analysis –unrestricted error correction model (UECM) to analyze the long-run relationships between exports and economic growth for Nigeria over the period 1979-2005.The results from the application of the bounds test shows that economic growth and its determinants namely, exports, imports, labor and exchange rate are cointegrated in others words, a long-run relationship between economic growth, exports, imports, labor and exchange rate exists. To estimate the coefficients of the long-run relationship between the variables he based its approach on the application of the Henry's (1995) general-to-specific method and found that exports and labor force was positively related to the economic growth. The CUSUM and CUSMUS Sum Square tests for the stability of the ELG model were employed and indicate that the parameters are stable during the sample period. He also conducted the Granger causality test and found that exports do not have significant unidirectional causal effects on the growth of GDP. However, the null hypothesis that economic growth does not Granger cause export was rejected, indicating that the export was susceptible to fluctuations due to economic growth. Thus, this study does not provide evidence to support the ELG hypothesis in the Nigeria economy.

3. Econometric Methodology

In this section, we summarize the bounds process (Pesaran,*et al* 2001) for testing for the existence of a long-run level relationship between exports and economic growth.

3.1 The UECM model specification

In their seminal work, Pesaran *et al* (2001) pointed out that as long as there exist both I(1) and (0) variables, a conventional cointegration test on the long-run equilibrium will produce biased results in the long-run interactions between the variables. In order to eliminate such bias due to the coexistence between I(1) and (0) variables, we implement the autoregressive distributed lag (ARDL) model, also know as bounds testing approach suggested by Pesaran *et al.* (2001). For a more description of the methodology see Pesaran *et al* (2001).

To model the relationship between the economic growth (GDP), exports, imports, exchange rate and the labor force we construct an unrestricted Vector Autoregression of order p , VAR (p), for the following export-led growth function:

$$y_t = \varphi + \sum_{i=1}^{p} \beta_i y_{t-1} + \varepsilon_t \qquad (1)$$

where y_t is the vector of w_t andz_t. z_t is assumed to be the dependent variable as the real GDP and w_t is the vector matrix which represents a set of explanatory variables. The explanatory variables in this model are real exports (X), real imports (M), real exchange rate (EXR) and the real labor force(L). β_i is a matrix of VAR parameters to be estimated and ε_t is a white noise error. According to Pesaran et al. (2001), the dependent variable must be I(1), while the exogenous variables can be either I(1) or I(0). Manipulation of equation (1), allows this VAR to be written as a vector error correction model (VECM):

$$\Delta y_t = \varphi + ct + \theta y_{t-1} + \sum_{i=1}^{p-1} \delta_i \Delta z_{t-1} + \sum_{i=1}^{p-1} \omega_i \Delta w_{t-1} + \varepsilon_t \qquad (2)$$

where Δ is the first-difference operator. The long-run multiplier matrix θ is given as:

$$\theta = \begin{bmatrix} \theta_{zz} & \theta_{zw} \\ \theta_{wz} & \theta_{ww} \end{bmatrix} \qquad (3)$$

The diagonal elements of this matrix are left unrestricted. This allows for the possibility that each of the series can be I(0) or I(1). For example, if $\theta_{zz} = 0$ it implies that economic growth z is I(1). In contrast, $\theta_{zz} < 0$ implies that it is I(0). This VECM procedure allows for the testing of at most one cointegrating vector between the dependent variable z_t and a set of regressors w_t. The Error Correction Model (ECM) is estimated as:

$$\Delta z_t = c_0 + \Pi_{zz} z_{t-1} + \Pi_{zw.w} w_{t-1} + \sum_{i=1}^{p-1} \phi_i \Delta x_{t-1} + w_{t-1} + \varepsilon_t \qquad (4)$$

Given equation (4), the first differences reflect the rate of change of each variable, thus, this representation can be used to examine both the short-and long-run relationship between the economics indicators. Secondly, equation (4) also indicates the economic growth is influenced and explained by its past values, implying that it involves other shocks.

In addition, following Pesaran et al. (2001), if we impose the restrictions that $\theta_{wz} = \theta_{zw} = 0, \varphi \neq 0$ and $c = 0$ (i.e. no trend), then the estimated export-led growth function can be stated using the unrestricted error model (UECM) as:

$$\Delta lnY_t = \beta_0 + \beta_1 lnY_{t-1} + \beta_2 lnX_{t-1} + \beta_3 lnM_{t-1} + \beta_4 lnEXR_{t-1} + \beta_5 lnL_{t-1} + \sum_{i=0}^{p} \beta_6 ln\Delta Y_{t-i} + \sum_{i=0}^{p} \beta_7 ln\Delta X_{t-i} + \sum_{i=0}^{p} \beta_8 ln\Delta M_{t-i} + \sum_{i=0}^{p} \beta_9 ln\Delta EXR_{t-i} + \sum_{i=0}^{p} \beta_{10} ln\Delta L_{t-i} + \gamma Dummy_t + u_t \qquad (5)$$

where, all variables were in the natural log and real from. Y_t is the gross domestic product, X_t is the exports, M_t is the imports,EXR_t is the exchange rate and L_t is the total labor. We introduced a dummy variable to capture and absorb the economic effects of liberalization. $Dummy_t$ takes the values of 0 from 1980 to 1994 and after the adoption of the liberalization policy takes the values of 1 for the period running from 1995 to 2007.

The long-run elasticities obtained from the equation (5) are the coefficients of the one lagged explanatory variable (multiplied by a negative sign) divided by the coefficient of one lagged dependent variable (Bardsen, 1989). Thus, the long-run export and import elasticities are (β_2/β_1) and (β_3/β_1) respectively.

The bounds test for examining evidence for a long run relationship can be conducted using the *F*-test. The *F*-test tests the joint significance of the coefficients on the one period lagged level of the variables in equation (5) that is, $H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0.$ The approximate critical values for the *F*-test are obtained from Pesaran *et al* (2001). The asymptotic distribution of critical values is obtained for the cases in which all regressors are purely I(1) as well when the regressors are purely I(0) mutually cointegrated.

3.2 Granger Causality

Once we have established the long run relationship between growth, exports and imports, the next step for our purpose is to examine the Granger causality relationship among the variables. *A* is said to "Ganger-cause" *B* if and only if the forecast of *B* is improved by using the past values of *A* together with the past values of *B*, than by not doing so (Granger 1969). Granger causality distinguishes between unidirectional and bi-directional causality. Unidirectional causality is said to exist from *A* to *B* if A causes *B* but does not cause *A*. If neither of them causes other, then a mutual feedback is said to exist between the variables. In order to test for Granger causality, we estimate the five variables VAR model as follows, where all are initially considered symmetrically and endogenously. This is show by equation system (4) below.

$$\begin{bmatrix} Y_t \\ X_t \\ M_t \\ EXR_t \\ L_t \end{bmatrix} = \alpha_0 + \alpha_1 \begin{bmatrix} Y_{t-1} \\ X_{t-1} \\ M_{t-1} \\ EXR_{t-1} \\ L_{t-1} \end{bmatrix} + \alpha \ldots\ldots + \begin{bmatrix} Y_{t-p} \\ X_{t-p} \\ M_{t-p} \\ EXR_{t-p} \\ L_{t-p} \end{bmatrix} + \begin{bmatrix} u_{1t} \\ u_{2t} \\ u_{3t} \\ u_{4t} \\ u_{5t} \end{bmatrix} \qquad (6)$$

where t is the time subscript, p is the number of lags for the VAR, α_0 is the vector of constants and$\alpha_0, \alpha_1, \ldots\ldots\ldots\ldots\ldots\ldots \alpha_P$ 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. Sources of Data

Data on GDP, exports, imports. Exchange rate and labor is for Cote d'Ivoire for the period of 1980-2007. All data are annual and were obtained from the World Bank's statistics in World Development

Indicators (WDI, 2008). Nominal values were converted into the real values by using the Consumer Price index, which was obtained from the same source.

5. Results and Discussion

5.1 *Unit root test*

For the unit root test we used the approach of the *KPSS unit root test* (Kwiatkoeski et *al,* 1992). The KPSS test for unit root differs from the ADF and Phillip and Perron test in that the series Y_t is assumed to be (trend-) stationary under the null. Put differently, the KPSS test reverses the null and the alternative hypothesis. The KPSS statistic is based on the residuals from the OLS regression, which takes the following form:

$$Y_t = \alpha_t + b_t + \varepsilon_t \tag{5}$$

where t is a linear deterministic trend, ε_t is a stationary error, and b_t is a random walk; $b_t = b_t - \mu_t$, where μ_t are iid $(0,\sigma_\mu^2)$. The initial value of b_0 is treated as fixed and is interpreted as an intercept. The test is conducted by first regressing Y_t on a constant and a trend (t), allowing one to obtain the residuals. The KPSS statistic is defined as:

$$\eta(u) = T^2 \sum S_t^2 / S^2(k) \tag{6}$$

where $S_t = \sum^t e_i (i = 1,2,\dots,t)$,e_i is the partial sum of the residuals, $S^2(k)$ is a consistent non-parametric estimate of the disturbance variance and T is the sample size. Kwiatkoeski *et al.* (1992) show that the statistic $\eta(u)$ has a nonstandard distribution, and the critical values are provided therein. If the calculated value of $\eta(u)$ is large than the critical value, then the null of stationarity for the KPSS test is rejected.

The results are reported in table 1. In the case of log-levels of all the three variables, the obtained test statistics are all greater than the critical value at the 5 percent level of significance, implying that we cannot accept the null hypothesis of stationarity; hence, we conclude that GDP, exports and imports are integrated at log-level.

5.2 *Cointegration*

The result from the bounds test cointegration for Cote d'Ivoire is reported in table 2. Following Pesaran *et al.* (2001), if the computed Wald or F-statistics fall outside the critical value bounds, a conclusive decision results without needing to know the cointegration rank r or the $\{x_t\}$ process. If, however, the Wald or F-statistic fall within these bounds, inference would be inconclusive. In such circumstances, knowledge of the cointegration rank r of the forcing variables $\{x_t\}$ is required to proceed further. In our case the computed F-statistic = 0.47 from the estimation of the Wald test is found to be outside the critical value bounds at both 1% and 5%. And also the computed F-statistic come to confirm that the order of integration of the x_t variables. The computed F-statistic is lower and close to the lower bounds that mean that $\{x_t\}$ ~*I(0)* . As a result of this significance and integration we proceeded to estimate the equation (5). To obtain the results in table 3, we used the application of the Hendry's (1995) named the general-to-specific approach in estimating equation (5). This is based on selecting coefficients with significant lags using Akaike Information Criterion (AIC). The R^2 and adjusted R^2 indicate a good fit since the model explains more than 90% of the variations in order to avoid unnecessary over-parameterization. Further, we implement diagnostic tests, for instance, testing for serial correlation (Breusch-Pagan LM), heteroskedasticity (ARCH) and normality test (Jarque Bera). Also the CUSUM and CUSUM Sum Square tests were employed to test the parameter stability during the sample period. As can be seen Figures 1 and 2, the CUSUM and CUSUM Sum Square tests indicate that the parameters are stable.

The long-run equation is presented as follow:

$$Y_t = -9.1278 + 1.1612X_t - 0.8146M_t - 0.3180EXR_t + 1.5807L_t + 0.0009Dummy_t \quad (7)$$

According to the equation (7) results the exports and the labor are positively related to economic growth. The estimated elasticities of exports and labor are 1.1612 and 1.5807 respectively. The implication of this is that a 1% increase in exports (labor force) will lead to a 1.61% (1.58%) increase in economic growth. Whereas; imports and exchange rate are negatively. This can be explaining by the fact that the increase of the imports implies a reduction in the international reserves and by extension a slow down on the economic growth. As for the exchange rate coefficient(EXR_t), it reported a negative correlation (-0.318) with economic growth. This indicates that a depreciation of exchange rate impacted negatively on economic growth. The coefficient of the dummy variable$(Dummy_t)$, is positive but not significant. A 1% increase in trade liberalization leads to a 0.0009% boost in economic growth. This can be explained by the fact that the Ivorian economy is largely agricultural with lacks of technology and since 1980s under the principle of the Most Favored Nation (MFN) of the GATT tariff reduction most of the agricultural products enter with low import duties to foreign countries and also 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. Thus the adoption of the trade liberalization in the 1995s not leads substantially to the economy growth. In another word the implication is that the reform policies should be sustained given their positive effects.

5.3 *Causality test results*

In table 4, causality result is depicted. The essence of this test is to investigate and test for causality relationship among the economic growth, exports, imports, labor and exchange rate. 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 test statistics of 4.82 for exports (X) with reference to economic growth (Y) represents the hypothesis that lagged coefficient of X in the regression equation of Y is equal to zero. Thus, X is Granger Causal for Y at 0.0282 level of significance. However, Y equation indicates that null hypothesis cannot be rejected for the individual lagged coefficient M, L and EXR. This suggests that Y is not influenced by these variables taken individually. The null hypothesis of block exogeneity is not rejected for the Y and L equations in the model. This indicates Y and L are not jointly influenced by the other variables. There is an evidence of bi-directional causality between X and Y which implies that both exports and economic growth are influenced by each other. Beside, uni-directional causality is observed from X to EXR and from X to M.

Conclusion

The main aim of this paper was to examine the export-led growth hypothesis for Cote d'Ivoire. We modeled the export-led growth function in the UECM Bounds test framework proposed by Pesaran, et al (2001), over the period 1980-2007. Our main findings are as follow. Using the KPSS test, which tests the null of stationarity; we investigated the intergrational properties of the data series and found that all the variables were stationary at log level except for exports variable. Next the bounds test reveals that economic growth and its determinants are stable and cointegrated. Secondly , the ARDL model indicates that exports, labor force and the trade liberalization have a positive influence on economic growth while imports and exchange rate, have negative impact on economic growth. We then examined the direction of causation among the five variables using the VAR Granger/Block Exogeneity Wald Tests. We found an evidence of bi-directional causality between X and Y which implies that both exports and economic growth are influenced by each other. Beside, uni-directional causality is observed from X to EXR and from X to M.

Our results imply that for Cote d'Ivoire there is evidence for export-led growth in the long-run. These findings have important messages for policy makers. In the case of Cote d'Ivoire, for instance, it is clear that development and growth will augur well for economic growth. The Cote d'Ivoire being dependent essentially on agricultural products is sensitive to international market shocks. Consequently, the government should intensify and sustain its efforts in macroeconomic policies stabilization which will enhance exports and its productivity. Secondly, research and development (R&D) should be encouraged to get the technology as this will enhance economic growth. Also emphasis should be geared to establish and develop adequate infrastructure particularly in the power generation and distribution and enhanced institutions to check corruption. It is anticipated that this will promote processed primary agricultural exports and ensure judicious use of exports proceeds particularly in the cocoa and coffee exports in the economic development process in Cote d'Ivoire.

Table 1: Unit root test Using KPSS (calculated and critical values)

Variables	At level I(0)	$1^{st}\Delta$ I(1)
Y_t	0.512393[4]*	
EXR_t	0.363022[4]**	
M_t	0.393833[3]**	
X_t		
L_t	0.619002[4]*	0.444156[0]*

Notes:
1. * indicates stationarity at 5% level and ** indicates stationary at 10%
2. [ ] Bandwidth chosen according to Newey-West using Bartlett Kernel
3. Asymptotic critical values
   1% 0.739000
   5% 0.463000
   10% 0.347000

Table 2: Bounds testing for Cointegration Analysis

Computed F-Statistic: 0.47 (lag structure, k=1)

Bounds level	Lower I(0)	Upper I(1)
Critical Bounds Value (1%)	6.84	7.84
Critical Bounds Value (5%)	4.94	5.73

Table 3: Estimated UECM for Cote D'Ivoire Economic Growth Function Based on Equation (5)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-9.127827	5.308228	-1.719562	0.2277
DY(-1)	0.336273	0.122234	2.751055	0.1106
DX	0.301927	0.117068	2.579073	0.1232
DX(-1)	-0.709714	0.146989	-4.828352	0.0403
DX(-2)	-0.238138	0.065503	-3.635519	0.0680
DM	0.091836	0.158622	0.578958	0.6211
DM(-2)	0.871624	0.297621	2.928634	0.0995
DM(-4)	0.103028	0.041417	2.487577	0.1307
DEXR	-0.421546	0.092262	-4.569017	0.0447
DEXR(-2)	0.292444	0.146187	2.000486	0.1834
DEXR(-3)	-0.222301	0.063316	-3.510966	0.0724
DL	1.824287	0.263607	6.920473	0.0202
DL(-2)	-1.725270	0.374078	-4.612065	0.0439
DL(-3)	0.588370	0.302791	1.943155	0.1915
DL(-4)	-0.858050	0.188183	-4.559659	0.0449
Y(-1)	-1.204770	0.247097	-4.875707	0.0396
X(-1)	1.399038	0.283825	4.929228	0.0388
M(-1)	-0.981376	0.280346	-3.500593	0.0728
EXR(-1)	-0.383081	0.073530	-5.209845	0.0349
L(-1)	1.904355	0.430596	4.422599	0.0475
DUMMY	0.000960	0.098885	0.009712	0.9931

R-squared	0.999265	Mean dependent var	0.001182
Adjusted R-squared	0.991916	S.D. dependent var	0.143083
S.E. of regression	0.012865	Akaike info criterion	-6.484910
Sum squared resid	0.000331	Schwarz criterion	-5.448154
Log likelihood	95.57646	Hannan-Quinn criter.	-6.224168
F-statistic	135.9706	Durbin-Watson stat	3.072693
Prob(F-statistic)	0.007325		

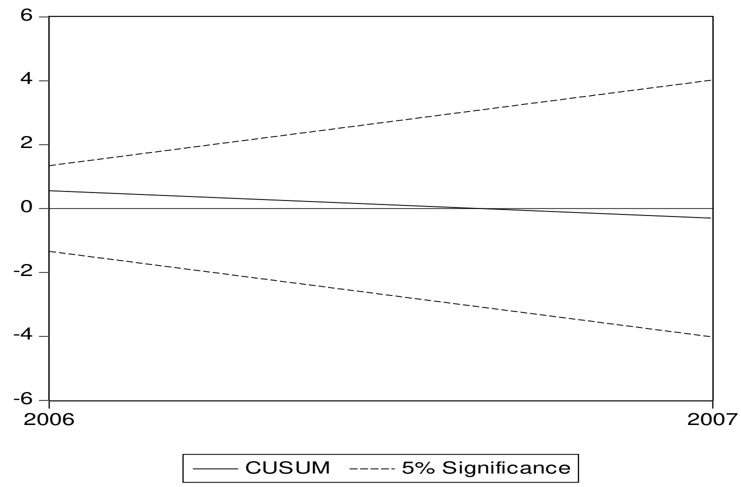

Figure 1: Stability test, Recursive Estimates (OLS) CUSUM Test

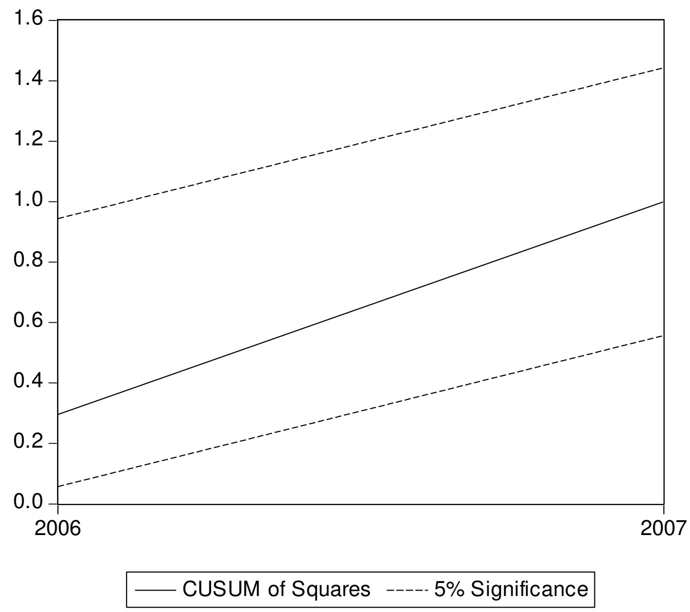

Figure 2: **Stability test, Recursive Estimates (OLS) CUSUM of Squares Test**

Table 4: VAR Granger Causality/ Block Exogeneity Wald Test Results

Dependent Variable	Excluded	Chi-Square Statistic	Degrees of Freedom	P-value
	X	4.818	1	0.0282
Y	M	1.089	1	0.2967
	L	0.0488	1	0.8251
	EXR	0.001	1	0.9747
	ALL values taken together	5.2863	4	0.2592
	Y	4.7921	1	0.0286
X	M	1.2109	1	0.2712
	L	2.4624	1	0.1166
	EXR	1.0415	1	0.3075
	ALL values taken together	9.8101	4	0.0437
	Y	0.5301	1	0.4665
M	X	8.1105	1	0.0044
	L	0.0565	1	0.8121
	M	0.2723	1	0.6018
	ALL values taken together	11.5119	4	0.0214
	Y	1.89995	1	0.1681
	X	0.0862	1	0.7691
L	M	0.4031	1	0.5255
	EXR	1.7731	1	0.183
	ALL values taken together	2.9585	4	0.5648
	Y	0.1287	1	0.7197
EXR	X	7.184	1	0.0074
	M	2.6928	1	0.2008
	L	0.03554	1	0.8505
	ALL values taken together	11.818	4	0.0188

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