Trade Openness, Exports and Economic Growth Relationship in India :

An Econometric Analysis

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ABSTRACT

Drastic changes have been taken place at the global level during the last two decades of liberalization and globalization. In the light of global changes, Indian government also initiated the process of domestic and external economic reforms in the early 1990s. So a shift took place in regard to trade liberalization with special emphasis on export-led growth policy. So the present study has been designed to examine the validity of the export-led growth (ELG) hypothesis implemented in India during the Post WTO Period. The study is based upon quarterly time series data covering the period from 1996-97 to 2008-09. An attempt has been made to analyze the relationship between three variables i.e. trade openness, export growth and its impact on economic growth within the framework of Vector Error Correction Model (VECM) using the Johansen Technique of Co-integration and the Block Exogeneity Wald Test. The study found that there is bi-directional causality running from GDP to export growth and vice versa for India. The ELG and GLE hypothesis is valid for India and empirical evidence supports the existence of long-run equilibrium relationship between export growth and economic growth. The unidirectional causality has also been observed among trade openness and economic growth (GDP), which is running from trade openness to GDP. In the light of above findings, the present study supports the hypothesis that there is a positive correlation between export growth and economic growth in India during the post reforms.

Keywords: *Export-led Growth Hypothesis, GDP, Co integration, Granger Causality Test*

INTRODUCTION

Export growth is important because of its effect on internal trade and economic stability of an economy. Moreover, the rate of economic growth and the distribution of income and wealth in a country are closely related to export growth (DeeKay, 2009). Empirical evidences supports that growth of an economy is directly related to exports. Therefore, the relationship between export and economic growth has become a crucial issue of debate among economists and researchers all over the World. An agreement has emerged on theoretical ground among Neo-classical economists in regard to export-led–growth (ELG) strategy as an instrument of economic progress. This agreement has got more support due to the success of free-market, and outward-oriented policies of Asian Tigers[1] (World Bank, 1991).

Neoclassical economists have strongly argued that export has emerged as an important factor, which make major contributions to economic growth. There are four major reasons for the support of export-led-growth hypothesis: (a) fostering specialization helps to benefit from the comparative advantages; (b) helps to utilize the full capacity of the plant size, where domestic demand is less than the full capacity production; (c) generate benefits of the greater economies of scale due to large market; and (d) increase the rate of investment and technological change (Dash, 2009). Therefore, export promotion strategy is considered as an important instrument of economic growth.

The early empirical studies of international trade and growth were stimulated by the divergent trends in economic growth throughout the world[2]. Most of the countries that had adopted protectionist Import Substitution Policies after World War II experienced lower growth rates by the 1970s whereas a small number of East Asian Economies made the growth of international trade a central part of their overall economic policies, as a result of which these countries experienced unprecedented rates of economic growth2. The experience of China, Mexico, South Africa and Israel etc. during the eighties and nineties provides further support to the argument that trade openness is a mechanism for attaining a higher level of economic growth. The success of export-led growth model motivated many LDCs which were facing economic instability to further stimulate their export-led orientation through implementing adjustments and stabilization programmes (Shirazi, et al. 2004).

During the last four decades, economists had produced a sufficient literature with statistical evidences on the relationship between international trade and economic growth (Lewer and Berg, 2003). Economists have estimated correlation coefficients, regression coefficients, tested for cointegration and performed a variety of other statistical tests to prove or disprove the existence of a relationship between international trade and economic growth[2]. These studies have used the data sets covering a variety of countries, time periods and economic variables and the results of these research studies largely support the hypothesis that, all other things remaining equal, countries open to international trade had succeeded to achieve higher incomes and higher rates of economic growth[2]. The findings of these research studies are even more definitive in its rejection of the alterative hypothesis that there is no convincing statistical evidence suggesting that trade and economic growth are negatively correlated[2].

In the light of above scenario, the aim of the present paper is to examine the causality relationship among export growth, trade openness and economic growth for India during the Post WTO covering period from (1996-97[Q1] to 2008-09[Q4]) on the basis of quarterly data. The uniqueness of the present study is due to the following three reasons, namely, (i) it is based on the empirical evidences of ELG hypothesis implemented during the Post WTO regime; (ii) The advanced time series techniques are used to get more reliable results for feasible policy decision making; (iii) Trade openness has been an important element of economic development strategy adopted by the Indian government during the post reforms period. It is pertinent to mention that trade openness leads to efficient allocation of resources through comparative advantage; allows the diffusion of knowledge and technological progress and promote competition in domestic and international markets. Moreover, the present study is an attempt to analyze the association between trade openness and economic growth.

BJECTIVES OF THE STUDY

No doubt, a vast literature is available to address this issue and economists have attempted to explain this hypothesis with their own logic since 1960s, but all the studies are not unanimous in regard to its impact on developed, developing and least developing countries at the global level. This is the main rationale why large number of researchers and research organizations are focusing on this area. To build a theoretical framework that links international trade and economic growth, a careful examination of empirical evidences is required to find out relationship between trade and growth on the basis of micro level studies. In light of this, the present paper is an attempt to examine causal relationship between the three variables, namely, Economic Growth (GDP), Exports, and Trade Openness of India during the Post-Liberalization period as defined above.

For the purpose of the analysis, this paper is organized as follows: the review of literature on the ELG hypothesis and data and methodology are discussed in Section-II; and Section-III outlines the analysis of the Indian Economy and Export Sector Performance. The empirical results and conclusions are presented in Section-IV.

SECTION-II

EVIEW OF LITERATURE

The extensive literature concerning the relationship between export and growth is also the results of the fast changes that have taken place in the field of development economics

and international trade in the last two decades (Dash, 2009). The International Trade and Development theory argued that exports growth (due to export oriented policies) contributes positively to economic growth and vice versa. Various economists and scholars have attempted in their respective studies to establish causal relationship between export and output growth.

Michaely (1977) used the spearman's rank correlation to examine a sample of 41 LDCs to detect the association between export growth and economic growth. The study found that there is a positive relationship between export growth and economic growth and the economic growth tended to be affected significantly by exports only when countries achieve some minimum level of development. Balassa (1978) studied the correlation between export growth and economic growth of a sample of 11 developing countries having a substantial industrial base. He found that the export growth favourably affects the rate of economic growth.

Tyler (1981) empirically analyzed the relationship between export expansion and economic growth of 55 middle income developing countries using the inter-country cross section analysis. The study found that there is a strong positive association between export expansion and economic growth and export expansion significantly enhances gross national product growth. The higher rates of economic performance have been associated with the higher rates of export growth (Kavoussi, 1984). The researchers like Feder (1983) and Rati (1985) examined ELG hypothesis and they argued in favour of exports, which help in reducing the foreign exchange constraints that facilitate in the imports of modern technologies and new production methods. Chow (1987) examined the causal pattern between export growth and growth in manufacturing output of 8 new industrialized countries (NICs) with the help of Granger Causality test. The study found the bi-directional causality in the case of Brazil, Hong Kong, Israel, Korea, Singapore and Taiwan and no causality in the case of Argentina.

The views regarding the effects of export growth on economic growth are divided as some scholars argue that export growth have a positive effect on the Gross Domestic product while other argue that there is no-causality between export and GDP growth. A group of studies had found the bi-directional causality between exports and economic growth, including, Oskooee (1993), Doraisami (1996), Ghali (2000), Summer (2004) Musonda (2007), Husein (2009), Bhattacharya et al. (2009) and Gazda (2010).

Oskooee et al. (1993) applied Co-integration and Error Correction Model (ECM) on the Quarterly data from 1973 (I) to1988 (IV) of the nine countries. They found that strong empirical support for bidirectional causality between export growth and output growth, which receives in almost all nine countries and there is long-run relationship exist between real exports and real output and this relation is a positive one. A one way causality from economic growth to exports growth is justified by, for instance, Oskooee (2005), Shah and Tian (1998) and Henriques and Sadorsky (1999). They observed that economic growth has upgraded the level of productivity growth and improved productivity is expected to facilitate exports. In reciprocal to ELG Hypothesis, GLE (Growth-led Export) Hypothesis has also been proved by Shirazi and Manap (2004, 2005), Mohan and Nandwa (2007) and Ferda (2007). The studies of Boltho (1996) and Medina-Smith (2001) challenge the empirical literature of ELG Hypothesis and generate suspicions in regard to export promotion strategy as a comprehensive development strategy. Dutt and Ghosh (1996) and Maneschiold (2008) had found mixed results for ELG Hypothesis for all the countries. Like the other countries, the results for India are also mixed and contradictory, which is appeared from Table 2.1. The empirical literature focusing on the export-led growth hypothesis related to single country studies is presented in Table2.1.

Table 2.1
Empirical Literature Focusing on the ELG and GLE Hypothesis Related to Single Country Studies

Author (Year)	Country	Variable	Period	Results
Krueger (1978)	India	Real GNP and Real Exports	1954-71	ELG
Ram (1987)	India	Real GDP, Real exports and Export share	1960-82	No causality
Nandi (1991)	India	Exports and GDP	1960-1985	ELG
Bhat (1995)	India	Exports and GDP	1950-1990	BDC
Doraisami (1996)	Malaysia	Real Exports and Real GDP	1963-1993	BDC
Dutt and Ghosh (1996)	India	Real Exports and Real GDP	1953-91	No co-integration
Mallick (1996)	India	Real GNP and Exports	1951-92	GLE
Shan and Tian (1998)	Shanghai (China)	Real GDP, Exports, Imports, Labour, GFCE and FDI	1990-96	GLE
Dhawan and Biswal (1999)	India	Real Exports, TOT and GDP	1963-1993	GLE
Henriques and Sadorsky (1999)	Canada	Real Exports, TOT and GDP	1877-1991	GLE
Ghali (2000)	Tunisia	Real Exports and Real GDP	1963-1993	BDC

Author (Year)	Country	Variable	Period	Results
Medina-Smith (2001)	Costa Rica	GDP, GDI; , Exports of goods and services; real GFCF and Population series	1950-97	No relation
Lin and Li (2002)	China	GDP, Investment, Consumption, Imports and Exports	1981-2000	ELG
Awokuse (2002)	Canada	Real Exports, GDP, TOT, GFCF.	1960-2000	ELG
Shirazi and Abdul Manap (2004)	Pakistan	Exports, Imports and Output	1960- 2003	ELG
Mamun and Nath (2005)	Bangladesh	Industrial Production, Exports of Goods and Services, Exports of Goods only	1976 -2003	ELG
Dawson (2005)	India	Exports and GDP	1950-99	BDC
Abou-Stait (2005)	Egypt	Exports, Imports, GDP and Capital Formation (investment)	1977 -2003	No Co-in tegration
Keong et al. (2005)	Malaysia	Economic Growth, Exports, Imports of consumption goods, GFCF, Labour Force and Exchange Rate.		ELG
Musonda (2007)	Zambia	GDP, Exports, Imports, GFCF, Labour Force, Real Exchange Rate, TOT and Degree of Openness	1970-2003	BDC
Uddin and Noman (2007)	Bangladesh	Industrial Production Index and Exports	1973-2006	BDC
Jordaan and Eita (2007)	Botswana	GDP and Exports	1995-2005	BDC
Jordaan (2007)	Namibia	GDP and Exports	1970-2005	ELG
Mohan and Nandwa (2007)	Kenya	Exports and GDP growth	1960-70 to 1970-80	ELG
Ferda (2007)	Turkey	Exports, Industrial Production and Terms of Trade	1980 -2005	ELG
Bhattacharya et al. (2009)	India	FDI inflow, Exports, Imports and GDP (quarterly data from	1996-2008	BDC
Husein (2009)	Jordan	GDP; Exports and TOT	1969-2005	BDC
Dash (2009)	India	Real Exports, IIP, Imports, Real Exchange Rate	1992-2007	ELG
Ullah et al. (2009)	Pakistan	Real GDP, Exports, Imports, GFCF and per capita income.	1970-2008	ELG
Elbeydi, Hamuda and Gazda (2010)	Libya	Exports, GDP and Exchange Rate	1980-2007	BDC

Note: Gross Domestic Investment (GDI), TOT (Terms of Trade), GDP (Gross Domestic Product), GNP (Gross National Product), GFCF (Gross Fixed Capital Formation)
BDC (Bi-directional Causality), ELG (Export led Growth), GLE (Growth led Export)

Consensus has not been emerged that trade always has a positive influence on a country's rate of economic growth. All empirical studies could not provide definitive proof that international trade causes a country's economy to grow faster, as compared to others[2]. It is evident from the analysis of table 2.1 that a group of studies like Krueger (1978), Ram Rati (1987), Nandi (1991), Bahmani-Oskooee and Alse (1993 and 2005), Bhat (1995), Doraisami (1996), Shan and Tian (1998), Dhawan and Biswal (1999), Henriques and Sadorsky (1999), Ghali (2000), Awokuse (2002), Hatemi, J. and Irandoust (2002), Shirazi and Abdul Manap (2004), Mamun and Nath (2005), Uddin and Noman (2007), Ferda (2007), Husein (2009), Eusuf and Ahmed (2007), Dutt and Ghosh (1996), Boltho (1996), Dash (2009), and Gazda and E. Hamuda (2010) have used time series data to investigate causality but all these studies were failed to provide uniform support for export-led growth hypothesis. This is due to the fact that a uniform relationship between export growth and economic growth among countries is not feasible because of the extensive differences in economic structure exhibited by developing economies and least developed countries. A one way causality (ELG) is justified by several studies like Krueger (1978), Nandi (1991),

Shah and Tian (1998), Henriques and Sadorsky (1999). Oskooee (2005), Ferda (2007), Dash (2009). On the other hand, GLE hypothesis has been proved by Mallick (1996), Dhawan and Biswal (1999), Henriques and Sadorsky (1999), and Shirazi and Manap (2004). A group of studies had found the degree to which the relationship between exports and economic growth is genuine (in both directions), including, Bhat (1995), Doraisami (1996), Ghali (2000), Summer (2004) Uddin and Noman (2007), Jordaan and Eita (2007), Husein (2009), Bhattacharya et al. (2009) and Gazda and E. Hamuda (2010). The test of the relationship between trade and economic growth is not a simple task. Therefore, regular testing of relationship between trade and economic growth is required. The present study is an effort to address this issue.

ATABASE AND RESEARCH METHODOLOGY OF THE STUDY

Database

The present study is based primarily on secondary data. The quarterly data of India relating to all the variables, namely, real exports real GDP and Trade openness under study has been taken from *Handbook of Statistics of Indian Economy, 2009* published by the Reserve Bank of India (RBI). The quarterly data have been used in the study from the period of 1996-97 Q1 to 2008-09 Q4, which comprises 52 observations. There are several deflators, which have been used to remove the inflationary effects on the data, but the appropriate deflator was chosen on the basis of the nature of data used. Asafu-Adjaye and Charaborty's analysis was based on data in rupees at current prices; exchange rate fluctuations were therefore, accounted for and the use of the GDP deflator was considered appropriate (Dawson, 2005). In the present study, we have taken data for analysis in rupees terms at current prices. Therefore, it is appropriate to apply the GDP deflator, which gives its value in real domestic purchasing power terms.

The GDP deflator (2000 as base year) was applied as price deflator for all nominal series to deflate the inflationary effects. The value of the real exports is obtained by the value of nominal series in domestic currency divided by the GDP deflator index. Trade openness is defined as the ratio of exports plus imports to GDP. All variables are also transformed to natural logs denoted as lnGDP (real Gross Domestic Product), lnX (real exports), and lnTO (Trade Openness).

Methodology

Granger-Causality test in a multivariate Vector Auto-regression (VAR) framework has considered appropriate to analyze the causal links among the Exports, Trade openness and the GDP, covering the period 1996-97 to 2008-09. The rationale for the selection of this period is that it corresponds with the post WTO period, in which a wide range of reforms have been implemented with a view to convert the Indian economy from closed economy to an open economy. The VAR methodology in econometric modeling was the firstly introduced by the Sims (1980). This model is used to examine the dynamic impact of random disturbances on the systems of variables. In the standard VAR model, each endogenous variable in the system is modeled as a function of its own past lags, and the past lags of other endogenous variables (Bhattacharyya, 2009).

Unit Root Test (Non-Stationary)

A time series must be required to be stationary[4] for feasibility of inference and forecasting. A number of unit root tests namely, Augmented Dickey Fuller (ADF) Test, Phillips Perron (PP) Test and Kwiatkowski, Phillips, Schmidt and Shin (KPSS) Test are available to test the stationarity of a time series. In the present paper, we used the Phillips–Perron test to examine whether a variable has a unit root or not. The null hypothesis H0 is that the variables contain a unit root and the alternative hypothesis H1 is that a stationary process has generated the variable. It is based on the –DickeyFuller test of the null hypothesis $\delta = 0$ in $\Lambda y_t = \delta y_{t-1} + u_1$; where λ is the first difference operator.

The variables must fulfill two conditions, i.e. (i) all the variables are stationary at same order; and (ii) differenced series or the residual series are stationary at level for the application of Johansen Co-integration Test. PP test has also been used to check the integration order of the variables.

Johansen Co-integration Test

The concept of Co-integration was introduced by Granger (1981, 1983) and Engle and Granger (1987) to explain stationary equilibrium relationship among the non-stationary variables. The Co-integration test was conducted to determine the long-run economic relationship between the variables (Thomas, 1993). This is the first step in exploring the causality relation between the variables. The maximum likelihood test procedure {established by Johansen and Juselius (1990) and Johansen (1991)} was also used to find out the co-integration rank and the number of co-integrating vectors. The null hypothesis of no co-integration is rejected, if there is exist, at least, one co-integrating vector, which exhibit a stable long-run relationship between the variables. The hypotheses of Johansen Co-integration test are as follows.

$H_0: r=0$; $H_1: r=1$

In this case two likelihood ratio tests are considered, namely, the trace test and Maximum Eigen value tests.

Trace Test

In the equation form, trace test is presented as:

$$\lambda_{trace} = -N \sum_{i=r+1}^{m} \ln [1-(r^*)^2]$$

Here, N is the number of observations; m is the number of variables; and r_i^* is the i correlation between i-th pair of variables. λ_{trace} has a chi-square distribution with M-r degrees of freedom. Large values of λ_{trace} give evidence against the hypothesis of r or fewer co-integration vectors.

Maximum Eigenvalue Test

According to Johansen and Juselius (1990), this test is more influential than the trace test. Maximum Eigenvalue test evaluates the null hypothesis H_0: r=0 against alternative hypothesis H_1: r=1. The following equation is considered for this test:

$$\lambda_{max=}\text{-T In (1-}\lambda\text{r+1)}$$

Tests for Granger Causality with VECM

The existence of co-integrating vector implies that causality exists in at least one direction. According to Engle and Granger (1987), if two series, say X and Y, are integrated of order one i.e. I (1) and co-integrated, then there is possibility of a causal relationship in at least one direction. In case of existence of no co-integrated vector in the model, the standard VAR should be applied to examine the causal relation between the variables.

Engle and Granger (1987) found that, in the existence of co-integration, there always presents a corresponding error-correction representation, captured by the Error Correction Term (ECT). The ECT means that changes in the dependent variable are a function of the level of disequilibrium in the co-integrating relationship as well as changes in other explanatory variables (Bhattacharya, 2009). It is used to determine long run adjustment of co-integrated variables and the incorporation of ECT in the VECM which allow us to detect both short and long run causal relationship among variables. We applied the Vector Error-Correction Model (VECM) to examine the direction of long-run and short run Causality among real exports, real GDP and trade openness and whether or not the ELG or GLE or both hypotheses are existing in case of India.

Block Exogeneity Wald Test

Finally, the direction of the export-economic growth relationship was attained by using Block Exogeneity Wald Test. The Granger causality test in VAR framework is known as Block Exogeneity Wald Test. This test is used in a multivariate context, when we have two variables; we are interested to know if some of these variables are generated independently of other variables considered (Badani, 2009).

SECTION-III

INDIAN ECONOMY AND EXPORT SECTOR PERFORMANCE DURING THE POST REFORMS PERIOD

Prior to the formation of WTO, India had largely been remained insulated from the world trading system for more than four decades since independence (Srinivasan, 2001). It has been argued that decades of pursuit of an inward-looking development strategy, almost hostile attitude towards foreign trade, technology and investment and by pessimism about export markets, inevitably led India to become marginalized in world trade (Ibid, 2001). The fluctuations in export earnings had directly effected the economic growth of the country, therefore, a number of reforms have been taken in the foreign trade policy of India during the liberal trade regime3. The Government of India had launched various incentives schemes to facilitate the Indian exporters that helped in removing the foreign exchange constraints. Efforts have also been made to reorient institutional infrastructure towards creating an export friendly environment to achieve the higher economic growth (Economic Survey of India, 2009-10).

A liberal trade policy was expected to positively influence the performance of Indian trade as like the other countries, namely, East Asian countries (Malaysia, Korea and Philippines), China and Mexico etc. These reforms were concerned with adoption of policies that encourage private domestic and foreign investments; reduction of the government interventions in the economy; and the other policies, which are intended to enhance efficiency and better allocation of resources. These reforms have put a great impact on external sector policy of India and which primarily focused on promotion and development of foreign trade instead of control and regulation over trade.

The performance of Indian exports during the post WTO period is presented in Table 3.1 The data reveals that Indian export sector has expanded during the post WTO period from 1994-95 to 2009-10. The study analyzes the performance of Indian exports by examining the changes in terms of value, volume and unit value of Indian exports. The value of Indian exports has shown a rising trend except in 2001-02. Indian exports also increased in terms of volume till 2002-03, which got reversal in 2003-04. However, the unit value of exports has increased which contributed positively to the Export performance. The increase in the unit value of Indian exports may be resulted due to the change in the commodity composition of the Indian exports during the post-WTO period. Subsequent years witnessed a surge in exports both in terms of volume and unit value with a relatively higher growth of volume.

Export volume increased by 10.2 per cent in 2006-07 mainly due to items like crude materials, machinery and transport equipments, and mineral fuels and lubricants. The unit value of such exports has increased by 13.7 per cent in 2006-07 mainly due to increase in competition of manufactured goods classified chiefly by materials, food and food articles and mineral fuels and lubricants. However, Growth of the unit value index of exports, decelerated in the late 1990s and early 2000s, which declined to 1 per cent in 2001-02. Again it accelerated and attained an average growth of 10.7 per cent per annum during 2003-04 to 2007-08. The data reveals that the export growth in value terms was 8.1 per cent (in US$) in 1990-95 which declined to 7.3 per cent in 1995-00. The value of export growth reached to 21.0 per cent in 2000-01, 20.3 percent in 2002-03, 21.1 per cent in 2003-04 and 30.8 per cent in 2004-05 except 2001-02 in which it turned negative i.e.-1.6 per cent. It reached to 29 per cent in 2007-08 in spite of global recession. However, in 2008-09, the value of Indian export growth rate declined to 13.6 per cent (in US$). The volume of export was 10.2 per cent in 1995-00, which increased sharply to 23.9 per cent in 2000-01. However, it declined to 10.2 per cent in 2006-07, which further declined to 7.9 per cent in recession period 2007-08 and again rose to 9.0 per cent in 2008-09.

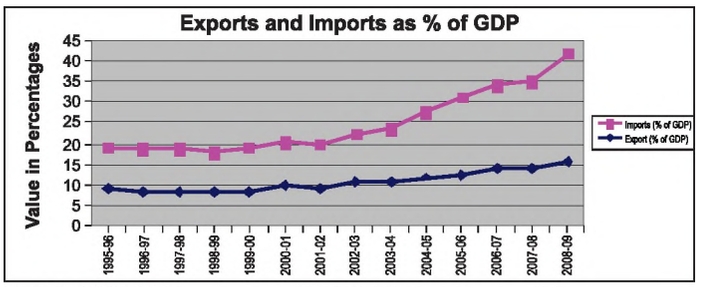
The study found that the performance of Indian exports in terms of value, volume and unit value has increased during the post WTO period, but in an inconsistent manner.

Table 3.1
Performance of Export Sector of India
(Annual Percentage Change)

Year	Export Growth		
	Value (US$)	Volume	Unit Value
1990-00	7.7	10.6	8.4
1990-95	8.1	10.9	12.6
1995-00	7.3	10.2	4.3
2000-01	21.0	23.9	3.3
2001-02	-1.6	0.8	1.0
2002-03	20.3	19.0	2.9
2003-04	21.1	7.3	7.5
2004-05	30.8	11.2	14.9
2005-06	23.4	15.1	6.1
2006-07	22.6	10.2	13.7
2007-08	29.0	7.9	5.1
2008-09	13.6	9.0	16.9
2009-10	-20.3	-	

Source: - Economic Survey of India 2009-10, and 2003-04

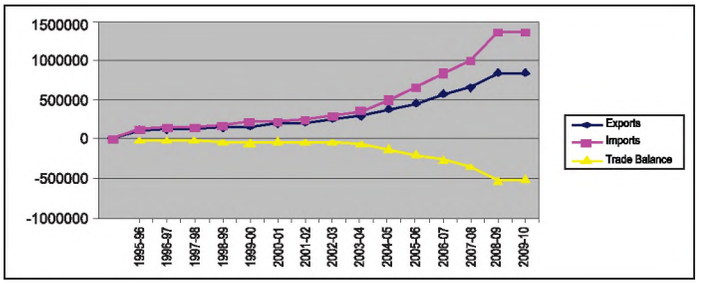
The picture of India's exports, imports, trade balance and the percentage of export and import as GDP of India during the post WTO period are presented in graph 3.1 and 3.2. The share of exports in GDP of the country was 8.92 per cent in 1995-96, which increased to 15.80 per cent in 2008-09, and the share of imports in GDP was 10.29 per cent in 1995-96, which increased to 25.83 per cent in 2008-09.



Source: CMIE, 2010

Figure 3.1

The growing share of export and import as a percentage of GDP shows the positive impact of liberal policies on the Indian economy. The balance of trade shows a negative balance of (-) Rs. 16326 in 1995-96, which increased to (-) Rs. 511344 in 2009-10. The analysis reveals that both exports and imports have increased during the post reforms period but higher increase in imports has further widened the trade deficits.



Source: CMIE, 2010

Figure 3.2

SECTION-IV

MPIRICAL RESULTS

Unit Root Test Results

The results of Phillips Perron Test of Unit root are shown in Table 4.1. The test is conducted on both the level and first difference of the lagged variables. The critical values for the variables are based on Mac Kinnon (1996) i.e. -3.5683, -2.919 and -2.597 at 1 per cent, 5 per cent, and 10 per cent significance level respectively. All variables, 'Exports',' Trade openness', and 'GDP' are non-stationary at the level but all are stationary at the first difference according to this test. This implies that all variables are integrated of order 1 i.e. I (1). We have also checked unit root of the differenced variables series. The results indicate that the differenced series are not stationary at level; therefore we have test the stationarity of residuals series with the help of the following regression equation.

$$GDP = \alpha+\beta X+\mu$$

The residuals in unit root are stationary at level; therefore, the data has justified the properties for the application of Co-integration test.

Table 4.1
Univariate Stationary Properties of Time Series Phillips Perron Test Results (Intercept)

Variable	Level		First difference	
	Test statistics	Critical values	Test statistics	Critical values
LnX	-0.5029 (0.8819)	-3.5683	-13.526 (0.000*)	-3.5683
LnTO	-1.783 (0.3842)	-3.5683	-15.342 (0.000*)	-3.5683
LnGDP	-0.4116 (0.8991)	-3.5683	-16.625 (0.000*)	-3.5683

***MacKinnon (1996) one-sided p-values**
All the variables are stationary at their first difference and 1 percent level of significance is used.

Johansen Co-integration Test Results

On the basis of results of the PP Test, we observed that all variables, namely, real exports; real GDP; and trade openness have the same order of integration, i.e. I(1), and therefore, the Johansen Co-integration Test has been used to find out the co-integration rank and the number of co-integrated vectors. Prior to conducting this test, the lag length of the test VAR has to be specified. The optimal lag length is chosen based on the minimum values of AIC (Akaike Information Criterion); SBIC (Schwarz' Bayesian Information Criterion); and HQIC (Hannan-Quinn Information Criterion), which is 4 in the present study. The results of Johansen Co-integration Test for the co-integration rank are presented in Table 4.2.

Table 4.2
Johansen Co-integration Test Statistics

Unrestricted Cointegration Rank Test				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.478112	35.47272	29.79707	0.0100
At most 1	0.099159	4.908528	15.49471	0.8185
At most 2	9.72E-06	0.000457	3.841466	0.9847

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Hypothesized No. of CE(s)	Eigenvalue	Max-eigen Statistic	0.05 Critical Value	Prob.**
None *	0.478112	30.56419	21.13162	0.0018
At most 1	0.099159	4.908072	14.26460	0.7534
At most 2	9.72E-06	0.000457	3.841466	0.9847

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

The statistics of the Johansen's λ_{trace} and λ_{max} in Table 4.2 reveals that long-run relationship exist among the variables under study because the rejection of null hypothesis is suggesting that there is, at least, one co-integrating vector in each sample to exhibit a stable long-run relationship among these three variables.

The results suggest rejection of the null hypothesis of no co-integration presence on the basis of existence of 1 co-integration equation (both tested at 5 per cent significance level). This implies that the alternative hypothesis (H_1: r=1) could be accepted. According to Trace test, the null hypothesis (H_0: r=0) is rejected against the alternative hypothesis (H_1:: r=1) at the 5 per cent level of significance. Similarly, in case of Max-Eigen value statistics, the null hypothesis (H_0: r=0) is rejected against the alternative hypothesis (H_1: r=1) at the 5 per cent level of significance. Thus, the existence of one co-integrated vector is supported by the empirical evidence, which implies that long-run relationship exist among the variables like export growth, real GDP and Trade Openness in India during the Post-WTO reforms.

VECM Test Results

The results of statistics of the Johansen's λ_{trace} and λ_{max} has proved that there is long-run relationship exists among the variables under study. According to Engle and Granger (1987), if the variables are co-integrated, then there exists a valid error correction representation of the data. The results of the vector error correction model are summarized in Table 4.3.

The term ECM (Error Correction Model) is used to determine the speed of adjustment of the system towards a long-run equilibrium and, the short-run dynamics are captured through the individual coefficients of the difference terms. The coefficient of Error correction tells us about whether the past values of the variables affect the current values of the variables under study and, a significant coefficient means that past equilibrium errors plays a role in determining the current outcomes (Bhattacharyya, 2009). The co-integrating equations are shown in Table 4.3 and the detailed results VECM is presented in Annexure-I. The changes in Export are shown in first column, changes in Trade Openness are shown in second column, and changes in GDP are shown in third column. The lagged coefficient of ΔX_{t-2} and ΔX_{t-3} are negative and statistically significant at the 1 per cent level of significant, which implies that uni-directional causality running from exports to GDP.

The estimate of ECT_{t-3} is positive and is statistically significant at the 5 per cent level of significance, which implies that error term contributes in explaining the GDP changes and a long-term relationship exists between independent variables and the GDP. The lagged coefficient of ΔTO_{t-2} is positive and statistically significant, indicates that higher trade openness has a positive impact on the GDP.

Table 4.3
Summarized Form of Results of VEC Model

Cointegrating Eq:	CointEq1		
LNX(-1)	1.000000		
LNTO(-1)	-0.543131		
	(0.06205)		
	[-8.75372]		
LNGDP(-1)	-1.116951		
	(0.05508)		
	[-20.2778]		
C	2.971911		
Error Correction:	D(LNX)	D(LNTO)	D(LNGDP)
CointEq1	-0.851289	-0.290856	0.118067
	(0.44675)	(0.45288)	(0.05854)
	[-1.90553]	[-0.64224]	[2.01694]**
R-squared	0.518908	0.632384	0.988150
Adj. R-squared	0.329388	0.487566	0.983482
Sum sq. resids	0.277015	0.284670	0.004756
S.E. equation	0.091621	0.092878	0.012005
F-statistic	2.738001	4.366736	211.6864

Note: * and ** denote statistical significance at 1 per cent and 5 per cent levels of significance respectively.

Vector Error Correction Estimates
Sample (adjusted): 6 52
Included observations: 47 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Causality Test with VECM

The results of the causality test with VECM are presented in Table 4.4. The analysis of Table reveals that bi-directional causality exists among the export growth and GDP of India. Uni-directional causality can also be noticed between the trade openness and GDP, which is running from the trade openness to the GDP of India. It implies that Trade openness has positively influenced the GDP of India.

Table 4.4
VEC Granger Causality/Block Exogeneity Wald Tests

Dependent variable: D(LNGDP) 6a

Excluded	Chi-sq	df	Prob.
D(LNX)	16.07821	4	0.0029
D(LNTO)	14.57859	4	0.0057
All	21.90103	8	0.0051

D(LNX)------- D(LNGDP)
D(LNTO)------- D(LNGDP)

Dependent variable: D(LNX) 6b

Excluded	Chi-sq	df	Prob.
D(LNGDP)	10.95593	4	0.0271
D(LNTO)	4.809719	4	0.3074
All	12.75518	8	0.1206

D(LNGDP)------- D(LNX)

Dependent variable: D (LNTO) 6c

Excluded	Chi-sq	df	Prob.
D(LNGDP)	7.783849	4	0.0998
D(LNX)	3.463586	4	0.4834
All	22.80008	8	0.0036

ONCLUSIONS AND RECOMMENDATIONS

Different trade models have provided useful insights into how international trade increases human welfare[2]. Therefore, the testing of the hypothesis that trade have positive influence on economic growth had remained a crucial issue in the present times. As trade and growth depend on many other economic, social, and political factors, therefore, the study of relationship between trade and economic growth is a complex one. The early empirical studies on international trade and growth relied more on correlation and simple regression methods that could be performed on mechanical calculations. However, by the 1980s multiple regression analysis had become the standard tool of analysis[2]. As a result, much of the research on the relationship between trade and growth over the past two decades had increasingly applied more sophisticated statistical methods to seek more accurate estimates of the relationship between trade and growth[2]. The study in question has attempted to analyze the relationship between three variables i.e. export growth, trade openness and economic growth within the framework of Vector Error Correction Model (VECM) using the Johansen technique of co-integration and the Granger test of causality.

The analysis of statistical data with the help of advanced techniques shows that there exist a bi-directional causality between exports and economic growth during the study period. The findings of our study are in consonance with number of studies, namely, Oskooee (1993), Doraisami (1996), Ghali (2000), Summer (2004), Dawson (2005), Musonda (2007), Noman (2007), Husein (2009), Bhattacharya et al. (2009) and Gazda (2010). The implementation of Economic reforms in regard to trade liberalization during the Post-WTO period has led to a favorable foreign trade policy during this period. The liberalization in imports has also contributed to the growth of exports which has led to higher import intensity in Indian Exports, which has resulted into negative impact on the balance of trade during the period under study.

Numbers of measures have been introduced during the Post-WTO Era, namely, simplification of Import-Export procedure, reduction in Tariffs and Non-Tariffs barriers, Foreign Currency reforms, Liberal Credit, setting up of Export Promotion Zones, incentives for the Foreign Companies and Joint Ventures etc. The formation of WTO, growth and improvement in infrastructure (i.e. roads, railways and ports etc), both in terms of quantity and quality, are the positive developments in India. The reduction in tariff rates and removal of non-tariff barriers as per the provisions of WTO compliance has also contributed to the higher growth in exports.

The study also found the Uni-directional causality among the trade openness and GDP of India. The analysis of data reveals that higher trade openness has a positive impact on the GDP of India during the Post-WTO period. It is clear from the empirical evidences that globalization and liberal trade regime have helped to create a more open trade environment which led to positive spillover effects on the economic growth of the country.

The findings of the study support the outward looking policies (Trade Openness) and Exports expansion approach. In case of India as it happened in others cases. Export expans[2] has contributed to the economic growth of India during the Post-WTO period which has become an integral part of economic development strategy. At the same time, the finding of our study does not undermine the contribution of other factors that are indispensable for economic growth.

Hence, in case of India, the study recommends that in order to make Indian exports more competitive in the international market, and to improve level of productivity of Indian export sector, a number of measures, including, the diversification of export commodities, infrastructure development, further more reduction in tariff barriers and quantitative restrictions, increase in the incentives and subsidies to exporters and operationalization of Export Processing Zones (EPZs) are required. It is pertinent to mention that in spite of existence of the positive relationship between the GDP, export growth and trade openness, there is question mark how this development has contributed to the level of income inequalities, impact on poverty reduction and generation of employment in India.

Therefore, the study suggests that further empirical investigation is required to see the impact of these variables on the overall welfare of the society during the Post-WTO period in general and India in particular.

Important Notes

[1]Asian tigers include Taiwan, Hong Kong, Singapore and Korea have been successful in achieving high and persistent rates of economic growth since early 1960s; because of their free market, outward oriented economies.

[2] Berg, Hendrik V. D. and Joshua J. Lewer (2007), "International Trade and Economic Growth" published by Prentice Hall of India Pvt. Ltd, New Delhi.

[3] The philosophy behind the trade liberalization was that the role of government in making decisions on resource allocation should be lessened and the incentive structure should change in favour of exports through import liberalization in order to follow an export promotion lane.

[4] A time series is stationary (in the sense of weak stationarity) if its mean, variance and covariance remain constant overtime.

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ANNEXURE I
Results of VEC Model

Cointegrating Eq:	CointEq1		
LNX(-1)	1.000000		
LNTO(-1)	-0.543131		
	(0.06205)		
	[-8.75372]		
LNGDP(-1)	-1.116951		
	(0.05508)		
	[-20.2778]		
C	2.971911		
Error Correction:	D(LNX)	D(LNTO)	D(LNGDP)
CointEq1	-0.851289	-0.290856	0.118067
	(0.44675)	(0.45288)	(0.05854)
	[-1.90553]	[-0.64224]	[2.01694]**
D(LNX(-1))	0.408141	0.415777	-0.082686
	(0.47424)	(0.48075)	(0.06214)
	[0.86061]	[0.86485]	[-1.33062]
D(LNX(-2))	0.506403	0.730298	-0.212900
	(0.41903)	(0.42478)	(0.05491)
	[1.20852]	[1.71925]	[-3.87757]*
D(LNX(-3))	0.209450	0.462458	-0.142726
	(0.48999)	(0.49672)	(0.06420)
	[0.42745]	[0.93102]	[-2.22299]*
D(LNX(-4))	-0.111810	-0.055510	-0.034603
	(0.44703)	(0.45317)	(0.05857)
	[-0.25012]	[-0.12249]	[-0.59076]
D(LNTO(-1))	-0.316233	-0.359916	0.025074
	(0.42090)	(0.42667)	(0.05515)
	[-0.75133]	[-0.84354]	[0.45465]
D(LNTO(-2))	-0.582056	-1.082091	0.184689
	(0.37684)	(0.38201)	(0.04938)
	[-1.54459]	[-2.83265]*	[3.74038]*
D(LNTO(-3))	0.077682	-0.209741	0.061884
	(0.45947)	(0.46578)	(0.06020)
	[0.16907]	[-0.45030]	[1.02790]
D(LNTO(-4))	0.378020	0.101028	0.020304
	(0.43163)	(0.43755)	(0.05656)
	[0.87580]	[0.23090]	[0.35901]
D(LNGDP(-1))	0.791547	0.831774	-0.220958
	(0.79684)	(0.80777)	(0.10441)
	[0.99336]	[1.02971]	[-2.11625]**
D(LNGDP(-2))	-0.398790	-0.367372	-0.090570
	(0.83896)	(0.85048)	(0.10993)
	[-0.47534]	[-0.43196]	[-0.82389]
D(LNGDP(-3))	1.166018	0.947577	-0.143736
	(0.70946)	(0.71920)	(0.09296)
	[1.64353]	[1.31755]	[-1.54619]
D(LNGDP(-4))	1.064136	0.088653	0.653098
	(0.73505)	(0.74514)	(0.09631)
	[1.44770]	[0.11898]	[6.78087]
C	-0.040990	-0.034192	0.021989
	(0.05240)	(0.05312)	(0.00687)
	[-0.78231]	[-0.64372]	[3.20281]*
R-squared	0.518908	0.632384	0.988150
Adj. R-squared	0.329388	0.487566	0.983482
Sum sq. resids	0.277015	0.284670	0.004756
S.E. equation	0.091621	0.092878	0.012005
F-statistic	2.738001	4.366736	211.6864

Note: * and ** denote statistical significance at 1 per cent and 5 per cent levels of significance respectively

Vector Error Correction Estimates
Sample (adjusted): 6 52
Included observations: 47 after adjustments
Standard errors in ( ) & t-statistics in [ ]