CAUSAL RELATIONSHIP BETWEEN REAL IMPORT, REAL EXPORT AND REAL GDP IN THE GAMBIA: AN ECONOMETRICS INVESTIGATION

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Abstract

This research paper examines the causal relationship of real import, real export and real GDP by using annual time series data for the Gambia over the period 1988-2015. The focus is Gambia because recently Gambia has existed an economic growth (GDP) with a huge current deficit. So, it is wondered if an economic growth causes an increase in imports or import expansion causes economic growth or export expansion causes economic growth or economic growth cause exports. Moreover, which category of imports or exports may affect economic growth or be affected by economic growth is another question wondered. Hence warranting the need for this study so as to address some of the international trade policy concerns and enhance healthy economic growth with minimized current deficits.

The research makes use of a number of econometric methods such as: Augmented Dickey-Fuller unit root test, Johansen cointegration test, Vector-autoregressive (VAR) model and Granger causality test.

The outcomes of this research paper confirmed that all the variables are stationary at first differenced. Furthermore, the Johansen test of cointegration reveals that there is no existence of the long run relationship among real import, real export and real GDP. The Granger test indicates evidence of short run causality running from real import and real export jointly to real GDP. There is also evidence of short run causality running from real export to real GDP.

Keywords: Augmented Dickey-Fuller unit root test; Granger Causality; Johansen Cointegration; Vector-Autoregressive Model.

1. Introduction

The association between real import, real export and real GDP fills a central place in the writings on economic development and is a subject of key policy concern for government planners and policy makers.

A rise in real export helps to fund real import of required capital goods and other goods which, in turn, give rise to swifter rate of capital creation and hence greater rate of real GDP growth. Moreover, export growth leads to the disclosure of countries to better competition as well as to global new ideas, new means of production and technology. This could lead to enhanced scale economies, effective resource re-distribution, better factor productivities, opening out of local market etc.

Practically, the causal relationship between real import, real export and real GDP has been a major topic of research in the openness growth matter and, till now, is a continuing discussion in the economic development works. Import and export have been considered the leading network through which openness surges the GDP performance. The central question in import and export growth matters is whether causality goes from import and export to GDP. The founding of the direction of this causal relationship has significant suggestions for economic policy schemes. If causality flows from import and export to GDP then the implementation of import and export promotion policies is a proper strategy for a country to develop. But if causality goes on the opposite direction then a certain degree of development may be a precondition for a country to increase its export so as to increase import of the necessary capital goods and, therefore, GDP growth policies are essential to achieved that. A bi-directional causality would suggest that both strategies are indispensible as long as one is strengthened in the other one. Hence, the leading objective of this research is to study the causal relationship

between real import, real export and real GDP in Gambia for the period 1988-2015 by using cointegration and Vector-autoregressive techniques.

2. Literature Review

Economic development is one of the key aims of each society in the world and economic growth is central to economic development.

 Dilek Temiz and Aytac Gokmen, (2010), examined export and economic growth in Turkey for the period 1950-2009. Using error-correction analysis and Granger causality tests, the results approve uni-directional causality flowing from economic growth to export growth in Turkey. There is also evidence for long-run and short run causality running from economic growth to export growth in Turkey. Error correction model and Granger causality test outcomes reveal that the causality flows from economic growth to exports growth. On the same subject S.Al-Khulaifi, (2013), investigated exports and imports in Qatar, using cointegration and error correction model. The result found a long-run unidirectional causality from imports to exports. The study confirms that Qatar is not in violation of its international budget constraints, and macroeconomic policies have been effective in bringing exports and imports into long-run equilibrium. Babatunde, (2014), explored the question ; are export and import cointegrated evidence from Nigeria, using Johansen, Bound testing and Hansen parameter instability test cointegration techniques. The results indicate the existence of long run relationship between exports and imports. The evidence revealed short-run imbalances due to drifting apart of exports and imports, the value of the long run coefficients were found to be close to unity. Again Afaf Abdull J.Saaed and Majeed Ali Hussain, (2015), investigated the impact of exports and imports evidence from Tunisia using Granger causality, Johansen cointegration and error correction models. The error correction model test confirmed that there exists short run causality between GDP and imports and between export and import. The Granger causality test confirmed the presence of uni-directional causality between GDP to imports and between export and import, but not the other way.

3. Methodology

This research uses the techniques of time series econometrics like cointegration, Vector-autoregressive models and Granger Causality to check for the causal relationship between real import, real export and real GDP. To be capable to report every chosen variables effect in time, Vector Auto-regression Method (VAR) is used in this research. In the VAR methods each equation has the same right hand side variables, and those variables include lagged values of all of the endogenous variables. The objective of VAR analysis is to decide the interrelationships among the parameter estimates. In the VAR method, cointegration analysis and Granger causality are used in order to test the causal relationship between variables. Granger causality shows the power of explanation of variable to each other in the system. In this research STATA program is used for the econometric analysis fortunately both VAR and Granger Test are reported by STATA.

4. Data Analysis and Empirical Findings

Annual data for the period 1988-2015 were used for estimation. The data on real import, real export and real GDP for The Gambia are obtained from World Integrated Trade Solutions (WITS) of the World Bank website. Primarily, stationarity of the variables has been examined. Stationarity of a variable depends on whether it has a unit root or not. In Table1 we present the results of unit root tests obtained using the Augmented Dickey-Fuller (ADF) test. The results are based on annual series of real import, real export and real GDP for The Gambia.

Table 1: Augment Dickey-Fuller Unit Root Tests				
Variable	**ADF Test Statistics (Lag(0))**	**Prob**	**Deterministic Regressors**	**Results**
Real GDP	-1.909	0.6501	Trend+Constant	Not Stationary
	0.998	0.9942	Intercept	Not Vaild
Realimport	-2.484	0.3359	Trend+Constant	Not Stationary
	-1.868	0.3472	Intercept	Not Stationary
Realexport	-1.209	0.9086	Trend+Constant	Not Stationary
	-1.186	0.6794	Intercept	Not Stationary
D.RealGDP	-6.182	0.0000	Trend+Constant	Stationary
	-5.759	0.0000	Intercept	Stationary
D.Realimport	-7.562	0.0000	Trend+Constant	Stationary
	-7.521	0.0000	Intercept	Stationary
D.Realexport	-4.759	0.0006	Trend+Constant	Stationary
	-4.735	0.0001	Intercept	Stationary

The results point to the non-existence of unit roots in all the three series after first differenced of each of the series. Precisely, the null hypothesis that the series are non-stationary is not rejected at level of all three variables. Though, when the first differenced of the variables are considered, the null hypothesis is rejected in approval of alternative hypothesis which state that the series are stationary. Therefore, the variables first differenced is found to be stationary and hence real import, real export and real GDP are all integrated of order I(1). The subsequent stage involves applying Johansen cointegration test to check whether the three variables are cointegrated. The optimal lag selections are determined using the Akaike (AIC) and Schwarz information criterion (SIC). The Johansen cointegration test has been executed for these three series and the outcomes of this test has been presented in Table2. The outcomes provide evidence that there is no existence of cointegration vector implying that the three variables are not cointegrated. This means that there is no long run relationship among real import, real export and real GDP. This evidence has pave way to execute analysis of the data using Unrestricted Vector-autoregressive (VAR) model.

Table 2: Johansen Tests For Cointegration					
Max Rank	**Parms**	**LL**	**Eigen Value**	**Trace Statistic**	**5% Critical Value**
0	21	-1390.6489		25.0198*	29.68
1	26	-1381.0384	0.53645	5.7988	15.41
2	29	-1378.3003	0.19672	0.3226	3.76
3	30	-1378.139	0.01282		
Max Rank	**Parms**	**LL**	**Eigen Value**	**Max Statistic**	**5% Critical Value**
0	21	-1390.6489		19.221	20.97
1	26	-1381.0384	0.53645	5.4762	14.07
2	29	-1378.3003	0.19672	0.3226	3.76
3	30	-1378.139	0.01282		

From Table2, we understand that test statistics show zero cointegrating equation at 5 % significance level. Thus, the results of Johansen cointegration test suggest that there is no long-run association between real import, real export and real GDP. The VAR method is used in the modelling of the data instead of VECM approach. The empirical results of the estimated VAR models are presented in Table3.

Table 3: VAR Estimation Model				
Variables	**Coefficients**	**Standard Errors**	**Z**	**P>|Z|**
RealGDP				
RealGDP				
L1.	0.668084	0.1859039	3.59	0.000
L2.	0.0499478	0.2092334	0.24	0.811
L3.	0.3343145	0.1697237	1.9700	0.0490
Realimport				
L1.	-0.147064	0.1044128	-1.4100	0.1590
L3.	-0.0204588	0.1316647	-0.1600	0.8770
L3.	0.0776908	0.1131457	0.6900	0.4920
Realexport				
L1.	0.4028344	0.1306448	3.0800	0.0020
L2.	-0.457206	0.1943635	-2.3500	0.0190
L3.	0.0247463	0.1608686	0.1500	0.8780
Constant	4.19E+07	4.63E+07	0.9100	0.3650
Realimport				
RealGDP				
L1.	0.1969004	0.4310888	0.46	0.648
L2.	0.0225358	0.485187	0.05	0.963
L3.	-0.0712753	0.3935772	-0.1800	0.8560
Realimport				
L1.	0.2910882	0.2421207	1.2000	0.2290
L2.	0.1573577	0.3053145	0.5200	0.6060
L3.	-0.1404607	0.2623711	-0.5400	0.5920
Realexport				
L1.	0.1236249	0.3029496	0.4100	0.6830
L2.	0.3667016	0.4507056	0.8100	0.4160
L3.	-0.1372764	0.373035	-0.3700	0.7130
Constant	7.84E+07	1.07E+08	0.7300	0.4650
Realexport				
RealGDP				
L1.	-0.4317134	0.2594123	-1.660	0.096
L2.	0.7492552	0.2919665	2.570	0.010
L3.	-0.3097947	0.2368393	-1.310	0.1910
Realimport				
L1.	-0.1249778	0.1456988	-0.8600	0.3910
L2.	-0.190232	0.1837263	-1.0400	0.3000
L3.	0.4329592	0.1578846	2.7400	0.0060
Realexport				
L1.	0.9472544	0.1823032	5.2000	0.0000
L2.	0.5080064	0.2712169	1.8700	0.0610
L3.	-0.8564196	0.2244778	-3.8200	0.0000
Constant	4.56E+07	6.46E+07	0.7100	0.4800

The results in Table3 show that there is short run causality running from L1.RealGDP and L3.RealGDP to RealGDP, also from L1.Realexport and L2.Realexport to RealGDP. Again there is also short run causality running from L2.RealGDP, L3.Realimport, L1.Realexport and L3.Realexport to Realexport.
The VAR was evaluated for autocorrelation and normality. It was found that there is no autocorrelation and the residuals are normally distributed (see Appendix).

Table 4: Granger Causality Wald Test For Model One				
Equation	Excluded	Chi2	df	Prob>Chi2
RealGDP	Realimports	2.3067	3	0.5110
RealGDP	Realexports	11.556	3	0.0090
RealGDP	ALL	13.42	6	0.0370
Realimports	RealGDP	6.021	3	0.1110
Realimports	Realexports	3.5725	3	0.3110
Realimports	ALL	9.1897	6	0.1630
Realexports	RealGDP	6.6094	3	0.0850
Realexports	Realimports	8.223	3	0.0420
Realexports	ALL	12.42	6	0.0530

Table4 gives the Granger Causality Wald Test for the estimated VAR model. There is evidence of short run causality running from real import and real export jointly to real GDP. There is also evidence of short run causality running from real export to real GDP. There is evidence of short run causality running from real import to real export. There is no evidence of short run causality running from real import to real GDP. This means that real import alone does not cause real GDP.

5. Conclusions

This empirical research investigates the causal relationship of real import, real export with real GDP by using annual time series data for the Gambia over the period 1988-2015. This research uses time series econometric tools such as ADF unit root test, Granger causality test, Johansen cointegration test and VAR model to explore the relationship between real import, real export and real GDP. The outcomes of ADF unit root test reveal that all the variables are stationary at first differenced. The Johansen cointegration techniques used in this research have shown that there is no long run relationship between real import, real export and real GDP in The Gambia.

VAR analysis confirm short run causality running from L1.RealGDP and L3.RealGDP to RealGDP, also from L1.Realexport and L2.Realexport to RealGDP. Again there is also short run causality running from L2.RealGDP, L3.Realimport, L1.Realexport and L3.Realexport to Realexport. There is no evidence for long-run causality running from real import and real export to real GDP as revealed by this study. Granger causality test results show evidence of short run causality running from real import and real export jointly to real GDP. There is also evidence of short run causality running from real export to real GDP. There is evidence of short run causality running from real import to real export. There is no evidence of short run causality running from real import to real GDP. This means that real import alone does not cause real GDP; and if causality flows from real import and real export jointly to real GDP then the implementation of import and export promotion policies is a proper strategy for the Gambia to adopt and develop so as to surge her economic growth. These results are consistent with some previous researches conducted by several researchers and in several different countries.

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APPENDIX

Table5: Lagrange-Multiplier Test

Lag	Chi2	df	Prob>Chi2
1	8.6848	9	0.46686
2	11.6872	9	0.23152

Table6: Jarque-Bera Test

Eaquation	Chi2	df	Prob>Chi2
RealGDP	8.322	2	0.01559
Realimport	0.201	2	0.90417
Realexport	0.238	2	0.88781
ALL	8.762	6	0.18742