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AN EMPIRICAL ASSESSMENT OF EXPORT LED GROWTH HYPOTHESIS IN THE CONTEXT OF INDIAN ECONOMY

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Abstract

The present study examines the validity of the relation between exports and economic growth India. This paper utilizes the advanced time series techniques such as the Causality, Cointegration to test the short run as well as the long run equilibrium between GDP growth and Exports. And it has also used the VAR test to measure the strength between them respectively. The causality confirms the ELG hypothesis in case of India whereas the result of the Cointegration test indicates that there exists no long run equilibrium relationship or co-movements between growth and increase in exports. The result of VAR exhibits the maximum contribution of Real Exports towards the growth of Economy. Hence, it supports the unidirectional relation between exports and economic growth India. Under the VAR framework some more variables are also undertaken to compare and see the irrelative impacts. The variables under the study are GDP, GCF, EXP, WEX, IMP, and TOT and are in billions of rupees. The data are collected from RBI Bulletin, Handbook of Statistics on Economy and IFS Database.

Keywords: *Export-Led Growth, Granger Causality, VAR, Co-integration, VECM*

INTRODUCTION AND BACKGROUND OF THE STUDY

World trade has grown much faster than world output over these years: but the GDP of most countries has grown impressively fast. A question arises whether trade liberalization has been responsible for the GDP growth. The economic development and growth literature contains extensive discussions on relationships between exports and economic growth. One debate centers on whether countries should promote the export sector to obtain economic growth. The role of exports in the economies of developing countries has been the subject of a wide range of empirical and theoretical studies. It is argued that the export sector uses more

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advanced technologies, which results in higher productivity and better allocation of resources in the economy. Trade also increases the extent of the market, and therefore further gains are realized through higher capacity utilization and greater economies of scale. In addition it is contended that the accumulation of foreign exchange from export allows the import of high quality inputs, mainly capital goods, for domestic production and exports, thus expanding the economy's production possibilities. Thus the export led growth strategy, whereby a country concentrates on increasing its exports, helps developing countries like India to enhance their growth. The question considered is whether strong economic performance is export-led or growth–driven. The question is important because the determination of the causal pattern between export and growth has important implications for policy makers, decisions about the appropriate growth and development strategies and policies to adopt. The fact that strong correlation exists between exports and real GDP growth has been well documented in the literature. But some empirical studies have produced mixed and conflicting results on the nature and direction of the causal relationship between export growth and output growth. Most studies focus on the causal link between exports and output growth in developing countries (Michaely 1977, Balassa 1978, Chow 1987), though some researchers have examined the export-led growth hypothesis with emphasis on industrialized countries (Sereletis 1992, Henriques and Sadorsky 1996). However, very few empirical studies have been done in the recent past to investigate the export-led growth (ELG) hypothesis for India (a few of these Biswal and Dhawan 1998, Sharma and Panagiotidis 2002). Broadly, the focus of the ELG debate is whether a country is better served by orienting trade policies to export promotion or import substitution. The traditional Neo-classical view has been that economic growth can be achieved by an expansion in exports. The Asian Newly Industrializing Countries (NIC's), particularly Hong Kong, Singapore, Korea, Taiwan, Malaysia, and Thailand are often cited as examples of countries that have experienced export-driven growth. Over the past 30 years, these NIC's have approximately doubled their standard of living every 10 years. Their experiences have shown that openness to trade is a mechanism for achieving more rapid and efficient growth, as well as better utilization of resources.

The apparent success of the East Asian countries, after they switched to an export-led growth strategy seemed to be strong evidence in its favor, to policy makers in general. However, there have been disagreements among economists concerning the applicability and validity of the ELG hypothesis. For one thing, it is pointed out that the East Asian countries followed complex policies, which involved more than just trade or export policies. It is not clear that circumstances in other countries would yield the same kind of results. It was also noted that the growth may not have been growth-driven. That is, cause and effect relation between exports and growth could be in either direction. Exports themselves could well be positively affected by growth. So merely observing the correlation between exports and growth could be misleading. The ELG strategy carries the implication that the country be guided by export oriented strategies. But this would obviously not work if causation

was the other way around, with increased economic activity resulting in higher exports. In fact, it is also possible that there is a two way relationship, with growth causing, and being caused by exports. More than anything else, the results could also be specific to the county. India has also followed the general trend of opening up its economy and the export sector has been playing an important role. But the validity of the ELG hypothesis needs to be tested in case of India.

OBJECTIVES OF THE STUDY

In the light of the above discussion, firstly, the present study attempts to examine the empirical relationship between export and economic growth for India. Secondly the study takes an attempt to measure the strength of the relationship between real GDP and real export in a multivariate framework taking the exogenous variables like real imports, real gross capital formations, growth without exports and terms of trade into consideration.

REVIEW OF EMPIRICAL LITERATURE

There is the general consensus the world over with policy makes appear to be on following outward looking policies, emphasizing exports. India too has moved in the direction of trade- liberalization. A number of studies have been carried out for various countries to test the relationship between exports and growth and here are some of these reviews.

Tyler (1981) investigated the relationship between economic growth and export expansion for 55 middle income group economies. The study applying simple correlation found a positive and significant relationship between GDP growth and export growth. There had been earlier studies like Emery (1967), Maizels (1968), Balassa (1978), Fajana (1979), Tyler (1981), Feder (1983), Kavoussi (1984) which appeared to support the relation between exports and economic growth. These studies used OLS regression and correlation but were unable to determine the direction of causality. That is whether export growth leads to economic growth or the other way.

Unless the direction is defined, policy makers cannot make strategic decisions on economic growth. To solve this problem, this paper attempts to test a cause and effect relationship between exports and economic growth by using Granger causality Test. This methodology is subject to more criticism as it does not account for error correction mechanism. Even Engle and Granger (1987) have shown traditional Granger causality Test is not appropriate if time-series variables included in the analysis exhibit cointegration properties. But this study has used traditional granger causality test as a prior technique before the co-integration which tends to complete the process of suggesting the direction as well as the short run and long rum movement between the exports and economic growth.

The other papers which have extended their research in the above line are Jung and Marshall (1985), Chow (1987), Moschos (1989), Bahmani and Else (1993),

Mamun and Nath (1995), Anita Doraisami (1996), Dutt and Ghosh (1996) and Doganlar (2004).

Jung and Marshall (1985), and Chow (1987) tried to empirically validate the apriori assumption regarding the existence of causal relationship between exports and economic growth. Jung and Marshall (1985) examined for 37 developing countries and found that the countries that are having higher growth rates provide no statistical support for the export promotion hypothesis. Chow (1987) examined for manufacturing industries in eight newly industrialized countries and found the export-led growth strategy is an advantage for the small open economies. Wan-Wen Chu (1998) took the case of Taiwan and confirms that the level of import content in exports increased during the phase of export-led growth. Moschos (1989) used cross country multivariate analysis of growth. The result showed that the effect of export expansion on economic growth tends to diminish as the stage of development of an economy passes from LDC to developing economies. Bahmani and Else (1993) also implied that export promotion policies has helped the LDC in their economic growth. This study has used co-integration test and ECM. Mamun and Nath (1995) found the same result as Bahmani and Else giving implication to Bangladesh and also Anita Doraisami (1996) has lent further support to Bahmani and Else by taking Malaysia as a special case where Malaysian exports contributes hugely to its economic growth. From the above literature, it is clear that the state of growth of LDCs and developing countries are more following the export promotion policies which confirms ELG hypothesis.

India being a developing country needs to justify its growth strategy in order to have a better policy for its economic growth. It is observed that less research has been done taking India as a case. A detailed study would help India in making its policies. A few literature like Dhawan and Biswal (1999) and Sharma and Panagiotidis (2004) have studied Export-led growth hypothesis in case of India. Dhawan and Biswal (1999) has used Johansen M L technique and found GDP and terms of trade jointly granger cause exports. Engle Grager test in the study confirms a short run phenomenon. Sharma and Panagiotidis (2004) have studied ELG hypothesis using Granger Causality, Co-integration test and VAR methodology which failed to support the hypothesis. It might be due to selection of variable or the selection of time period. Taking this into consideration, the present study will be using the above said methodology in different aspect to study the ELG hypothesis in case of India.

METHODOLOGY OF THE STUDY

This paper utilizes the advanced time series techniques to test the above said objectives. In order to test the empirical relationship between export and economic growth, the study has used the test of Granger causality. In order to test the long run relationship between economic growth and exports, the study employed the co integration techniques. Engle-Granger bivariate cointegration test and Johansen Maximum likelihood test is used to trace the co integrating relationship between

economic growth and export. Beyond the analysis of the long-run relationships among the system of variables, the short-run dynamics is also explored by performing multivariate Granger causality tests for the Vector Error Correction Model (VECM). The Error Correction Model is used to account explicitly for the dynamics of short run adjustment towards long run equilibrium. The multivariate Vector Auto Regression (VAR) model is also used to test the dynamic relationships between export and economic growth along with the exogenous macroeconomic indicators. The impulse responses and forecast error variances of the system of equations under the VAR frame work are analyzed to explore the dynamism between the systems of equations. The time series properties of the variables are tested using Dickey-Fuller, Augmented Dickey-Fuller and Phillips-Perron tests. It was found that both the variables are non-stationary. For testing causality, the variables were turned to be stationary by differencing once. But for co-integration, the requirement of stationarity is relaxed as the differencing process wipes out time trend and co integrating relationships of the variables. Furthermore, as Granger causality is very sensitive to lag structure, we have employed five lag length selection criterions such as LR, FPE, AIC, SC, and HQ for selecting an appropriate lag length for our model. The ordering of the variables is the important part of this study which says the first variable in the model influences all its variables to its right side and has no effect on the variable to its left. Following the rule the ordering of the variables in the study is LRGDP, LRGCF, LREXP, LGWEX, LRIMP and LTOT. The study is based on annual observations and the data period spans from 1970 to 2006. The data are collected from RBI Bulletin, Handbook of Statistics on Economy and IFS Database. In the present study all the variables are in billions of rupees and the variables are taken in logarithm form

NATURE AND SOURCES OF DATA

The study is based on annual observation in their logarithmic form, real gross domestic product (LRGDP), and the macroeconomic variables such as GDP without export (LGWEX), real exports (LREXP), real imports (LRIMP), real gross capital formation (LRGCF) and terms of trade (LTOT). The data period spans from 1970 to 2006. The data are collected from RBI Bulletin, Handbook of Statistics on Economy and IFS Database. All the variables of the study are in billions of rupees.

FINDINGS OF THE STUDY

Testing of stationarity is the prior requirement for time series observations, before the estimation to be carried out. In order to test unit root, the study has used Dickey-Fuller, Augmented Dickey-Fuller and Phillips-Perron Test. Unit root Test results are shown in Tables 1(a) and 1(b) with level and first differences respectively. From the tables it is evident that both the variables are not stationary. This implies the existence of unit root. DF and PP test τ- values reject the null hypothesis of unit root at 5% level whereas ADF τ - values reject the null hypothesis of unit root at 1% level.

Table 1a
Unit Root Test

Level

Variables	*Without Trend*			*Trend+ Intercept*		
	DF	*ADF*	*PP*	*DF*	*ADF*	*PP*
LRGDP	2.55	2.58 (1)	2.33	-1.37	-1.16(1)	-1.14
LRGCF	-0.45	-2.29(4)	-0.44	-3.97**	-4.36(1)*	-3.82**
LREXP	1.62	2.03(2)	2.19	-0.71	-0.30(1)	-0.48
LGWEX	1.91	2.01(1)	2.45	-2.12	-1.89(1)	-1.97
LRIMP	0.41	0.58(1)	0.74	-2.21	-2.45(1)	-2.14
LTOT	-2.1	-2.55(1)	-2.11	-2.36	-3.39(2)***	-2.24

Table 1b
Unit Root Test

First Differences

Variables	*Without Trend*			*Trend+ Intercept*		
	DF	*ADF*	*PP*	*DF*	*ADF*	*PP*
LRGDP	-5.25*	-6.37(1)*	-5.23*	-6.38*	-4.74(1)*	-6.48*
LRGCF	-6.26*	-6.29(1)*	-6.94*	-6.15*	-6.19(1)*	-6.80*
LREXP	-6.10*	-4.09(1)*	-6.09*	-6.59*	-4.83(1)*	-6.64*
LGWEX	-5.81*	-4.10(1)*	-5.81*	-6.52*	-4.71(1)*	-6.62*
LRIMP	-5.57*	-5.15(1)*	-5.61*	-5.67*	-5.21(1)*	-5.80*
LTOT	-5.17*	-4.86(2)*	-5.15*	-5.09*	-4.75(1)*	-5.05*

Note: The critical values for unit root tests are -3.63, -2.94, -2.61 for without trend and -4.25, -3.54, -3.20 for trend + intercept at 1%, 5%, and 10% level respectively. Figures in the parenthesis against ADF statistics are the number of lags used to obtain white noise residuals and these lag are selected using AIC and SBC. In PP test we used the lag length 3. This optimal lag length is selected using the Newey-West method. *, ** & *** imply significance at 1%, 5%, and 10% level respectively.

In order to test the export-led growth hypothesis in case of India, the study employed the Granger causality which shows the direction of causation between exports (LREXP) and GDP (LRGDP). The result of the Granger causality test for LRGDP and LREXP is presented in the table 2. The first null hypothesis that LREXP does not Granger cause LRGDP is rejected at 5% level of significance. It implies LREXP does Granger cause LRGDP at 5% level of significance. But the second null hypothesis that LRGDP does not Granger cause LREXP could not be rejected as the probability of rejection is very high (49%) i.e. there is 49% chance of occurring type one error. The result of the Granger causality test helps us to conclude that there exist a unidirectional relationship between Real Exports and Real GDP. Therefore at a preliminary level the study shows the existence of a unidirectional causality proving export-led growth hypothesis in case of India.

Table 2
Granger Causality Test Statistics

Null Hypothesis	*F-Statistic*	*Probability*
LREXP does not Granger Cause LRGDP	3.21	0.05
LRGDP does not Granger Cause LREXP	0.71	0.49

Engle-Granger Bivariate Co-Integration test helps in looking at long run equilibrium relationship between variables. This study undertakes the pair wise co-integration test between LRGDP and LREXP to detect the long run equilibrium relationship between economic growth and exports. The bivariate co-integration test is carried for two pairs and the results are reported in the table 3(a). The DF and ADF values of the residual of the two OLS regression are shown in the last two columns of the table. The calculated statistics are compared with the critical values shown in table 3(b). The cointegration result cannot reject the null hypothesis of no cointegration in both of the cases. The presence of no cointegration between economic growth and exports or vice versa indicates that there exists no long run equilibrium relationship or co-movements between them. So the value of neither can be predicted by the other. In other words, export by itself cannot predict GDP, nor can GDP alone predict export. This is because there exist no long run equilibrium relationships between LRGDP and LREXP.

Table 3a
Engle-granger Bivariate Cointegration Test

Dependent Variable	*Independent Variable*	*Constant*	*Slope Coefficient*	*DF*	*ADF*
LRGDP	LREXP	3.54* (192.901)	0.61* (29.24)	-2.17	-1.52 (1)
LREXP	LRGDP	-5.54* (-25.46)	1.57* (29.24)	-2.11	-1.46 (1)

Statistics in ( ) are estimated t-statistics of the respective coefficients and for ADF, it is the selected optimum lag.

Table 3b
Engle-granger Critical Values for the Null of no Cointegration Test

Sample Size (T)	*No Lags (DF Test)*			*Lags (ADF Test)*		
	1%	*5%*	*10%*	*1%*	*5%*	*10%*
100	-4.07	-3.37	-3.3	-3.73	-3.17	-2.91
200	-4	-3.37	-3.3	-3.78	-3.25	-2.98

Johansen Maximum Likelihood test is used in this research to study the co integrating vectors among the above discussed five macro economic variables as it could not be solved by Engel –Granger two step procedures. The selected variables are found to be integrated of the same order, I (1). It excludes LRGCF as it not integrated of order one. The estimated statistics are presented in table 4. The co

integration test deals with test of trace statistics and Max-Eigen statistics. These are computed against the critical values at 1% and 5% level. The null hypothesis for trace statistics, $r = 0$, $r \leq 1$, $r \leq 2$, $r \leq 3$ and $r \leq 4$ are tested against the alternative hypothesis $r > 0$, $r > 1$, $r > 2$, $r > 3$ and $r > 4$ respectively. For trace statistics (λt_{race}) the null hypothesis of $r = 0$, i.e. there is no co integrating vector, is rejected at 1% and 5% level against the alternative hypothesis of one or more co integrating vector ($r > 0$). Similarly, for the next null hypothesis $r \leq 1$ i.e. existence of at most one co integrating vector is rejected at 5% level against the alternative hypothesis of existence of 2 or more co integrating vector ($r > 1$). For the rest of the cases the (λt_{race}) statistics is less than the critical values at 5% level an hence we cannot reject the hypothesis. Thus we may conclude that among the five variables there exists two co integrating vectors at 5% level and one co integrating vector at 1% level. The result of max-eigen (λmax) value test shows that null hypothesis of no co integrating vectors ($r = 0$) against the alternative hypothesis of one co integrating vector ($r = 1$) is rejected at 5% level but not at 1% level. The test indicates one co integrating equation at 5% level. Next the null hypothesis of one co integrating vector ($r = 1$) against the alternative hypothesis of two co integrating vectors ($r = 2$) cannot be rejected at both 1% and 5% level because both of the critical values are greater than the max-eigen statistic value. For rest of the cases, (λ_{max}) statistic is less than their critical values and hence we cannot reject the null hypothesis. Hence max-eigen test statistics only one co integrating equation exists among the five variables.

Table 4
Johansen Test Results for Cointegration Among LRGDP, LRGCF, LREXP, LGWEX, LRIMP, LTOT

λ Trace Statistics

Null Hypothesis	*Alternative Hypothesis*	*λ Trace Statistics*	*5% Critical Value*	*1% Critical Value*
$r = 0$	$r > 0$	83.74	68.52	76.07
$r \leq 1$	$r > 1$	48.92	47.21	54.46
$r \leq 2$	$r > 2$	25.97	29.68	35.65
$r \leq 3$	$r > 3$	10.95	15.41	20.04
$r \leq 4$	$r > 4$	3.58	3.76	6.65

λ Max Statistics

Null Hypothesis	*Alternative Hypothesis*	*λ Max Statistics*	*5% Critical Value*	*1% Critical Value*
$r = 0$	$r = 1$	34.81	33.46	38.77
$r = 1$	$r = 2$	22.94	27.07	32.24
$r = 2$	$r = 3$	15.01	20.97	25.52
$r = 3$	$r = 4$	7.37	14.07	18.63
$r = 4$	$r = 5$	3.58	3.76	6.65

Since there exist a unique co integrating vector in the five variables VAR used in the co integration test, it is best to estimate models with one error correction term that is included to capture long run relationships. Beyond the analysis of the long run relationships among the five variables in the system, the short term dynamics is also explored by performing multivariate granger causality tests for the VECM. F- Statistics and probability (in parenthesis) for Granger causality test from the VECM specification are presented in table 5. Table 5 also includes the test statistics for the error correction terms (ECT), for each of the equations. Emphasis is placed only on the relationships between real GDP and real exports. For each variable in the system, at least one channel of Granger causality is active: either in short run through the joint test of the lagged differences or a statistically significant ECT. The latter channel is provided by the VECM specification and is statistically significant in three equations for LRGDP, LGWEX and LRIMP. A significant ECT coefficient implies that past equilibrium errors plays a role in determining current outcomes. The short term dynamics are captured by the individual coefficient of the differenced terms. It is noted that the ECT coefficient for the real GDP equation is statistically significant (2.32) while the ECT coefficient for the real export equation is not significant (1.03). This implies that export growth does Granger cause the growth in real GDP. But on the other hand, real GDP growth does not Granger cause exports. This supports our ELG hypothesis in case of India. In the short run, joints tests of lagged difference also we can see the t-statistics of exports in the first equation is significant (2.26). It means that in short run, the change in export significantly affects the changes in GDP. This tends further supports to our conclusion.

Table 5
Multivariate Granger Causality test Based on VECM

Dependent Variable	*Short-run lagged Differences*					*Lagged*
	LRGDP	*LREXP*	*LGWEX*	*LRIMP*	*LTOT*	*ECT*
LRGDP	-	0.16	0.18	0.04	0.19	
		(0.07)	(2.04)	(0.05)	(0.06)	2.32
		[2.26]	[0.09]	[0.73]	[2.97]	
LREXP	2.97		-2.74	-0.09	0.15	
	(8.47)	-	(8.39)	(0.22)	(0.06)	1.03
	[0.35]		[0.32]	[0.41]	[2.97]	
LGWEX	-0.18	0.15		-0.03	0.20	
	(2.17)	(0.07)	-	(0.05)	(0.07)	2.22
	[0.08]	[2.00]		[0.58]	[2.91]	
LRIMP	-6.45	0.20	8.21		0.07	
	(7.15)	(0.25)	(7.13)	-	(0.23)	3.25
	[0.89]	[0.79]	[1.15]		[0.31]	
LTOT	8.60	-0.20	-9.77	0.53		
	(11.58)	(0.40)	(11.48)	(0.30)	-	0.76
	[0.74]	[0.50]	[0.85]	[1.73]		

To analyse the causal and dynamic interaction between economic growth and the rest macroeconomic variables the study has used multivariate vector autoregressive model. Since the coefficient of VAR cannot be interpreted directly, impulse response and forecast error variance are used. Impulse response function shows the dynamic response of all variables in the system due to one standard deviation shock in each variable. It not only directly affects its current future but is also transmitted to all the other endogenous variables through the dynamic structure of VAR. In the study we have computed 10 period ahead impulse responses for the VAR system, since the sample size is 36 yearly observations. In the table 6 impulse responses are tabulated at four point of time after the initial shocks namely, 1st, 3rd, 5th and 10th period. Starting with one standard deviation stock with LRGDP has a positive effect throughout the system. In the next three periods, the unit shocks in LRGDP correspond to 0.009, 0.006 and 0.008 units respectively. Due to positive shock in LRGDP the responses of LRGCF on 1st, 3rd, 5th and 10th ahead are 0.014, 0.012, 0.009 and 0.009 respectively. Similarly in the case of LREXP, the responses are 0.004, 0.009, 0.013 and 0.014; for LGWEX, the responses are 0.010, 0.008, 0.006 and 0.007. For LRIMP, the responses are 0.011, 0.004, 0.007 and 0.011 and for LTOT, the responses are 0.001, 0.006, 0.001 and 0.0003 respectively. Thus, an increase in LRGDP leads to an increase in all the other variables. Most of these responses are high in the initial periods but gradually decline as the shock gets neutralized in lead periods. Further, one standard deviation positive shock in LREXP equal to 0.034, 0.014, 0.013 and 0.013 gets a positive response from LRGDP and LRGCF. The response of LRGDP and LRGCF is zero in the first period and in the remaining three periods they are 0.004, 0.006, and 0.008 for LRGDP and 0.010, 0.006, and 0.009 for LRGCF respectively. This means an increase in exports leads to economic growth and gross capital formation. The responses of LGWEX are -0.0008, 0.004, 0.005 and 0.007. The positive shock in export causes an immediate negative response from LGWEX but later on its responses are positive. Similarly, the responses of LRIMP are positive with reference to the positive shocks in export except its 3rd step ahead response. At the same time the total responses of LTOT are negative (-0.023, -0.016, -0.0004 and -0.001). A positive in LRGCF affects LGDEX and LTOT with one period lag, but all other variables of the system responds positively immediately after the shocks in LRGCF. A positive shock of LGWEX generates negative impact of LRIMP and LTOT in second and 10th step ahead responses. One standard deviation shock in LRIMP gets positive responses from LRGDP, LRGCF, LREXP and LGWEX, except for the 3rd step response of LREXP which is negative. Finally, one standard deviation shocks in LTOT implies positive shock for LTOT and gets positive responses from the system of six variables except from 3rd step ahead responses. Variance decomposition breaks down variation in the system into components due to variation in the shocks. This is done in terms of the forecast error variance. The study estimates forecast error variance for the six variables, in the VAR model, and the percentage error variance of each variable is explained by the innovations in the other variables including the innovation in itself. Table 7 contains the estimated statistics of variance decomposition. In first

time period, LRGDP explains 100% of its own forecast error variance leaving nothing to other variables. Gradually, it explains less than before and is explained more, over time by other variables such as LRGCF, LREXP, LGWEX, LRIMP and LTOT. Among these variables, LREXP explains a substantial part of the forecast error variance of LRGDP that is 14.4%, 20.2% and 28.2% in 3rd, 5th and 10th step respectively. This result suggests that export led hypothesis may hold. LREXP explains its own forecast error variance by 77.92%, 56.08%, 54.13% and 44.17% in 1st, 3rd, 5th and 10th period ahead. It explains a substantial part of its own forecast error variance and still leaves some to be explained by other variables. Among other variables, LRGCF explains 20.8%, 26.4%, 20.9% and 15.6% in 1st, 3rd, 5th and 10th period respectively. Here contribution of LRGDP in explaining forecast error

Table 6
Estimated Test Statistics for Impulse Response Function of Var Model

Due to shock in	*(Steps in Year)*	*Response to*					
		LRGDP	*LRGCF*	*LREXP*	*LGWEX*	*LRIMP*	*LTOT*
LRGDP	1	0.010	0.014	0.004	0.010	0.011	0.001
	3	0.009	0.012	0.009	0.008	0.004	0.0006
	5	0.006	0.009	0.013	0.006	0.007	0.001
	10	0.008	0.009	0.014	0.007	0.011	0.0003
LRGCF	1	0.000	0.018	0.017	-0.0004	0.0009	-0.002
	3	0.001	0.002	0.013	0.001	0.030	0.019
	5	0.004	0.008	0.001	0.004	0.020	0.002
	10	0.005	0.009	0.007	0.005	0.010	0.007
LREXP	1	0.000	0.000	0.034	-0.008	0.018	-0.023
	3	0.004	0.010	0.014	0.004	-0.007	-0.016
	5	0.006	0.006	0.013	0.005	0.008	-0.004
	10	0.008	0.009	0.016	0.007	0.010	-0.001
LGWEX	1	0.000	0.000	0.000	-0.001	0.014	-0.014
	3	-0.00004	0.009	-0.010	0.0005	-0.024	-0.014
	5	0.0003	0.003	-0.006	0.001	-0.007	0.003
	10	-0.001	0.001	-0.012	-0.0009	0.0008	0.007
LRIMP	1	0.000	0.000	0.000	0.0000	0.036	-0.019
	3	0.003	0.004	-0.001	0.004	0.006	-0.001
	5	0.005	0.010	0.001	0.005	-0.006	-0.001
	10	0.003	0.004	0.001	0.003	0.008	0.002
LTOT	1	0.000	0.000	0.000	0.000	0.000	0.033
	3	6.15E-05	0.0004	0.002	-0.0001	0.007	0.009
	5	0.002	0.0005	0.001	9.72E-05	0.009	0.008
	10	0.001	0.001	0.002	0.0008	0.003	0.003

Table 7
Estimated Test Statistics for Variance Decomposition Function of Var Model

Due to shock in (Steps in Year)		*By Innovation in (%)*					
		LRGDP	*LRGCF*	*LREXP*	*LGWEX*	*LRIMP*	*LTOT*
LRGDP	1	100.00	0.00	0.00	0.00	0.00	0.00
	3	71.135	4.64	14.46	0.26	4.34	4.92
	5	54.01	9.41	20.22	0.63	13.01	2.69
	10	42.86	16.54	28.27	0.88	10.07	1.34
LRGCF	1	36.90	63.09	0.00	0.00	0.00	0.00
	3	33.67	43.59	11.65	6.50	1.39	3.17
	5	32.46	32.40	19.46	6.40	12.17	1.34
	10	28.46	32.14	19.46	6.40	12.17	1.34
LREXP	1	1.18	20.88	77.92	0.00	0.00	0.00
	3	9.15	26.43	56.08	7.58	0.38	0.35
	5	15.50	20.91	54.13	8.67	0.36	0.39
	10	23.12	15.62	44.17	15.78	0.81	0.47
LGWEX	1	98.17	0.14	0.59	1.08	0.00	0.00
	3	71.65	4.10	11.76	1.19	5.64	5.63
	5	52.49	9.58	17.29	2.10	15.44	3.07
	10	41.52	17.65	26.17	1.16	11.93	1.54
LRIMP	1	6.08	0.04	17.28	9.78	66.80	0.00
	3	3.25	21.49	9.96	19.08	39.15	7.04
	5	2.59	43.04	6.82	17.66	23.51	6.35
	10	12.10	38.07	9.95	13.14	19.70	7.01
LTOT	1	0.12	0.25	25.20	8.84	16.17	49.39
	3	0.20	8.53	26.52	24.72	10.51	29.48
	5	0.32	9.12	26.59	23.42	9.84	30.68
	10	0.38	14.74	24.41	22.78	9.07	28.59

variance of LREXP is very small. Rest of the variables in the table 5 can be explained in the similar fashion. The forecast error variance of LRGCF is explained more by itself and substantial part of its forecast error variance is explained by LRGDP and LREXP. In case of LGWEX, it is unable to contribute much to its own forecast error variance and a substantial part of its forecast error variance is explained by LRGDP. The other variables are explained negligibly. LRIMP is more explained by itself and next to it is explained more by LREXP and LRGCF. Finally, LTOT is mainly explained by itself and to a great extent LREXP and LGWEX also explain the forecast error variance of LTOT.

CONCLUDING REMARKS OF THE STUDY

The result of the Granger Causality test helps us to conclude that there exist a unidirectional relationship between Real Exports and Real GDP. The null hypothesis that export does not Granger cause GDP is rejected at 5% level of significance. But the null hypothesis that GDP does not Granger cause Export could not be rejected as the probability of rejection is very high (49%) i.e. there is 49% chance of occurring type one error. Thus, this analysis suggests that the ELG hypothesis will work in India. The result of Engle-Granger pair-wise co integration test between LRGDP and LREXP indicates that there exists no long run equilibrium relationship or co-movements between growth and increase in exports. It means neither of the two variables can be used to predict the other. The Johansen M L test was carried out and it shows one co-integrating vector at 5% level implying the long run co-movement among these five variables. Though there was only one co-integrating vector in the system at max only one error correction term for VECM could be included. The result of VECM implies export is significantly influencing the error correction term for the short run disequilibrium of LRGDP whereas LRGDP is not statistically significant in correcting the errors of short run disequilibrium of LREXP. Again in LRGDP equation the coefficient of LREXP is statistically significant but the coefficient LRGDP in equation LREXP is not significant which provides enough evidences for the ELG hypothesis in case of India. The findings of Variance Decomposition specifies that exports has more impact on GDP other that itself which implies more of exports leads to a high GDP, whereas, the contribution of GDP is comparatively less in having impact on exports. This further goes to support a unidirectional relationship from exports to GDP in case of India.

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