

Causal Relationship between Trade & Economic Growth in India during Post WTO Period

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This paper investigates in to the impact of WTO on the causal relationship among exports, imports and economic growth between 1995 and 2016. The study used Granger Causality test to know the short run relationship between the variables and Johansen Co-integration approach for long run relationship. Augmented Dickey Fuller (ADF) test was applied to check stationarity of the variables used in the study. The variables were stationary at first and second level difference level. There was sufficient evidence that there existed long run relationship between export and economic growth and also between import and economic growth. The results provide evidence that economic growth in India was propelled by a growth led import strategy as well as export led growth.

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Introduction

The World Trade Organization (WTO) is the only global organization dealing with the rules of trade between nations. The aim of this organization is to help producers of goods and services, exporters, and importers who conduct their business. It has been theoretically well known that both export and import play a crucial role in economic development. The theoretical and empirical studies mainly concentrate on either the relationship between export and growth or between import and growth or the association between export, import and economic growth. The majority of WTO members are developing countries, so one of the main focuses in the organization is on ensuring that these countries are able to benefit from participating in international trade and from the multilateral trading system. The WTO recognizes the need for positive efforts to ensure that developing countries, and especially those that are least-developed, share in the growth of international trade. This was also reiterated in the Doha Ministerial Declaration of 2001, which launched the current multilateral trade negotiations. These negotiations, known

as the Doha Development Agenda (DDA), are central to the WTO's contribution to achieving the MDGs (Millennium Development Goals) which include (1) eradicate extreme poverty and hunger; (2) achieve universal basic education; (3) promote gender equality and empower women; (4) reduce child mortality; (5) improve maternal health; (6) combat HIV/AIDS, malaria, and other diseases; (7) ensure environmental sustainability; (8) develop a global partnership for development. In the Agreement establishing the WTO, it is recognized that "there is need for positive efforts designed to ensure that developing countries, and especially the least developed among them, secure a share in the growth in international trade commensurate with the needs of their economic development". Developing countries are increasingly driving the performance of the world economy. Trade between developing countries is becoming as important as trade between them and developed economies. Moreover by growing their domestic market and pursuing regional economic integration, developing countries can diversify their production away from their traditional available export markets. Economic growth depends upon enhancing productivity (of labor, capital, land and knowledge); a stable and conducive policy environment; and strong incentives for investment by individuals and businesses.

Over the years, trade openness has contributed considerably to enhancing developing countries' participation in the global economy. The export led growth hypothesis (ELGH) assumes that export

advancement is one of the key indicators of growth. It encourages that the overall progress of countries can be achieved not only by mounting the quantity of manpower and investment within the economy, but also by increasing exports. Another relationship of causality from growth to export is called growth led exports and it tells that there is unidirectional causality from economic growth to exports but not vice versa. There is also a possibility of two way causality link from exports to growth and from growth to exports. This study contributes to the literature in the following ways. First, previous studies focused mainly on the interactions between exports and economic growth. Recognizing the role of imports on economic growth and possibly on export activities of a country, this study empirically examines the relationship between exports and economic growth and imports and economic growth. Second, this study will use co-integration test to investigate for the presence of a long run relationship. To investigate co-integrating relationship between exports, imports and economic growth, approaches by Engle and Granger (1987), Johansen (1988) and Johansen and Juselius (1990) were used. The aim of this study, therefore, is to econometrically investigate direct linkages among trade and economic growth for India. In particular, this study tries to empirically find an answer for the question of whether export leads economic growth or whether import leads economic growth or economic growth leads exports and imports.

Economic growth is one of the most important determinants of economic wel-

fare. The relationship between exports and economic growth is a topic of frequent discussion, when economists try to explain the different levels of economic growth between countries. Exports of goods and services represent one of the most important sources of foreign exchange income that ease the pressure on the balance of payments and create employment opportunities. The argument concerning the role of exports as one of the main deterministic factors of economic growth is not new. It goes back to the classical economic theories by Adam Smith and David Ricardo, who argued that international trade plays an important role in economic growth. The neo-classical approach emphasizes the importance of competitive advantages in international trade. Each country maximizes its welfare through the activities which are the most efficient regarding resource and production factors scarcity in the economy. In this case, the benefits of the trade are static and trade liberation and openness cannot lead to increase in long run growth rate, but it influences income levels (Ruba Abu Shihab, 2014).

Related Studies

The study of Vohra (2001) assessed the relationship between the export and growth in India, Pakistan, Philippines, Malaysia, and Thailand for the period from 1973 to 1993. The empirical results indicated that when a country has achieved some level of economic development then the exports have a positive and significant impact on economic growth. The study also showed the importance of liberal market policies by

pursuing export expansion strategies and by attracting foreign investments.

Ullah et.al (2009) investigated export led growth by using time series econometric techniques (Unit Root Test, Co-integration and Granger causality through Vector Error Correction Model) over the period 1970 - 2008 for Pakistan. The results revealed that export expansion leads to economic growth. They also checked whether there is unidirectional or bi-directional causality between economic growth, real exports, real imports, real gross fixed capital formation and real per capita income. Based on the Granger causality test it was found that there was unidirectional causality between economic growth, exports and imports. On the other hand Granger causality through vector error correction was checked with the help of F-value of the model and t-value of the error correction term, which partially reconciled the traditional Granger causality test.

It was found that there was unidirectional causality between economic growth, exports and imports.

Deepika Kumari and Neena Malhotra (2014) evaluated the causal linkage between exports and economic growth by employing Johansen co-integration and Granger causality approaches. Annual time series data for the variables exports and GDP per capita stemming from 1980 to 2012 have been used in the analysis for India. The tests on the long run and short run relationship

between exports and economic growth were conducted. Based on the findings of co-integration approach it was observed that there did not exist long run equilibrium relationship between exports and GDP per capita. Granger causality test showed bi-directional causality running from exports to GDP per capita and GDP per capita to exports.

Export and economic growth were co-integrated and, hence, a long-run equilibrium relationship existed between them.

In his study Gurmeet Singh (2015) investigated the relationship between export and economic growth, over the period April 2005 to March 2014. Index of industrial production was used as indicator of economic growth. Johansen's co-integration and Granger causality test have been applied to explore the long-run & short run equilibrium relationship between export and economic growth. The analysis revealed that export and economic growth were co-integrated and, hence, a long-run equilibrium relationship existed between them. It was observed that the export and index of industrial production as indicator of economic growth were positively related to each other. The export was found to be significant in determining economic growth and economic growth significantly affects export. In the Granger causality sense, export granger causes economic growth and economic growth granger causes export or there was bi-directional causality between export and economic growth in both long run and short-run.

Hussain (2014) tested the relationship between exports and GDP in Pakistan using annual data collected from 1976 to 2011. The variables proved to be integrated of the order one (1) at first difference using Augmented Dickey Fuller test. The co-integration test indicated the existence of long run equilibrium relationship between the two variables as confirmed by the Johansen co-integration test results. The ECM (Error Correction Model) estimates proved that there was short run causality coming from GDP to export. The findings indicated that there was unidirectional causality from GDP to exports in Pakistan but not vice versa.

Hussain and Saaed (2014) attempted to analyze the nexus of exports, imports and economic growth in Saudi Arabia, using annual data for the period 1990-2011. Both Trace and Maximum Eigen value indicated co-integration at 5% level of significance pointing to the fact that the variables have a long run relationship. Also, economic growth was found to Granger cause import. There was a unidirectional causality existing between exports and imports. But the result of the causation between exports and economic growth and imports and economic growth was statistically insignificant.

Afaf Abdull J. Saaed and Majeed Ali Hussain (2015) made an effort to study the impact of exports and imports on the economic growth of Tunis over the period 1977-2012. The study used Granger Causality and Johansen co-integration approaches for long run relationship using Augmented Dickey Fuller (ADF) and

Phillip Perron (PP) stationarity test. The variables were proved to be integrated of the order one (1) at first difference. Economic growth was found to Granger cause imports and export was found to Granger cause import. There was unidirectional causality between exports and economic growth and between imports and economic growth. These results provided evidence that growth in Tunisia was propelled by a growth led import strategy as well as export led import. Imports were proved to be the source of economic growth in Tunisia.

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Sachin N. Mehta (2015) examined the relationship between Gross Domestic Product (GDP), Export and Import in India using time series data from 1976 to 2014. This study used the ADF unit root test, Johansen co-integration and Vector Error Correction techniques to investigate the long run causality between gross domestic product (GDP), exports and Imports in India. Based on the study, it could be concluded that the Augmented Dickey Fuller unit root tests showed that GDP, exports and imports series become stationary when first difference was considered. Also the empirical result revealed a long run co-integrating relationship between Gross Domestic Product (GDP), exports and imports in India. Unidirectional causality running from GDP to exports was observed, it meant in the long term GDP lead to exports but export did not lead to GDP. The result revealed that

there was no causality between GDP and imports; it meant GDP did not lead to import and import did not lead to GDP. It was also found evidence of unidirectional causality running from export to import, it meant in the long term exports lead to imports but imports do not lead to exports.

It was found no causal relationship between openness and total government expenditures or productive and unproductive expenditures.

Micheal Benarroch and Manish Pandey (2017) examined the casual relationship between international trade and the size and composition of government expenditures, productive versus unproductive for the period 1972-2000. To capture differential impacts on how government responds to greater international exposure three measures were used: the ratio of exports plus imports to GDP (openness), the ratio of exports to GDP, and the ratio imports to GDP. For all countries in aggregate, it was found no causal relationship between openness and total government expenditures or productive and unproductive expenditures. For low-income countries however, there was a positive causal relationship between openness and productive government expenditures. Further, there was a positive causal relationship between the import ratio and productive expenditures for all countries as well as for low-and high-income countries separately. Exports, conversely, had no causal relationship with any measure of government expenditures.

Yaya Keho (2017) examined the impact of trade openness on economic growth for Cote d'Ivoire over the period 1965–2014 in a multivariate framework including capital stock, labor and trade openness as regressors. It used the Autoregressive Distributed Lag bounds test to co-integration and the Toda and Yamamoto Granger causality tests. The results showed that trade openness had positive effects on economic growth both in the short and long run. Furthermore, they revealed a positive and strong complementary relationship between trade openness and capital formation in promoting economic growth.

Nazife Ozge K yl c and Murat Beser (2017) found the relationship between foreign trade and economic growth for the countries of Eurasia Economic Union by using data in era of 1992-2015 with the help of panel data analysis. First of all, cross-sectional dependency and homogeneity test had been done in the study and it had been concluded that there was cross-sectional dependency in between the series. For this purpose, unit root and causality test considering the cross-sectional dependency had been applied. Relationship between the variables had been analyzed with the panel causality test developed by Konya (2006). It had been determined that there was bi-directional causality from growth to export and uni-directional causality from growth to import.

Objectives

The major objectives of the present study are:

1. To study the causal relationship between export and economic growth and between import and economic growth in India during WTO regime.
2. To analyze the long run relationship between export and economic growth and between import and economic growth in India during post WTO regime.

Methodology

The analysis used in this study cover annual time series data from 1995 to 2016 which was sufficient to capture the short run and long run correlation between export, import and economic growth in the model. The data set consisted of observations for GDP, exports of goods and services and imports of goods and services. GDP at market price was taken as proxy for economic growth. All data sets were taken from WTO statistical data base. The entire estimation procedure consisted of first, unit root test; second, co-integration test and third, Granger Causality test. The application of Granger Causality test involves the following steps:

- a. *Unit-root test:* In the present study non-stationarity or the presence of a unit-root was tested using the Augmented Dickey Fuller test. To test if a sequence Y_t contains a unit-root, two different regression equations were considered:

$$rY_t = \alpha + gY_{t-i} + q t + S \text{ bi } rY_{t-i} + e_i \dots \dots \dots (1)$$

$$rY_t = gY_{t-i} + S \text{ bi } rY_{t-i} + e_i \dots \dots \dots (2)$$

The first equation includes both a drift term and a deterministic trend, and the second does not contain an intercept but include the deterministic trend. In both the equations, the parameter of intercept is g . If $g = 0$, the Y_t sequence has a unit-root. The estimated 't' statistic was compared with the appropriate critical value to determine if the null hypothesis is valid. However, if the variables are non-stationary, they are tested for the possibility of a co-integrating relationship.

b. Multi-Variant Co-integration analysis: The Multi-variant Co-integration technique developed by Johansen (1988), and Johansen and Juselius (1990) were used to test for the number of co-integrating vectors (co-integration rank) in the system. This test enables the estimation of more than one co-integrating relationship and also permits testing for the validity of any restrictions on co-integrating relationships implied by economic theory. This procedure has a further advantage when testing for co-integration. When there are 'n' series and (n-1) potential co-integrating relationships, it first tests the null hypothesis of zero co-integrating relationship and proceeds in step-wise fashion to test the null of higher number of such relationship up to (n-1).

The general form of the model for a higher order autoregressive process is:

$$Dct = Sp1Dt-1 + pct-m + et..... (3)$$

where ct is the (n x 1) vector of variables, et is an independently and identically distributed 'n' dimensional vector

with zero mean and variance matrix $Sp1$ is a (n x 1) matrix, and its rank is equal to the number of independent co-integration vectors.

The rank of a matrix is equal to the number of its characteristic roots that differs from zero. Thus, the number of independent co-integrating vectors in the system can be determined by checking the significance of the characteristic roots of p (estimated matrix). The test of the number of co-integration vector was conducted using the following test statistics:

$$I_{trace}(r) = -TS \ln(I - I_i)..... (4)$$

$$I_{max}(r, r+1) = -T \ln(1 - I_{r+1})..... (5)$$

Where, I_i is the estimated values of the characteristic roots or Eigen values obtained from the estimated p matrix and T is the number of usable observations. The trace test (equation 4) is the test statistic that tests for the null hypothesis that the number of co-integrating vector is less than or equal to 'r' against a general alternative. The maximum Eigen value test (equation 5) is the test statistics that tests the number of co-integrating vectors 'r' against the alternative of (r+1) co-integrating vectors. Critical values for both tests were tabulated based on Osterwald-Lenum (1992) guidance list.

c. Granger Causality-Model Specification: Granger Causality test was employed to examine the causal relationship among economic growth, export and import in India during post WTO period. The primary

model showing the causal relationship among economic growth, export and import in India can be specified thus:

$$LGDP_t = \alpha + \beta Lexport_t + \varepsilon_t \dots \dots \dots (6)$$

$$Lexport_t = \alpha + \beta LGDP_t + \varepsilon_t \dots \dots \dots (7)$$

$$LGDP_t = \alpha + \beta Limport_t + \varepsilon_t \dots \dots \dots (8)$$

$$Limport_t = \alpha + \beta LGDP_t + \varepsilon_t \dots \dots \dots (9)$$

Where, α is the constant term, 't' is the time trend, and 'e' is the random error term assumed to be normally, identically and independently distributed. Here, $LGDP_t$, $Lexport_t$ and $Limport_t$ show the Gross Domestic Product, export and import at a particular 't' time respectively while ε_t represents the "noise" or error term; α and β represent the slope and coefficient of regression. The coefficient of regression, β indicates how a unit change in the independent variable (export and import) affects the dependent variable (Gross Domestic Product). The error, ε_t , is incorporated in the equation to cater for other factors that may influence GDP. The validity or strength of the Ordinary Least Squares method depends on the accuracy of assumptions. In this study, the Gauss Markov assumptions were used and they include that the dependent and independent variables (GDP, export and import) are linearly correlated, the estimators (a and b) are unbiased with an expected value of zero i.e., $(\varepsilon_t) = 0$, which implies that on average the errors cancel out each other.

Results of Augmented Dickey Fuller Test (ADF)

The results of Augmented Dickey Fuller Test (ADF) for the variables export, import and economic growth (GDP) are shown in Table 1.

The results showed that the test statistics for the log level of the variables exports and imports were less than the critical values in absolute terms. This implied that the null hypothesis cannot be rejected. The test statistics for their second difference exceeded the respective critical values, implying rejection of null hypothesis whereas the variable economic growth was stationary at the first difference. Hence, the variables were stationary at first and second level difference.

Table 1 Results of Augmented Dickey Fuller Test

Variables	ADF Values
Exports	-6.018563**
Imports	-4.991904**
Economic Growth(GDP)	4.135421*

Source: Calculations are based on WTO time series data

* Stationary at first difference

** Stationary at second difference

Relationships between Exports & Economic Growth (GDP)

The causal relationship between exports and economic growth is discussed as follows:

Long run Relationships between Exports and Economic Growth: The maximum Eigen value and Trace tests were used to determine the rank of the

co-integrating vectors and for testing existence of long run relationship between the variables exports and economic growth.

This relationship during post WTO period is given in Table 2.

Table 2 Unrestricted Co-integration Rank Test –Exports & Economic Growth (GDP)

Hypothesized No. of CE (s)	Eigen Value	Trace Statistic	5 percent Critical Value	Prob.**
None *	0.757770	38.24789	15.49471	0.0000
At most 1 *	0.448537	11.30844	3.841466	0.0008

HypothesizedNo. of CE (s)	Eigen Value	Max-Eigen Statistic	Critical Value	Prob.**
None *	0.4124	15.1037	14.2646	0.0052
At most 1 *	0.4014	9.7531	3.8414	0.0018

Source: Calculations are based on WTO time series data

Note: Trace test and Maximum Eigen Value test indicates 2 co-integrating equations

*denotes rejection of the hypothesis at the 0.05 level

**Mackinnon-Haug-Mchelis (1999) ρ-values

Based on the Trace Statistic and Eigen Value there was sufficient evidence to reject the null hypothesis in favor of the alternative hypothesis stating that there existed long run relationship between the variables exports and economic growth. Also, 2 co-integrating equations were observed.

Short run causal relationship between Export and Economic Growth (GDP): The standard Granger causality test was applied to determine the short run causal relationship (direction) between the variables export and GDP during post WTO era. The results of the same are reported in Table 3.

There existed long run relationship between the variables exports and economic growth.

Based on the Granger Causality test, it was found that the null hypothesis of exports Granger causing economic growth could be rejected since the re-

Table 3 Causality between Exports & Economic Growth

Null Hypothesis	Post WTO Period	
	F-Statistic	Prob (0.05)
Exports Does Not Granger Cause Economic Growth	17.3719	0.0002
Economic Growth Does Not Granger Cause Exports	1.19878	0.3307

Source: Calculations are based on WTO time series data

ported probability was less than 0.05 implying that the short run relationship be-

tween exports and economic growth was dependent on each other in India

It is very clear that there existed uni-directional causality between the variables exports and economic growth.

during post WTO period. Besides, the results of the Granger Causality viz. economic growth Granger causing exports could not be rejected since the relationship between them were independent due to the reason that the reported probability was more than 0.05. It is very clear that there existed uni-directional causality between the variables exports and economic growth.

Relationship between Import & Economic Growth (GDP)

The causal relationship between Imports and Economic Growth is discussed as follows:

Long Run Relationship between Imports and Economic Growth: The maximum Eigen value and Trace test were used to determine the rank of the co-integrating vectors and for testing existence long run relationship between the variables imports and economic growth. This relationship during post WTO period is given in Table 4.

Table 4 Unrestricted Co-integration Rank Test –Imports & GDP

Hypothesized No.of CE (s)	Eigen Value	Trace Statistic	5 percent Critical Value	Prob.**
None *	0.720868	38.05295	15.49471	0.0000*
At most 1 *	0.516505	13.80758	3.841466	0.0002*
Hypothesized No. of CE (s)	Eigen Value	Max-Eigen Statistic	Critical Value	Prob.**
None *	0.720868	24.24536	14.26460	0.0010
At most 1 *	0.516505	13.80758	3.841466	0.0002*

Source: Calculations are based on WTO time series data

Note: Trace test and Maximum Eigen value test indicates 2 co-integrating equations

*denotes rejection of the hypothesis at 1% level

**Mackinnon-Haug-Mchelis (1999) ρ -values

Based on the Trace Statistic and Eigen value, there was sufficient evidence to reject the null hypothesis in favor of alternative hypothesis. In other words, there existed long run relationship between the variables imports and economic growth.

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Also, 2 co-integrating equations were observed for the above shown test.

Short Run Causal Relationship between Imports & GDP: Based on the standard Granger Causality test the short run causal relationship (direction) between the variables imports and GDP during post WTO was determined. The results of the same are reported in Table 5.

Table 5 Causality between Imports & GDP

Null Hypothesis	Post WTO Period	
	F-Statistic	Prob(0.05)
Imports does not Granger Cause Economic Growth	17.0541	0.0002
Economic Growth does not Granger Cause Imports	2.61235	0.1086

Source: Calculations are based on WTO time series data

The short run relationship between imports and economic growth was such that both are dependent on each other in India during post WTO period.

Based on the Granger causality test, it was found that the null hypothesis of imports Granger causing economic growth could be rejected since the reported probability value was less than 0.05 which implied that the short run relationship between imports and economic growth was such that both are dependent on each other in India during post WTO period. Besides, the results of the Granger causality test showed that the hypothesis viz. economic growth does not Granger cause imports could not be rejected since the relationship between them were independent due to excess probability value of 0.05. Hence, there existed uni-directional causality between the variables imports and economic growth.

Conclusion

It is reasonable to recognize that a large number of factors, such as capital accumulation, entrepreneurship, innovation, learning by doing and human capital accumulation, other than exports and imports determine economic growth.

However, in the Indian case it should be emphasized that the evidence obtained from the supply side (imports and exports) implied that growth might be driven primarily by traditional factors of production and, although exports might have acted as an additional engine of growth. A long period of economic cooperation with export orientation should be followed to have the effect of export on the economic growth. Unless and until the social/ political issues are settled, it will be difficult to realize the benefits of export to augment economic growth.

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