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Exports, domestic demand and economic growth in Ethiopia: Granger causality analysis

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Fundamental relationships between different macroeconomic variables may follow certain common theories, but local preferences are also decisive in determining their unique behaviour. Looking into domestic demand-growth nexus and export-growth nexus is, therefore, needed in Ethiopia, so as to understand the long -run economic stance and to capture the short-run dynamics in the national economy. Thus, the aim of this study is to find a causal relationship between exports, domestic demand and economic growth in Ethiopia using time series data over the period 1960 to 2011. Household consumption and government consumption were used to measure domestic demand. Granger causality and Johansen cointegration tests were employed in the empirical analysis. Result of Johansen cointegration test indicates the existence of long run relationship among the variables and Granger causality test result shows a dynamic relationship between export and economic growth, and between domestic demand and economic growth. Exports and domestic demands are important for economic growth and economic growth has an impact on exports and domestic demand in Ethiopia. A successful and sustained economic growth requires growth in both exports and domestic demand. Nevertheless, a balance emphasis should be on domestic demand, particularly household consumption to push the economy towards higher growth path.

Key words: Domestic demand, Ethiopia, exports, Granger causality.

INTRODUCTION

Any development model starts with the key factors determining economic growth. In this regard, an admirable Keynesians macro economic theory suggests aggregate demand is the source of growth. Broadly, aggregate demand is categorized into domestic demand and external demand. It was primarily generated from the Keynesian theory of demand, either or other wise to follow export promotion or internal market development for economic development of a given country. The former focuses on external demand, while the latter highly stresses on the domestic demand as articulated by the Keynesian theory of demand in Keynes' General Theory (1930).

Growth is termed as export-led growth if the attainments of a high rate of export growth go with a high GDP and income growth rate. If an increase in economic growth leads to increase in export it is called growth-led export. On the other hand, growth could be termed as domestic demand-led, if the growth of GDP is mostly influenced by growth of domestic demand and the role of export is relatively weaker. Moreover, if an increase in economic growth lead to increase in domestic demand it is called growth-led export. Naturally, the short-run association, the long run relationships and an estimation of the impact of exports and domestic demand on economic growth are needed, since, the short-run and long run relationships

among macroeconomic variables such as aggregate demand would find their way into policy formulation at various level of government. Importantly, the direction of causality among exports, domestic demand and economic growth are crucial for the choice of the growth strategy.

Literature tries to assess the nature of the relationship between exports, domestic demand and economic growth, but hold different views. Moreover, there are debates among economists concerning which demand is more superior and especially which demand is more favorable for LDCs to enhance their long-run economic growth. Particularly, an analysis of the causal relationship between exports, domestic demand and economic growth in Ethiopia has not received adequate attention. Tegenu (2011) examined export-led growth or domestic demand led-growth for Ethiopia. However, his analysis focuses on paradigm shift of policy from export promotion to strengthen domestic demand. His analysis is purely argumentative and not supported with empirical evidences. Biramo (2012) also analyzed the effect of export-led growth strategy (ELG) on Ethiopian economy and argued that export causes economic growth and the reverse causality is not true. But, his analysis did not incorporate domestic demand, whereas this study does.

The aim of this study is therefore to deal with the causal relationship between domestic demand, export and economic growth in Ethiopia using annual data over the period 1960 to 2011. Augmented Dickey- Fuller (1981) and the Phillips Perron (PP) (1988) unit root test statistics are employed to examine whether the series are stationary or otherwise. The Johansen (1988) cointegration technique is used to test the long run relationship of exports, domestic demand and economic growth since the Johansen Maximum Likelihood technique has several advantages: Firstly, without imposing any bias on the estimates, it permits the existence of cointegration between series of variables. Secondly, it helps to identify whether more than one cointegrating vectors exist or not. Thirdly, it can estimate long-run relationship between non-stationary series using Maximum Likelihood procedure. In addition, the robustness result of Johansen cointegration technique is not doubtful if the sample size is more than 40, even though Auto-regressive Distributive Lag (ARDL) otherwise known as bound test is more robust for small sample size. For comparison purpose, in addition to Johansen cointegration, ARDL approach is also employed. Moreover, unlike Toda, Yamamoto, Dolado and Lutkepohl (TYDL), Granger causality (used in this study) is helpful in determining short-run and long run causality among exports, domestic demand and economic growth.

The importance of this is to provide a wide outlook for policy making in which the final demand components are more important and need attention in order to add a momentum to the economy. Moreover, it is expected to be used as an input for a more coherent policy prescription, particularly step-wise procedure regarding the final

demand and economic growth nexus.

The remaining part of this study is structured as follows: Section two reviews literature related to exports, domestic demand and economic growth. Section three provides Ethiopian economy at glance. Section four provides econometrics model specifications whereas section five presents the empirical results and discussion. The last section provides concluding remarks and forward policy implications.

REVIEW OF LITERATURE ON EXPORTS, DOMESTIC DEMAND AND ECONOMIC GROWTH

Early growth theories emphasized on different factors that lead to economic growth. For instance, Mercantilists emphasized surplus balance of trade, Physiocrats emphasized agriculture as the source of all wealth while the Cameralists favoured taxation and state regulation for strong economy (Lombardini, 1996). Within the framework of the classical models of Smith and Malthus, economic growth is described in terms of fixed land and growing population.

Barbosa et al. (1999) stated that, mainstream growth models usually follow Say's Law and, accordingly, emphasize on the supply side of income growth through some sort of growth accounting. In such framework, however, there is no fundamental role for aggregate demand since, from the start; it is assumed that supply creates its own demand.

In contrast to this framework, Keynesian models usually follow the principle of effective demand and, therefore, give emphasis to sources of aggregate demand. Hence, in Keynesian models growth is a demand-led process. Accordingly, this demand is broadly categorized into external and domestic demand. In the literature domestic demand is best proxied by household and government consumption. Export-led growth (ELG) strategy is characterized by the attainments of a high rate of export that would lead to a high growth in GDP. Domestic demand-led growth hypothesis suggests that, it is the rise in domestic demand which is considered to be the main driving force for economic growth.

Felipe (2003) analyzed the growth accounting among Asian countries, and found that since income level is too low among these countries, domestic demand-led growth fails to generate and accelerate economic growth. These countries should rely up on foreign market to sell their products and finally enhance their economy. Felipe argues that these countries are better off by following export-led growth rather than domestic-led growth. Blecker (2003) provided some counter-arguments against export-led growth, especially on Felipe's line of thinking. Blecker argued that "the export-led growth strategy is doomed to fail due to global demand constraints since 'the market for developing countries' exports is limited by the capacity of the industrialized nations' imports".

Wong (2006) examined Granger causality among

export, domestic demand and economic growth in China using time series data over the period 1978-2002. Households and government consumption were used as the measure of domestic demand. The result showed bi-directional Granger causality among export, domestic demand and economic growth. Consequently, he concluded that, there is a dynamic relationship among export, domestic demand and economic growth.

Chimobi and Uche (2010) examined the relationship between export, domestic demand and Economic growth in Nigeria using time series data over the period 1970-2005. They employed Granger causality and co-integration test. Household and government consumption were used as the proxy for measuring domestic demand. They found that economic growth Granger causes both export and domestic demand while government consumption is caused by export. In addition, their result reveals bidirectional causality between export and household consumption. They argued that domestic demand is a genuine tool that encourages Nigerian economy.

Tegenu (2011) examined export-led or domestic demand-led growth policy in Ethiopia. He based his arguments on Ethiopian government's plan to export power to Sudan and Djibouti. He asks why the government gave priority to energy export in the face of growing domestic power shortage in the country; he answers that in its development strategy the government has given strong emphasis to the promotion of exports in order to increase the growth performance of the economy. He argued that the current stage of the country's structural transformation requires policy agenda of domestic demand-led growth. He concluded that, in Ethiopian context to increase effective domestic demand, it is necessary at first to bring about a shift in the household demand from food consumption to manufactured goods. To bring about a shift in demand, it is necessary to increase household income. Surprisingly, he propose paradigm shift of policy based on single line of arguments (Power export) even without raising government's spending and investment.

In a nutshell, mixed empirical results concerning the causal relationship between, domestic demand, export and economic growth can be attributed to a number of factors. Among other things, estimation techniques, choice of variables, study period, and level of development of the country are being studied.

Moreover, to take care of the simultaneity problem, since export and measures of domestic demand (households' consumption and government consumption) are components of GDP, percentage share of export, household consumption and government consumption in GDP is used.

The economy of Ethiopia at a glance

In spite of its long history and rich potential in terms of resources, Ethiopia is one of the poorest and least

developed countries in the world in terms of economic and social indicators. High incidence of poverty, low social service facilities, unemployment, backward technology and low productivity, environmental degradation, etc. are the characteristic features of Ethiopian economy. Agriculture takes the lion's share of economic structure with other proportion of service and industrial sector. The per capita income of the country is one of the lowest in the world and the combined rapid population growth makes the situation worse off. Nevertheless, the recent performance is encouraging. In comparison with sub-saharan Africa, Ethiopian economy is performing well, especially over the past decade. According to report by World Bank (2012) "Over the past decade, the Ethiopian economy has been growing twice the rate of the Africa region, averaging 10.6 percent GDP per year between 2004 and 2011 compared to 5.2 percent in sub-saharan Africa".

The Ethiopian economy came back to growth in the early 1990s after the overthrow of the Dergue and the end of its suppressive economic policies. However, this recovery was interrupted by two major shocks: the war with Eritrea from 1998-2000 and drought in 2002/03. The current boom is a combined effect of cyclical recovery and structural shifts in the economy towards a higher growth path. In Ethiopia, private consumption expenditure represents the largest component of total spending in the economy and hence it accounts for around two-thirds of the nation's Gross Domestic Products (GDP). On average, the share of household consumption from GDP has increased over the whole period being 77.45% in 1960/61-1973/4 to 82.30% in 2001/02/-2010/11. Between 1960 and 2011 the share of household consumption from GDP has averaged about 79.5 percent. In general, household consumption as the largest components of aggregate demand influences economic growth and is used to determine the economic cycle.

On the other hand, growth rate of exports and government consumption are volatile in Ethiopia during the period under consideration owing to international market price fluctuation, drought and political instability, respectively. Relative to export and government consumption, household consumption moves in a very closer way with economic growth (see annex A). The most important observation here is that the behaviour of household consumption is very much similar with that of economic growth. In sum, domestic demand and export have a role in the economic growth in Ethiopia.

Econometrics model specification

The basic macroeconomic relationship of the aggregate demand composition is used in this study to examine the relationship between economic growth, domestic demand and export using Vector Autoregressive Model (VAR). The VAR method is powerful in causal analysis of variables, since all the variables in a VAR are

systematically treated endogenous by including for each variable an equation explaining its evolution based on its own lags and the lags of all the other variables in the model.

Thus, in order to examine the short-run dynamics and long-run relationships among domestic demand, export and economic growth, the study employs cointegration and Granger causality test in the VAR form as: $U(\text{VAR})=(Y,X,GC,HC)$.

Following Lai, (2004), Wong (2007, 2008) and Chimobi and Uche (2010), the model could be specified as:

$$Y_t = f(X_t, HC_t, GC_t) \quad (1.1)$$

In an econometric form equation (4.1) can be stated as:

$$\ln Y_t = \beta_0 + \beta_1 \ln X_t + \beta_2 \ln HC_t + \beta_3 \ln GC_t + \varepsilon_t \quad (1.2)$$

Where, Y_t is economic growth proxied by GDP per capita,

X_t is export (%GDP)

GC_t is government consumption (%GDP)

HC_t is household consumption (%GDP)

The variables are logged so that, the first differences can be interpreted as growth rates and to reduce variation in time series data sets. The coefficients are elasticities and ε is the white noise error term.

According to Sheehy (1990), using exports and other component of GDP as existing figures leads to bias in favor of correlation and, the alternative measures of the components of GDP (e.g export) variable not subject to this bias should be used to test the desired relationship such as using the percentage share. The same is true for household and government consumption since, they are other components of GDP in context of the final demand. Following the above justification, household consumption, government consumption and exports are expressed as the percentage of GDP. The study used annual data over the period 1960 to 2011. The data are collected from Ethiopian Ministry of Finance and Economic Development (MoFED, 2011), and International Monetary Fund (IMF) and World Bank (WB, (2011) CD-ROM.

Estimation technique

This sub-section proceeds as follows: First, Augmented Dickey- Fuller (1981) and the Phillips Perron (PP) (1988) unit root tests have been employed to know whether the series are stationary or otherwise. If the series are non-stationary and we used a classical method of estimation such as OLS, we are mistakenly going to accept spurious relationships, in which their results would be meaningless. Moreover, if the series are found to be non-

stationary, the common knowledge is differencing the series if they are DS. But, differencing has its own costs. It prevents detection of the long-run relationship that may be present in the data, that is, the long-run information is lost. The null hypothesis for the test states that the series has unit root. Whereas, the alternative hypothesis says the series is stationary. The unit root test is undertaken both at the intercept and intercept plus trend regression forms.

Secondly, if the series are found to be stationary after differencing, Johansen cointegration technique (that has an ability to capture the properties of time series by estimating all of the possible cointegrating vectors along with the test statistics) is applied to test the long run relationship among the variables. Thirdly, once cointegration is examined vector error correction model is used to obtain both short run and long run information. Fourthly, Granger causality test is applied to could hold through error correction term. Finally, volatility test acquired to Forecast Error Variance Decomposition and Impulse Response Function have been used to detect out sample causality test. Diagnosis tests at each stage of estimation technique are performed to check parameter consistency.

ESTIMATION AND DISCUSSION OF RESULTS

Unit root test

According to Granger and Newbold (1974), the regression results may be spurious if the variables are non-stationary. In the result, it is very important to test the existence of unit root and examine the order of integration for each variable beforehand, so as to avoid the spurious correlation problem. Both Augmented Dickey- Fuller (1981) and the Phillips Perron (PP) (1988) unit root tests suggest that the variables under examination are a unit root process at levels and, hence, integrated of order one, $I(1)$.

The variables for the growth rate of per capita GDP is given by DLP_{GDP} ; the share of export earnings in the GDP is by LX , the share of private consumption expenditure in the GDP is by LHC and the share of government consumption in the GDP is given by LGC . The null hypothesis claims that the relevant series contains a unit root. D indicates the first difference of the respective series and finally $**$ indicates rejection of null hypothesis at 1% level of significance.

Tables 1 and 2 present the result of both ADF (based on the automatic lag length selection by Akaike information criteria) and PP test. The obtained results show that all the time series in levels are non-stationary, which means they are integrated at an order of 1, i.e. $I(1)$. Thus, the null hypothesis cannot be rejected for any of the variables under examination at 1 and 5% level of significance. However, when differenced once, the tests

Table 1. ADF unit root test for stationarity.

Variables	Level								
	Intercept				Trend and intercept				
	Statistics test	1% critical values	5% critical values	P-value	Statistics test	1% critical values	5% critical values	P-value	Decision
LPGDP	1.012	-3.565	-2.919	0.996	0.329	-4.148	-3.500	0.998	I(1)
LRX	-1.966	-3.565	-2.919	0.300	-2.329	-4.149	-3.500	0.411	I(1)
LRHC	-2.551	-3.568	-2.921	0.109	-2.337	-4.152	-3.502	0.406	I(1)
LGC	-2.605	-3.568	-2.921	0.098	-3.009	-4.175	-3.513	0.141	I(1)
					First difference				
DLPGDP	-2.513	-3.574	-2.923	0.001**	-2.799	-4.161	-3.506	0.0003**	
DLRX	-7.326	-3.568	-2.921	0.000**	-7.260	-4.152	-3.502	0.0000**	
DLHC	-6.309	-3.574	-2.923	0.000**	-5.709	-4.165	-3.508	0.0001**	
DLGC	-5.895	-3.568	-2.921	0.000**	-5.952	-4.152	-3.502	0.0000**	

Table 2. PP unit root test for stationary.

Variables	Level								
	Intercept				Trend and intercept				
	Statistics test	1% critical values	5% critical values	P-value	Statistics test	1% critical values	5% critical values	P-value	Decision
LPGDP	0.748	-3.565	-2.919	0.992	0.096	-4.148	-3.500	0.996	I(1)
LX	-1.952	-3.565	-2.919	0.306	-2.371	-4.148	-3.500	0.389	I(1)
LHC	0.122	-2.611	-1.947	0.717	-3.500	-4.148	-3.848	0.217	I(1)
LGC	-2.237	-3.565	-2.919	0.196	-2.1343	-4.148	-3.500	0.514	I(1)
					First difference				
DLPGDP	-5.129	-3.568	-2.921	0.000**	-5.325	-4.152	-3.502	0.0003**	
DLX	7.328	-3.568	-2.921	0.000**	-7.261	-4.152	-3.502	0.000**	
DLHC	-18.631	-3.568	-2.921	0.000**	-22.558	-4.152	-3.502	0.0001**	
DLGC	-5.872	-3.568	-2.921	0.000**	-5.904	-4.152	-3.507	0.0001**	

strongly reject the unit root, saying that they are integrated at an order of zero.

The results of the unit root test are consistent with the theoretical argument that most macroeconomic series are not stationary at their levels and become stationary at their first difference. Once, the series are found to be stationary in differencing once, no further tests are required.

Although the individual series could be non-stationary, that is, they are individually I (1), as presented above, a linear combination of them might be stationary (Engle and Granger, 1987), which means a well-defined linear relationship exists among them in the long run. So, the subsequent discussion provides a test for cointegration between the variables under investigation.

Lag length selection and long run relationship

Before proceeding to the task of testing cointegration relationship, optimal lag length determination is required in vector autoregressive (VAR) model. This is important since, under-parameterization would lead to a biased result and similarly, over-parameterization reduces the power of the tests. Basically, information theoretic model selection criteria attributed to Hannan-Quinn information criteria (HIC), the Log Likelihood (LL), the Schwarz information criteria (SIC) and the Akaike information criteria (AIC) are considered.

This study determined the optimal lag length according to the VAR lag order selection criteria and hence, Akaike Information Criterion (AIC) of lags (p) of VAR, Schwarz

Table 3. VAR lag order selection.

Lag	LR	FPE	AIC	SC	HQ
0	NA	1.00e-07	-4.763068	-4.605609	-4.703815
1	212.5406*	1.26e-09*	-9.142708*	-8.355411*	-8.846443*
2	20.03414	1.49e-09	-8.989071	-7.571937	-8.455794

*Indicates lag order selected by the criteria using Eviews – 6; AIC: Akaike information criterion; FFPE: Final prediction error; SSC: Schwarz information criterion; HHQ: Hannan-Quinn information criterion; LLR: sequential modified LR test statistic (e(Each test at 5% level).

Table 4. Result of Johansen cointegration test.

Null hypothesis	Alternative hypothesis	Eigen value	Statistic	5% critical value	Prob.
Trace test(λ_{trace})					
$r=0$	$r \geq 0$	0.396398	48.78435	47.85613	0.040*
$r \leq 1$	$r \geq 1$	0.259520	23.54232	29.79707	0.770
$r \leq 2$	$r \geq 2$	0.136639	8.519461	15.49471	0.411
$r \leq 3$	$r \geq 3$	0.023194	1.173336	3.841466	0.2787
Maximum Eigen value test(λ_{max})					
$r=0$	$r=1$	0.396398	25.24203	27.58434	0.096
$r=1$	$r=2$	0.259520	15.02286	21.13162	0.287
$r=2$	$r=3$	0.136639	7.346124	14.26460	0.449
$r=3$	$r=4$	0.023194	1.173336	3.84166	0.278

Where (*) means rejection of the null hypothesis at the 5% and r denotes the rank of the long-run matrix.

Bayesian Criterion (SBC) of lags (p) of VAR and others select the same lag length which is one. So in this study, the lag length used is one for cointegration test (Table 3).

Once the optimal lag is decided based on the criterion, then corresponding estimated residuals need to be tested for the sufficiency of the lag to pass tests relating to the presence of autocorrelation. The lag length selected by the criteria would be used when residual could pass the autocorrelation test and, hence, the test shows no autocorrelation problem at lag one. Then step is taken to discuss the long run relationship among variables.

Final demand and growth linkage in the long run

Both PP and ADF tests suggest that all the variables are found to be integrated of order of 1, i.e., I (1), and thus, have a stochastic trend, and in addition, found to be stationary at their first differences, indicating that they are all candidates for inclusion in a long-run relationships for testing the number of cointegrating relationship among them. Both tests; the maximum eigenvalue (λ_{max}) and trace statistics (λ_{trace}) are used to determine the number of cointegrating vectors.

The trace statistic indicates the existence of one cointegrating relationship while, the maximum Eigen

value fails to say (Table 4). Though no complete agreement among econometricians, concerning which of the test is powerful, this study has preferred to report and rely on trace tests. The trace test shows more robustness to skewness and excess kurtosis in the residual rather than maximum eigenvalue. It is also robust to departure from heteroscedasticity (Johansen, 1995).

The null hypothesis claims no cointegration is rejected at the conventional level of significance, since the trace test statistic is greater than the critical value at zero cointegrating vector ($r=0$). So, it is fair to conclude that there exists a long run relationship between the series and the results support the existence of one cointegrating relationships. This is equivalent to say among economic growth, household consumption, government consumption and export, there is one long run relationship (Table 5).

Cointegration test using ARDL for comparison

Autoregressive distributive lag estimates

ARDL (1, 0, 0, 0) is selected based on Schwarz Bayesian Criterion. Dependent Variable is LY. 50 Observations were used for estimation from 1961 to 2011. If the

Table 5. Cointegration test using ARDL for comparison.

Regressors	Coefficient	Standard Error	T-Ratio [prob]
LY (-1)	.71802	0.95953	7.4830[0.00]
LHC	-.95476	.48644	2.1386[.038]
LEX	.090645	.17152	1.7459[0.046]
LGC	.12494	.17710	1.79530[0.043]
INPT	3.7676	1.7487	2.1546[0.037]
TREND	.3015E-3	-.0020704	.1456 [0.885]
R-Squared	.8219	R-Bar –Squared	.80168
S.E of Regression	.13011	F-Stat. (5, 44)	40.6145[0.00]
Mean of Dependent Variable	2.2328	S.D of Dependent Variable	.29216
Residual Sum of Squares	.74486	Equation Log-likelihood	34.2175
Akaike Info. Criterion	28.2175	Schwarz Bayesian Criterion	22.4814
DW-Statistic	1.7616	Durbin's h-Statistic	1.1475[.251]

Testing for existence of a level relationship among the variables in the ARDL model

F-Statistic	95% lower bound	95% upper bound	90% lower bound	90% upper bound
1.2461	4.3912	5.5380	3.6942	4.7324
W-Statistic	95% L. Bound	95% U. Bound	90% L. Bound	90% U. Bound
4.9843	17.5647	22.1519	14.7770	18.9295

Note: since the F-stat. is below the 95% Lower bound, when economic growth is used as dependent variable, it indicates only one cointegrating equation which is similar with that of Johansen's cointegration technique.

Table 6. Diagnostic test.

Test Statistic	LM Version	F- Version
A: Serial Correlation	*CHSQ (1) 1.0307[.309]* * F(1,43)	.91074 [.345]*
B: Functional Form	*CHSQ (1) .54264[.461] * F (1, 43)	.47179[.496]*
C. Normality	*CHSQ (1) .1511[0.11] *	Not Applicable
D: Heteroscedasticity	*CHSQ (1) .466773 * F(1,48)	.4522[.504] *

Table 7. Results of Long run Equation (Normalized co-integration coefficients).

Variable	LGC	LHC	LX
Coefficient	0.20177	3.7106	0.5778
P value	[0.423]	[0.018]*	[0.001]**

* and** denote significant at 5 and 1%, respectively.

statistic lies between the bounds, the test is inconclusive. If it is above the upper bound, the null hypothesis no level effect is rejected. If it is below the lower bound, the null hypothesis no level effect cannot be rejected. The critical value bounds are computed by stochastic simulations using 20000 replications (Table 6).

Once the existence of unique cointegrating vector is identified, Johansen Maximum Likelihood method of the linear combination of variables represented by the first row of standardized beta (β) eigenvectors and first

column of alpha (α) coefficients are important for long run equation and short run adjustment (Table 7).

Consequently, the results that appeared in Table 8 suggest that the number of statistically significant cointegration vectors is equal to 1 and is as follows:

In order for the results to be econometrically creditable and economically meaningful, it is important to investigate the statistical properties of the model. To this end, a number of diagnostic test have been undertaken. The result shows that, the null of no serial correlation, homoscedasticity and normality are not rejected at conventional level of significance. Moreover, the RESET test also confirmed that there is no functional misspecification problem. In addition, graphical test of vector autoregressive (VAR) stability and the diagnostic graph of residual (1-step residuals +/-2nd SE) have also been employed. As can be seen from the graphs, the null hypothesis of overall parameter consistency from the VAR cannot be rejected based on the 1-step recursive residuals (1-step residuals +/-2nd SE) and hence, each

Table 8. Parsimonious result of VECM estimate.

Variables	Coefficient	Std.error	t-value	t-prob
Constant	0.00613860	0.008140	0.754	0.455
Dpcy_1	0.725056	0.2217	3.27	0.002
DLGC	0.00959534	0.06120	0.157	0.876
DLGC_1	0.124787	0.05895	2.12	0.041
DLHC	0.374591	0.1736	2.16	0.037
DLHC_1	0.267918	0.1626	2.65	0.007
DLEX	0.0258301	0.07028	2.368	0.015
DLEX_1	0.0379640	0.17366	3.115	0.009
ECT_1	-0.61765	0.2932	-2.11	0.042

Y = 0.20177LGC + 3.71064LHC + 0.5778LX; P_{value}: [0.423], [0.018]*, [0.001]**; System (Multivariate) Diagnostic test; Vector AR 1-2 test: F(32,119)= 1.1155 [0.3282]; Vector Normality test: Chi²(8) = 38.235 [0.11000]; Vector hetero test: F(80,167)= 0.79392 [0.8765]; Vector hetero-X test: F(140,173)= 0.74283[0.9662].

variable is stable (See annex B).

The coefficients' estimates in equilibrium relationships which are essentially the long run estimated elasticities relative to economic growth suggest that household consumption is elastic to economic growth.

In the long run, an increase of 1% of household consumption will lead to an increase of 3.7% for economic growth. This is through multiplier effect of final demand. Higher consumption implies higher demand. The higher demand in the economy necessitates output expansion in order to satisfy the excess demand whereas

$$\Delta Y_t = \psi + \sum_{i=1}^m h_i \Delta Y_{t-i} + \sum_{j=1}^m \lambda_j \Delta GC_{t-j} + \sum_{q=1}^m \phi \Delta HC_{t-q} + \sum_{z=1}^m \gamma \Delta X_{t-z} + \pi ecm_{t-1} + \varepsilon_t \text{ --- 1.3}$$

Where; π is the speed of adjustment

With the exception of the first difference of government consumption expenditure all included variables are found to be statistically significant and economically meaningful. Normality test, residual autocorrelation, test of heteroscedasticity and Ramsey's reset tests are conducted.

R² = 0. 795031 F (8, 40) = 8.264 [0.000]** DW = 1.88

Diagnostic tests

AR 1-2 test: F (2, 37) = 3.9159 [0.087]
 ARCH 1-1 test: F (1, 37) = 1.5093 [0.2270]
 Normality test: Chi²(2) = 3.1534 [0.2067]
 Hetero test: F(16,22) = 2.9115 [0.1006]
 RESET test: F (1,38) = 3.6817 [0.0625]

the excess demand would further exert its own power for higher output.

The result corresponds to long run economic growth. In the long run we do not expect the production capacity of the economy remain fixed, since the country is currently adopting different technologies and knowhow and striving to expand market that would contribute their part to expansion in production.

On the other hand, in the long run, an increase of export by 1% will lead to incase of economic growth by 0.57%. This is due to the fact export is very important for economic growth through improving productivity. The finding is consistent with that of Chimobi and Uche in Nigeria (Lai, 2004), Malaysia (Lin and Li, 2002), China (Gemechu, 2002), Ethiopia among others.

However, government consumption expenditure is found to be statistically insignificant and, hence, has no significant effect on growth in the long run. This is due to short run phenomenon of this type of expenditure, and hence, inability of such expenditure to create productive asset as its spillover effect would not be span to long run to drive the economy in the future. This finding is consistent with Dunne and Nikolaidou (1999) in the case of Greece (Loto, 2011) and Nigeria.

A VAR model with an error correction mechanism

After determining that the logarithms of the variables in the model are cointegrated, we must estimate then a VAR model in which we shall include a mechanism of error correction model (ECM). This is formulated as under:

The value of the coefficient of determination (R-square) is sufficient. Goodness of fit of the model (R²) shows 79.5 percent of a variation in the dependent variable (economic growth is explained by the combined effects of all the included variables in the short-run). The F statistics rejects null hypothesis that all the coefficients in the model are jointly insignificant. In addition, the test for autoregressive conditional heteroscedasticity (ARCH) points that no ARCH structure in the error term is detected (Table 9). Failure to reject the null of no ARCH indicates the existence of constant variance. The Jacque Bera test for normality cannot reject the null hypothesis of normality. It points out that the error term is normally distributed. Finally, the Ramsey test for functional form misspecification accepts the regression specification of the dynamic model, while the Durbin-Watson (DW) statistics is within the permissible limits, without revealing any autocorrelation balances.

In the short run, change in economic growth is

Table 9. Results of Granger causality tests.

Dependent	Sources of causation (Independent)							
	Short run (P-value)	Long run (P-value)	Over all causality (P-value)					
$\Delta \ln Y$	$\Delta \ln X$	$\Delta \ln G$	$\Delta \ln C$	ECT_1	$\Delta \ln Y$, ECT	$\Delta \ln X$, ECT	$\Delta \ln G$, ECT	$\Delta \ln C$, ECT
-	0.26	0.03	0.004	0.004	-	0.019	0.45	0.002
0.011	-	0.74	0.042	0.032	0.011	-	1.24	0.65
0.049	0.75	-	0.026	0.41	0.042	3.52	-	0.008
0.006	0.32	0.11	-	0.024	0.003	0.035	0.00	-

positively and significantly affected by last year growth. Change in domestic demand components in this year and one year back also causes current economic growth positively. The same is also true for export earnings. This is in line with theoretical argument that economic growth is due to its major components in each year and accumulated effect of the past year. The base year growth matters for the current year economic improvement and becomes the base for the enhancement of its components for the years to come.

The lagged error correction term (ECT-1) included in the model to capture the long run dynamics between the cointegrating series is negative indicating that about 61.76% of the short run disequilibrium in economic growth will be adjusted to equilibrium within a year (the same year) and full adjustment will take about one year and seven months.

The magnitude of export, government consumption and household consumption in the long run are much higher than the short-run impacts, indicating that the impacts of change in export and domestic demand on economic growth are much stronger in the long-run.

The existence of cointegrating relation among exports, government and household consumption and economic growth suggests there must be Granger causality at least in one direction.

Granger causality test

Though cointegration implies the existence of at least unidirectional causality between variables, it does not provide the direction of causality (Engel and Granger, 1987). Thus, having established a cointegration relationship, we based on error-correction model (ECM) to test for Granger causality among export, domestic demand and economic growth. According to Granger (1988), if the series are found to be cointegrated, the inclusion of error correction term in testing causal relationship among variables is very much important, since, it provides an extra channel through which causality may be observed. Otherwise, the standard Granger test may lead to invalid causal information. Moreover, including error correction term also allows us to distinguish between short run, long run and overall

causality.

Sources of causation between the variables in one equation could be identified through three channels:

- The coefficients of each explanatory variable in one equation (short-run Granger causality)
- The lagged error correction terms
- The terms just described in (a) and (b) jointly (strong or over all Granger causality)

The lagged change in the respective independent variables of VAR representation tells us about the short run causal impact whereas, the significance of the error correction term gives the information on long run causality. The coefficients of error correction terms are expected to capture the adjustments of ΔY_t , ΔX_t , ΔG_t , ΔH_t and ΔC_t to their long run equilibrium, whereas, the coefficients on lagged variables of ΔY_t , ΔX_t , ΔG_t , ΔH_t and ΔC_t are expected to capture the short run dynamics of the models.

In the Granger causality, the following four conditions are the likely outcomes: (1) Neither Granger variables cause each other (short-run phenomenon) (2) one variable (say g) causes the other (say h) but not the other way round (3) one variable (say h) causes the other variable (say g) but not vice versa and (4) all variables are reinforcing each other.

As long as the coefficient of error correction term is statistically significant, causality exists among the variables under investigation even if the coefficients of the lagged variables are not statistically significant.

The direction of causality can be determined by testing for the significance of the coefficients of each dependent variable in each equation. For long-run causality we need to test the significance of the speed of adjustment, which means testing whether the coefficient of the respective error-correction terms are equal to zero or different from zero. Finally, strong causality is tested by applying joint tests including the coefficients of the respective explanatory variables and the respective error correction term of each equation. This is helpful to notice which variables bear the burden of a short-run adjustment to re-establish a long-run equilibrium, following a shock to the system (Asafu-Adjaye, 2000).

As a testing criterion, the Wald χ^2 test and F statistic

Table 10. Variance decomposition of LY.

Period	S.E.	LY	LX	LHC	LGC
1	0.046023	100.0000	0.000000	0.000000	0.000000
2	0.068041	96.44478	0.102601	3.160620	0.292000
3	0.088137	79.01571	0.930299	19.58130	0.472696
4	0.110181	63.13423	3.675878	31.82163	1.368253
5	0.130230	53.34229	5.407502	39.09911	2.151100
6	0.147652	47.90169	6.430054	42.89626	2.771998
7	0.162791	44.72255	6.960153	45.13427	3.183027
8	0.176380	42.68580	7.277303	46.57678	3.460123
9	0.188897	41.23326	7.490918	47.62335	3.652465
10	0.200629	40.11628	7.655193	48.43270	3.795824

are used. With these statistics the variables of interests (economic growth, household consumption, government consumption and export) are tested for each separate equation. The results are summarized in Table 10.

The included variables in the analysis are: per capita GDP (Y) share of export earnings in the GDP (X), the share of private consumption expenditure in the GDP (C) and the share of government consumption in the GDP (G). The reported probability is that of F-statistics.

Empirically, the finding reveals that there are causal relationships between economic growth, export, government consumption and household consumption at least in one of the three cases, that is short-run, long-run and overall causality.

Let us begin the analysis with the short-run causality results. In the short-run, the result tells us that causality runs from household consumption to economic growth and from economic growth to household consumption. So, there is bi-directional Granger causality between economic growth and household consumption in the short run. Moreover, the causality also runs from government consumption to economic growth and from economic growth to government consumption. There is uni-directional causality between export and household consumption as well as between government consumption and household consumption. The causality is running from household consumption to export and government consumption. In addition, the causality between export and economic growth in the short run is also unidirectional; the causality is running from growth to export. However, there is no short-run Granger causality between export and government consumption. Thus, there is a dynamic relationship between export, domestic demand and economic growth.

In the long run, export and domestic demand Granger causes economic growth. Economic growth, government consumption and export also Granger causes household consumption. There is bidirectional Granger causality between export and economic growth and, between household consumption and economic growth. However, there is unidirectional causality between economic growth

and government consumption. The direction of causality is running from economic growth to government consumption. The result also shows strong causality between household consumption and economic growth.

In the whole, the result shows that domestic demand measured by household and government consumption is important for economic growth and in the same manner economic growth is also important for domestic demand. The same is true for export. Economic growth promotes export and export is also important for economic growth. In the result, the finding supports domestic demand led-growth, growth led-domestic demand and growth led export hypothesis in the short run and long run, while, export-led growth hypothesis is supported in the long run.

With respect to previous work undertaken concerning export, domestic demand and growth nexus, the finding that domestic and economic growth reinforcing each other is consistent with the argument of Palley (2002), who argued that domestic demand plays a significant role in economic growth; Bello (2001) who argued government has understood the importance of domestic demand to stimulate growth. Munko (2007) argued that economic strategy prioritizing stimulation of domestic market has the potential effect for growth and development. The result is also supported by Lai (2004), who argued about domestic demand-led growth. However, as long as there is long run relationship between exports and economic activity, domestic demand led growth should not entirely replace an export-led growth strategy. Since, export-orientation is still one of the best strategies to adopt to ensure growth. Moreover, the finding of bidirectional Granger causality between household consumption and economic growth is consistent with Wong (2008) in case of Asean-5; causality between government consumption and economic growth is consistent with that of Ranjan and Sharma (2008) in the case of India, Sami Taban (2010) in the case of Turkey, Olukayode (2009) in the case of Nigeria, among others. Regarding export-economic nexus, the finding is consistent with Ekanayake (1999), in the case of India, Indonesia, Korea, Pakistan, Philippines,

Sri Lanka and Thailand and Thornton (1996) in the case of Mexico among others.

However, compared with other previous studies the finding of this study contradicts with the argument of Palley (2011) who argued “the global economy is now characterized by a structural shortage of demand and intense competition between emerging economies. In such an environment, export-led growth cannot work for emerging economies as a whole. The solution is to shift to domestic demand-led growth”. Finally, as to this study there is no evidence to support pulley’s (2002) argument (drawback of export-led in developing countries) and the solution set by him to paradigm shift to domestic demand and Bello’s (2001) argument; government has understood the importance of domestic demand to stimulate growth specially in least developed economies and domestic demand led growth will replace export-led growth.

Test of volatility

The presence of causal links among domestic demand, export and economic growth is already presented using Granger causality tests. However, Granger causality does not sufficiently answer the question on what is the extent of causality and as such, is it destabilizing in nature? In this regard, we take the advantage of forecast error variance decomposition and impulse response function in order to provide further insight to the dynamic relationship of the variables in the system.

Forecast error variance decompositions (FEVD)

If domestic demand and export are important for economic growth, the impact of the shocks on these variables is significant on growth. How much of the variance in forecast errors of future economic growth can be attributed to innovations in export and domestic demand growth is the issue of FEVD. This technique is standard in the VAR approach; for details, the reader is referred to Doan (1992), Sims (1980), etc. The analysis of variance decomposition is computed through distributing all variables in the system by one standard deviation. But ordering of the variables matter, since, ordering can alter the decomposition factor.

The result presented in Table 10 is based on the VAR system ordered as Chelosky ordering of LY LX LHC LGC. Since there is no prior reason to choose any ordering over the other, it is decided to experiment the analysis by ordering all four variables alternatively with some other ordering. The result shows that estimates are affected when order changes, but basic results concerning the short run and long run relationship among per capita GDP, export and domestic demand are not altered. Thus, changing the ordering had the negligible impact on the result and therefore, the inference in this

particular case. The results of variance decomposition of per capita GDP, export, private consumption and government consumption to one-standard deviation shocks in over a 10 years period is presented in Table 10¹ (Chelosky ordering LY LX LHC LGC).

There are several considerable findings from the variance decomposition results. The result show how much an economic growth own shock is explained by movements in its own variance and the other variable. After two years, 96.44, 98.52, 76.54 and 80.48 percent of the variation in the forecast error variance for per capita income, export, household consumption and government consumption spending is explained by its own shock, respectively.

In explaining the shocks in per capita GDP growth, household consumption expenditure is more important than export and government consumption both in the short-run and long-run. After 2 years 3.16 percent of variation in per capita GDP is being explained by household consumption expenditure, 0.29 percent by government consumption and 0.10 by export. Then the statistics for household consumption expenditure, government consumption and export increases to 48.43, 3.79 and 7.65 percent respectively, after ten years. Therefore, in the sense of final demand, household consumption expenditure plays more important role in forecasting and accelerating economic growth in Ethiopia.

Variance decomposition provides information concerning the magnitude and direction of causality, but says nothing about the sign of the causal relationship among the variables and how long would the effect of the shocks persist in the system. In this regard, we take the advantage of the generalized impulse response function.

Generalized impulse response function (GIRF)

An impulse response functions portrays the response of the system over time to a shock to each of the variables in the system. The result of impulse response function of economic growth measured by per capita GDP to a one-standard deviation shocks in per capita GDP, export, private consumption expenditure and government consumption over a 10 years period is presented in Table 11.

For a one standard deviation innovation of disturbance

¹ since, the focus is on the response of output growth per capita to shocks in the export and domestic demand, only the forecast-error variance decomposition of the GDP growth per capita variable in response to a one standard deviation innovation in export, private consumption expenditure and government consumption is presented. These responses are estimated using random generation of the parameters of the model setted in Granger causality analysis in a Monte Carlo study with 100 iterations. Since the innovations are not necessarily totally uncorrelated, the residual terms are orthogonalized using a Chelosky decomposition in order to obtain a diagonal covariance matrix of the resulting innovations and, therefore, isolate the effects of each variable on the other.(see appendix D for the variance decomposition of other variables)

Table 11. Impulse responses to generalized One S.D innovation response of LY.

Period	LY	LX	LHC	LGC
1	0.046023	0.006459	-0.008092	0.003512
2	0.048444	0.004641	0.003562	-0.003963
3	0.040904	0.013876	0.028061	-0.011706
4	0.039067	0.024630	0.038116	-0.019549
5	0.037180	0.026703	0.042288	-0.023142
6	0.037368	0.027043	0.041776	-0.024206
7	0.037533	0.026099	0.040807	-0.024014
8	0.037785	0.025581	0.040058	-0.023653
9	0.037859	0.025336	0.039821	-0.023424
10	0.037877	0.025326	0.039811	-0.023354

originating from itself, future per capita GDP increases by 0.05 percent in the first year and declines in the fourth year to 0.04 and reaches to 0.037 at the end of time horizon. Though, its impact declines overtime but does not cease in the long run. One standard deviation innovation of disturbance coming from household consumption results in about 0.003 percent increase in per capita GDP in the second year and further increases to 0.04 percent in the fifth year and its effect did not die out and eventually reaches 0.03 percent at the end of time horizon. But its effect after the immediate shock is negative, that is in the first year. This is due to excess demand from the household following shocks, and inability of the economy to adjust itself immediately to higher demand. Since, the time is too short to adjust output. But, in the years to come, the economy adjusts to this excess demand and the response of economic growth is positive.

In other words, a shock in household consumption exerts a negative impact on economic growth in the first year. But between years two to four the impact of the shock is, a sharp rise in growth and positive economic growth and then fluctuates around there and finally stabilizes thereafter. One standard deviation innovation of disturbance coming from export results in about 0.006 percent in the first year and increases to 0.02 percent in the fourth year and finally stabilizes at about 0.02 percent in the time horizon. Thus, the impact of export on economic growth is strong in the long run. However, a response of growth to disturbances in government consumption is positive only in the first year. From two to ten years, the shock to government consumption decreases growth. It remains negative and declines sharply up to year four, and fluctuates around the negative level before stabilizes after year six. This implies that shock to government consumption affects growth negatively. Thus, the impact of export and domestic demand on economic growth is permanent.

Generally, comparing the results from descriptive analysis through short-run and long run results to

Granger causality and Volatility test results; the output speaks loudly the same thing, which enhances the trustworthiness of the results.

CONCLUSION AND POLICY IMPLICATIONS

The study has investigated a causal relationship among domestic demand, export and economic growth in Ethiopia using annual time series data. In empirical analysis, Augmented Dickey Fullers (ADF) and Phillips Perron (PP) unit root tests are used in testing the stationarity of the variables. The result shows that export, domestic demand (government and household consumption) and economic growth measured by per capita income are found to be integrated of order one. Therefore, the study proceeds to determine the existence or otherwise of cointegrating vectors in the variables. The result of Johansen cointegration test shows that export, domestic demand and economic growth are cointegrated. Thus, the finding indicates a co-movement in the variables. So, the Granger causality should be in the ECMs.

The result of Granger causality test shows a dynamic relationship between domestic demand (household consumption) and economic growth both in the short run and long run and evidence of unidirectional causality between export and economic growth as well as between government consumption and economic growth. Overall, there is a dynamic relationship between domestic demand and economic growth and between export and economic growth in Ethiopia.

The strength of the causal relationship of variables, as measured by variance decomposition analysis, reveals that household consumption highly causes economic growth and certainly the most important one when compared to export and government consumption in Ethiopia. Thus, the finding supports domestic demand led-growth, growth led-domestic demand and growth-led export hypothesis in the short run and long run, and

export-led growth hypothesis is in the long run. There is some evidence to support that growth led-domestic demand and export is dominant than the feedback causality. There is also evidence that domestic demand is superior to export in causing economic growth. Generally, export and domestic demands are both important for economic growth and economic growth has an impact on export and domestic demand. In other words, economic growth Granger causes both export and domestic demand and domestic demand and export are also the causes for economic growth in Ethiopia.

Output growth in Ethiopia seems to come from increase in household consumption expenditure. Thus, government needs to boost domestic demand in general and household consumption expenditure in particular through creating employment. Income is the most important determinant of consumption. One way of obtaining income is through employment. Therefore, reduction of unemployment is similar to increasing aggregate domestic demand and hence, consumption. In addition, reduction of unemployment increases productive labor forces that are used as factor input particularly in least developed countries like Ethiopia. Since, exports provide foreign exchange earnings and also create employment opportunity, and eventually growth in output, policy should pay considerable attention to exports. However, a balance emphasis should be domestic demand to push the economy towards higher growth path.

In general, successful and sustained economic growth requires growth in both export and domestic demand. Finally, prudent macroeconomic policies such as income policy are important to strengthen export growth nexus and domestic demand growth nexus in Ethiopia. This study's policy suggestion emphasized on development of domestic capacities for domestic use purposes that are necessary to increase household income which would bring shift in demand. To this end, industrial decentralization which creates rapid employment in rural towns and green revolution which increase household income in rural areas should be stressed. These alternative policy suggestions increase the level of effective domestic demand (function of income increase) and the capacity to produce more to meet effective demands. Implementation of manufacturing and green revolution requires extensive power generation in addition to other infrastructure such as transport, communications and water supply facilities.

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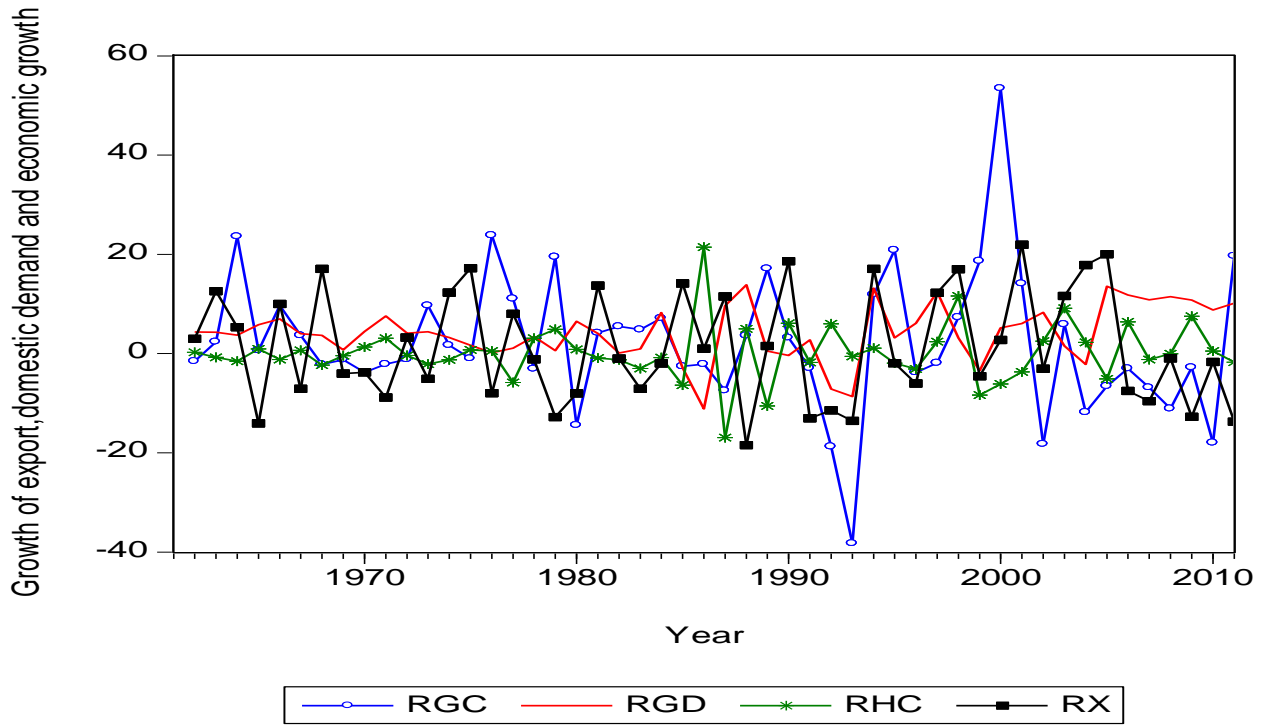
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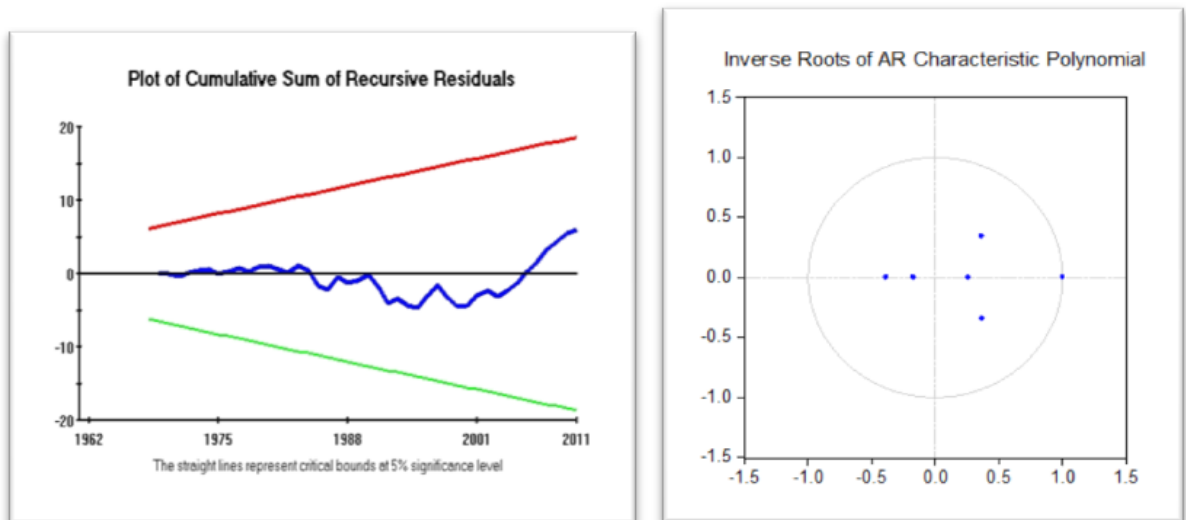
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ANNEX

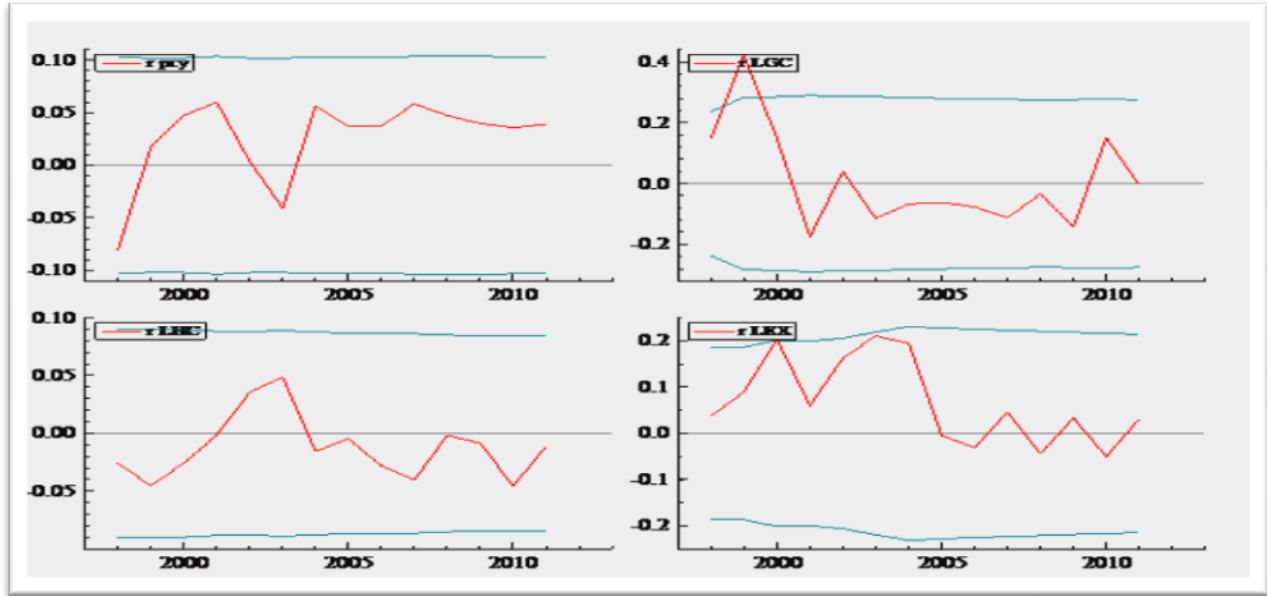


A. Growth rate of economy, household consumption, government consumption and exports.

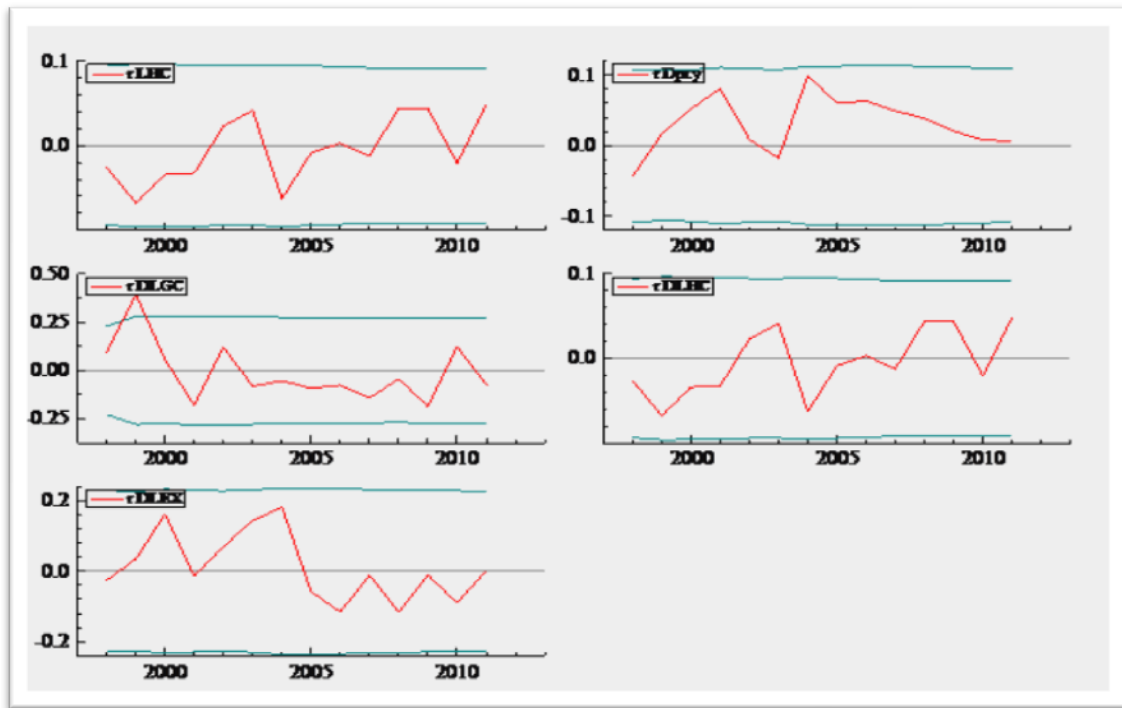
B. Stability Test



I. Cumulative sum of squares of recursive residuals and inverse of AR characteristics polynomial for VAR stability test.



II. Long run recursive test, 1-step residuals $\pm 2^{nd}$ SE.



III. Short run recursive test, 1-step residuals $\pm 2^{nd}$ SE.