

## An Empirical Study of Export and Economic Growth in India since 1960: A Co integration Analysis

Syed Mohammadreza Hosseini \*

D.S.Leelavathi \*\*

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### Abstract

The current study aims to explore the relationship between the two main macroeconomic variables, the export and economic growth, based on the export-led growth hypothesis (ELGH) in India for the period 1960 to 2010. The ELGH is an economic strategy used in the international trade policy of some developing countries for tracing the impact of trade on their economic growth. The ELGH is tested by the co-integration, error correction modeling and Granger causality approach. The results of the study show that there is evidence of unidirectional causality between export and economic growth for India. In fact, the economic growth causes export growth.

**Keywords:** Export-Led Growth Hypothesis, Export, Economic growth, co integration, Error correction model.

### 1- Introduction

Since the last five decades, the developing countries manage to develop their competitive export industries with astonishing growth rates, such as Taiwan and South Korea in the 1960's; Malaysia, Thailand, and Singapore in the 1970's; China in the 1980's, and eventually India in the 1990's.

Some of developing countries emphasize industrial, like India, and a few other countries, such Asian countries, emphasize on sector of services. In fact, India implemented different growth model when compare to others Asian countries with concentrated on Manufacture than others sectors.

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\* Research Scholar, Department of Studies in Economics, University of Mysore, Mysore; (Corresponding Author).

\*\* Professor of Economics DOS in Economics & Cooperation University of Mysore.

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The investigators want focus on India planning for showing the impact of it on macroeconomic variables and relationship between them. In briefly, after India independent (1947 AD), planning divided to four phases, that strategy at the first phase, involve three plans, between 1951 to 1966, was building up huge construction and investment like iron, steel that the growth rate of industrial index got about 7.3% that it was good rate for first phase but the rate of export decrease of 24.9 to 0.3 percent and the average of rate of economic growth in the first plan was 4.4 percent and decrease to 2.6 percent. In the second phase, involve fourth and fifth plans, between 1969 to 1979, the growth rate of industrial index decreased sharply to 4.1% but the rate of export increased of 3.5 to 13.9 percent and the rate of growth increased of 3.1 to 4.9 percent. The government decided to change its policy in the third phase, involve fifth and sixth plans (1980s), the strategy aimed to industry recovery and economic reform with the purpose of giving support to private sector and trade liberalization policy as well as at the end of this policy Industrial index obtained 7.4% but in this period the rate of export decreased of 13.9 to 6.8 percent and the rate of growth increased of 4.9 to 5.4 percent. The last phase, involve eighth to eleventh plans since 1991, was a new era of economic in India that named trade liberalization. Economic reform in this period increased industrial index to 8.9 % and in this phase the average rate of export was 13.15 and the average rate of growth was about 5.8 .( Misra& Puri, 2011)

After half a century, since mid 1960s, planning is following trade liberalization policy. So we come across this question “whether trade liberalization policy has positive impact on macroeconomic variables by testing ELGH? This investigating is organized as following. Section 2 explains about ELG hypothesis. Section 3 deal with literature review and section 4 gives details about methodology and data. In the 5 section we state objective & hypothesis. Section 6 involves empirical study and the last section, section 7, is conclusion.

### **2-Export-led growth (ELG) hypothesis**

Ricardo’s theory of competitive advantage believes that trade help to growth & development of countries but different strategies were applied that limited trade among countries. About five decades before, the export

promotion strategy accepted by majority of developing countries and some of them have good experience in this way like Asian countries.

This trade theory has given birth to a new direction for economic policy, namely the export-led growth [ELG] hypothesis (Zuniga, 2000). Based on theory, Countries hope to gain enough growth in economic.

According to Taban and Aktarr (2005), the export-oriented policies contribute to economic growth from the different ways summarized as follows:

- Keynesian argument is that an increase in exports leads through the foreign trade multiplier to output expansion.
- Export relaxes the binding foreign exchange constraint to allow increases in imports of capital and intermediate goods which lead, in turn, to economic growth.
- Exports increase efficiency via competition.
- Competition gives rise to the economies of scale and diffusion of the technical.

### **3- Literature review**

The ELGH has been studied by some researchers in different countries that we study some of them as following:

A. Taban and Aktarr (2005) applied the ELGH in Turkey. They used time series data for period 1980:1-2007:4. Co integration and error correction model were applied for hypotheses testing and they find out an evidence to support ELGH and long run relationship between export growth and real GDP growth.

B. Emilio J. Medina-Smith (2001) used Cob-Douglas function for hypotheses testing. They used series data for period 1950-1997 in Costa Rica. They applied co integration analyses for finding short run as well as long run relationship between export growth and economic growth. They showed that export has positive effect on economic growth but not very strong. They found out that the ELGH is probably beneficial only for a limited number of developing countries, and only to a certain extent.

C. A brief framework of the others researchers that related economic literature on the export-led growth hypothesis are as follows:

Study	Sample	Period of study	Methodology				Conclusions
			Data set	Economic growth	Exports	Econometric technique	
Emery (1967)	50	1953-1963 Averages	Cross-section	GNP growth	Export growth	OLS	Support for the export-led hypothesis.
Syron & Walsh (1968)	50	1953-1963 Averages	Cross-section	GNP growth	Export growth	OLS	Support for the hypothesis but the results are sensitive depending on the type of country under scrutiny LDCs or developed countries.
Kravis (1970)	37	1835-1966	Cross-section	GNP	Export growth	Spearman rank correlation	Supports the export-led hypothesis; however, indicates that LDCs that have been capable of diversifying their exports have been more successful in terms of growth.
Heller & Porter (1978)	41	1950-1973	Cross-section	Output growth rate GNP	Per capita exports	Spearman rank correlation	Little support for export growth causing growth.
Tyler (1981)	55&49	1960-1977 Middle-income LDCs	Cross-section	Real GNP growth and GNP per capita	Real export growth	Pearson and Spearman rank correlation, OLS, production function	Supports the export growth hypothesis and suggest the existence of a threshold effect.
Ram (1985)	73	1960-1970 1970-1977 Low- and middle-income LDCs	Time series two-sub periods	Real GDP growth	Real export growth	OLS, White test for specification bias and heteroskedasticity	Supports the export growth hypothesis and suggests the existence of an threshold effect.
Fosu (1990)	28	1960-1970 1970-1980 African countries	Pooled cross-sectional two periods	GDP growth	Rate of growth of merchandise exports	OLS, production function	Supports the export -led hypothesis.
Greenaway & Sapsford (1994)	19	1957-1985 1970-1985 1971-1985	Time series	Real GDP growth	Real export growth and export change/output	OLS, 3 versions of production function	Little support for the export-led growth hypothesis and for the positive liberalization effects on growth.

Source: Emilio J. Medina-Smith

#### 4- Methodology and Data

At first, we need to discern the stationary of the series in order to avoid spurious regression. Stationary could be achieved by appropriate differencing and this appropriate number of differencing is called order of integration. In this study, we use Augmented Dickey Fuller (ADF) test that whether the variables are stationary. (Gujarati, Porter and Gunasekar, 2012)

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{i=1}^k \alpha_i \Delta Y_{t-i} + \varepsilon_t \quad (1)$$

There is  $H_0 : \delta = 0, H_1 : \delta \neq 0$  that base on critical value if null hypothesis cannot be rejected then the  $Y_t$  series is non stationary.

If the absolute value of the computed t-statistics for  $\delta$  exceeds the absolute critical value, then the null hypothesis that the log level of y series is not stationary must be rejected against its alternative. If, on the other hand, it is less than the critical value, it is concluded that the log level of y is non stationary. In this case, the same regression must be repeated for the first difference of the logarithmic value of the series. The appropriate lag order of k in equation 1 was chosen on the basis of the criteria of Schwarz.

If all variables are found to be I (1), the second step is to test for the existence of a cointegration relationship between them. We follow the Engle and Granger (1987) two step procedure to search for cointegration among the variables. In the first step, non stationary series (For example, X and Y) are estimated by using Ordinary Least Squares method:

$$Y_t = \alpha + \beta X_t + u_t \quad (2)$$

After the estimation, again the ADF unit root process is applied for the residual of equation 3 to determine whether the residual term (u) is stationary.

$$\Delta u_t = \gamma + \theta u_{t-1} + \sum_{i=1}^k \rho_i \Delta u_{t-i} + \varepsilon_t \quad (3)$$

If the residual term is found stationary, this case, in equation 3, indicates that time series are co integrated in the long term. Otherwise, it is understood that

these series are not co integrated, in other words, we conclude that time series do not share the same stochastic trend in the long- run. However, the Engle-Granger approach is criticized for several shortcomings, which include the following: (a) the arbitrary normalization of the cointegration vector, (b) the assumption of one co integrating vector in systems with more than two variables and (c) biased OLS estimators. Furthermore, due to non-normality of the distribution of the estimators, no final judgement can be passed on the significance of the estimated coefficient (Taban and Aktarr 2005). Therefore, we use the maximum likelihood approach of Johansen and Johansen and Juselius in addition to the Engle-Granger method.

If the series are found co integrated by either Engle-Granger approach or Johansen- Juselius approach or both, there will exist an error correction model (ECM) including an error correction term (ECT) obtained from the relevant cointegration regressions. ECT is used for correcting disequilibrium and testing for long run and short run causality among co integrated variables. The error correction models are defined as in equations (4) and (5).

$$\Delta Y_t = \alpha_1 + \sum_{i=1}^m \beta_{1i} \Delta Y_{t-i} + \sum_{i=1}^n \gamma_{1i} \Delta X_{t-i} + \sum_{i=1}^r \delta_{1i} ECT_{t-1} + e_t \quad (4)$$

$$\Delta X_t = \alpha_2 + \sum_{i=1}^m \beta_{2i} \Delta Y_{t-i} + \sum_{i=1}^n \gamma_{2i} \Delta X_{t-i} + \sum_{i=1}^r \delta_{2i} ECT_{t-1} + e_t \quad (5)$$

In this study uses annual real data of GDP (2000 base year) and export data for the 1960-2010 period of India. All data come from World Bank via internet. All variables are also transformed to natural logs denoted as LGDP and LEX.

## **6-Behavior of Major Variables**

It is very much important to get a clear picture on general behavior of major variables concerned in the study. Basically long term trend and oscillations of variables mainly in economic growth and export growth variables are essential to study during 1960-2010 period.

### **- Economic Growth in India**

Economic growth rates over the last five decades show regular pattern due to internal and external shocks faced by the country. According to figure 1, India has experienced a low average economic growth rate during the period from 1961-1980. Of which, period from 1981 -1990 country has shown a stability good

economic performance. This period is especially well known as policy makers decided to decrease restriction on international trade but interval 1988 till 1991 that trade liberalization was not accepted completely by government and the economic growth experienced sharp decrease of about 5.5% to 1%. In 1991, trade liberalization was accepted and it has positive effect on economic growth.

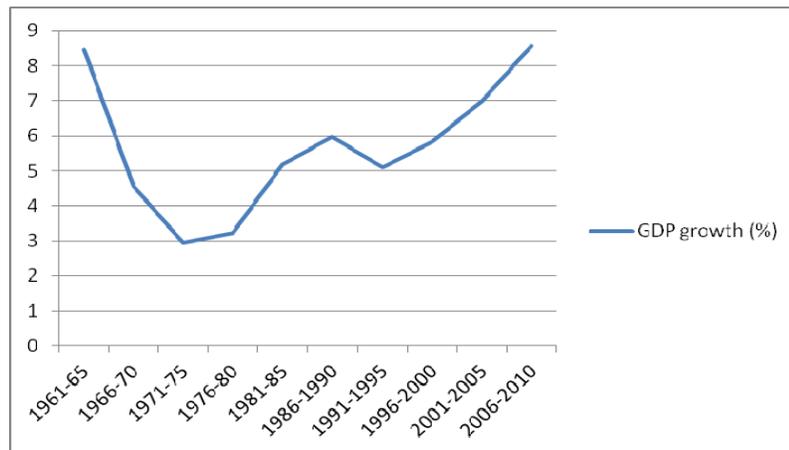


Figure1: Economic growth in India

Source: World Bank

### - Export Growth in India

Export growth rate over the last five decades show quite irregular pattern. According to the figure 2, India has experienced a low average export growth rate, 7 percent, during the period pre trade liberalization from 1970 – 1990. After trade liberalization (1991) export growth rate has shown more than before trade liberalization about 13 and 14 percent respectively. This period is especially well known as policy makers decided decrease restriction on trade international In fact, trade liberalization, 1991, was accepted and it has positive effect on export growth rate of course with high fluctuation.

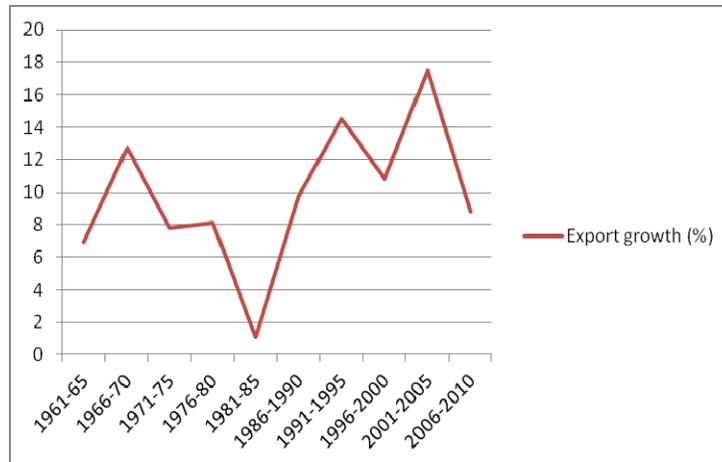


Figure 2: Export Growth in India

Source: World Bank

## 7- Empirical Results

The unit root test results are reported as follows:

Table 1: Augmented Dickey-Fuller Stationary Test Results

Variable	Constant		Critical Value		Constant		Critical Value	
	No Trend		1%	5%	Trend		1%	5%
LGDP	1.567	(2)	-3.56	-2.92	-0.20	(2)	-4.15	-3.50
LEX	1.109	(2)	-3.56	-2.92	-1.06	(2)	-4.15	-3.50
$\Delta$ LGDP	-7.13*	(2)	-3.57	-2.92	-7.42*	(3)	-4.15	-3.50
$\Delta$ LEX	-7.12*	(2)	-3.57	-2.92	-7.23*	(3)	-4.15	-3.50

The number inside brackets denotes the appropriate lag lengths which are chosen using Schwarz Criterion.

\* Denotes for 1% significance level.

Table 1 reports the results of the ADF test on the integration properties of real GDP and export for India. Results of the ADF test indicate that the two series are found to be non stationary. But the stationary of these series at first differences

lead to stationary. These indicate that the integration of real GDP and real export for India is of order one (1), namely I (1).

Given that integration of the two series are of the same order, we continued to test whether the two series are co integrated over the sample period. At first, Engle-Granger cointegration test procedure is applied. The cointegration results based on this procedure are presented as follows:

**Table 2: Engle-Granger Cointegration Test**

Dependent Variable	Independent Variable	ADF Statistics	<u>Critical Value</u>		Result
			1%	5%	
LGDP	LEX	-8.51 (3)	-3.58	-2.92	Co integrated
LEX	LGDP	-8.32 (3)	-3.57	-2.92	Co integrated

The optimum lag-lengths are indicated within parentheses and they are determined by the Schwarz criterion.

As seen from the Table 2, the entire ADF test statistics are bigger than the critical values (absolute amounts). This shows that the variables are co integrated. This expresses that there is a long-run relationship between real GDP and export series over the period 1960-2010 in terms of Engle-Granger approach.

To overcome any confusion about the cointegration relation, the Johansen-Juselius Procedure is applied next. Table 3 shows the results of Johansen test.

**Table 3: Johansen Cointegration Test**

**Series: LGDP, LEX**

r	Eigenvalue	Trace Statistic	Critical Value 5%	Max-Eigen Statistic	Critical Value 5%	Result
Null: r=0	0.501	41.332*(3)	20.261	32.748*(3)	15.892	co integration
Alter r=1	0.166	8.584 (3)	9.164	8.584 (3)	9.164	

Normalized cointegration equation:  $LGDP = -71.091 + 3.011LEX$

\* Denotes for 5% significance level.

The optimum lag-lengths are indicated within parentheses and they are determined by the Schwarz criterion.

Trace and maximum eigenvalue tests indicate one co integrating equation at the 5% level of significance. In other words, the hypothesis of no co integrating vector is rejected by both trace and maximum eigenvalue tests. Finding a co

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integrating vector between real GDP and export series indicate that there is a long-run equilibrium relationship between these series for India.

The normalized co integrating coefficients are shown in the last row of Table 3, and the signs of the variables conform to the theory in the literature (i.e. there is positive relationship between economic growth and export).

Following the detection of the co integrating relationship between real GDP and export in terms of the Johansen method, the error correction models (7) and (8) were set up to investigate short and long-run causality. The results are reported as follows:

**Table 4: Granger Causality Test**

Dependent Variable	Causal Variable	Lag Orders	Short-run causality		t statistics of the coefficient ECT <sub>t-1</sub>
			$\Sigma \Delta LY$	$\Sigma \Delta LX$	
$\Delta LGDP$	$\Delta LEX$	n = 2 , m = 2	-	2.06	-1.613
$\Delta LEX$	$\Delta LGDP$	n = 2 , m = 4	3.473*	-	2.37*

Lag orders are selected based on the Schwarz criterion, m = lag length of dependent variable, n= lag length of “causal

variable”.  $\Sigma$  shows the lagged coefficients of the concerned variable are all jointly tested.

\*Denotes for 5% significance level

As can be seen from the table 4, F statistics, which are applied the lagged coefficients of  $\Delta LEX$  and  $\Delta LGDP$  is jointly significant at the 5% but  $\Delta LGDP$  and  $\Delta LEX$  is not jointly significant at the 5%. We conclude that there is a short run causal relationship between  $\Delta LEX$  and  $\Delta LGDP$ .

In summary, Granger causality test results indicate that there is unidirectional causality from growth to export in India for the period 1960-2010.

**Conclusion**

This study researched the export-led growth hypothesis using the annual time series data running from 1960 to 2010 for India. This study has applied the error correction model to investigate the causality between the real export growth and real GDP growth. Before testing causality, both Engle-Granger and Johansen approaches were used to investigate the cointegration. Even though Engle-Granger test results indicated that there is long-run relationship between the export and real GDP series, also a long-run relationship between these series was

found by applying Johansen's cointegration method. Following the detection of the co integrating relationship between export and real GDP in terms of Johansen approach, an error correction model was set up to investigate short and long-run causality. The results of the study show that there is evidence of unidirectional causality between export and economic growth for India. Base on in this study, we cannot say that the export-led growth policies contribute to economic growth but inverse the results show that the economic growth contribute to growth in export in India.

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