EURASIAN JOURNAL OF ECONOMICS AND FINANCE

www.eurasianpublications.com

WHETHER THE ECONOMIC GROWTH OF INDIA IS TRADE OPENNESS LED?

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Received: March 14, 2020

Accepted: March 29, 2020

Abstract

The prime aim of the paper is looming around the doubt whether the economic growth of India is trade openness led? If yes, whether the trade openness led growth could be a short term or a protracted-term phenomenon. To check this, the paper took the annual time series data on the GDP per capita income as a proxy for economic growth, and also the different standards of trade openness like the amount of exports and imports as a percentage of GDP, export and import of products and services as a percentage of GDP, and per cent of World exports and imports. The model is grounded on the extended version of the Cobb-Douglas production function. The short-run and long-term dynamics of the connection between trade openness and economic growth is analyzed by employing Toda Yamamoto's Granger's non-causality test, Johansen's Maximum Likelihood test and Fully Modified Ordinary Least Square model. The findings of the study exposed that the GDP per capita income is positively statistically explained by the trade openness, exports of goods and services as per cent of GDP, imports of goods and services as a percentage of GDP, per cent of total World exports, capital investment, and labour force participation rate. There exists a long-run equilibrium relationship between the economic growth and trade openness indicators considered within the study. The positive impact of trade openness on economic growth suggests that India should give more emphasis on the optimal allocation of domestic resources, technological progress and knowledge spillovers and encourage integration and competition among domestic and international markets.

Keywords: Trade Openness, Growth, FMOLS, Cointegration, Granger's Non-Causality

JEL Classifications: C32, F43, O24

1. Introduction

Trade openness is critical to any economy. As economies became more open and competitive, there are more chances of growth and innovations and enlistment of the society in developing economies. Trade openness has transformed many nations from the state-based economies of the former Soviet Union to the over-regulated economies of South America and also the rising tigers of Asia. Many countries have opened their economies for the aim of economic growth and development after the 1980s. This may be due to the fact that export promotion measures through trade liberalization brought incentives for domestic optimal resource allocation and efficient production. It has been well established within the literature that trade acts as an engine of economic growth as postulated by trade led hypothesis. However, this can be

supported by the specialization and concentration within the country concerning the export or import orientation. It has been observed that in the long run, trade openness can significantly contribute to economic growth by providing access to goods and services, achieving allocational efficiency of resources and improving total factor productivity through the dissemination of knowledge and technology diffusion (Barro and Sala-i-Martin, 1997; Rivera-Batiz and Romer, 1991). It is therefore expected that countries with more trade openness will contribute significantly to the economic growth in comparison to the countries with relatively less trade openness. However, there is no near unanimity of the relationship between trade openness and economic growth within the international trade literature until today.

Krueger (1978) argued that trade liberalization encourages specialization in sectors which have economies of scale that contribute to improving the efficiency and productivity in the long-run. A few studies suggest that trade openness has a positive impact on economic growth due to efficient allocation of resources, dissemination of knowledge and technological progress and encouragement of competition in domestic as well as international market (Grossman and Helpman, 1991; Romer, 1994; Coe and Helpman, 1995; Bahmani-Oskooee and Niroomand, 1999; Frankel and Romer, 1999; Karras, 2003; Yanikkaya, 2003; Dollar and Kraay, 2004; Wang *et al.* 2004; Freund and Bolaky, 2008; Chang *et al.* 2009; Das and Paul, 2011; Marelli and Signorelli, 2011; Nowbutsing, 2014; and Zarra-Nezhad *et al.* 2014). On the contrary, Rigobon and Rodrik (2005) find a significant negative impact of trade on income levels. Vamvakidis (2002) and Ulasan (2015) find no support for the trade-led growth hypothesis. The studies like Krugman (1994) and Rodrik and Rodriguez (2001) argued that the effect of openness on trade is doubtful.

It is in this context, the objective of the study is to look at the dynamic linkages between trade openness and economic growth within the context of India. The most important motivation for the study is stemming from the recent slowdown of economic growth, which is reduced from 7 per cent in 2018 to 4.5 per cent within the 4th quarter of 2019. At the identical time, India's containerized trade growth slowed to at least one per cent in the 2nd quarter of 2019. Both imports and exports were growing at a healthy rate during the 2nd quarter of 2018 at 8 per cent and 9 per cent respectively. However, in the 2nd quarter of 2019, imports have grown at a meagre 2 per cent, while exports remain flat. This could be due to the combination of international factors like slowing trade growth, and growing trade tensions as well as domestic factors like rural consumer distress, plunging consumption demand, tightening liquidity, and a slowdown in key manufacturing sectors. The mixture of these factors also impacted the country's economic activity and slowing overall import-export growth. This paradox has raised whether the present economic growth in India is trade led? If yes, whether trade-led growth could be a short term or a protracted-term phenomenon. The paper is an endeavor in this direction.

The study is predicated on the annual time series data on various indicators of economic growth, and trade openness, and also the study period is spanning from 1991 to 2018. The study is based on the methodology of an extended Cobb Douglas production function. The short term dynamic interaction is examined by employing the Toda Yamamoto Granger's Non-Causality test within the VAR block exogeneity form. The long-run dynamics are examined by employing the Johansen Maximum Likelihood Procedure cointegration and Fully Modified Ordinary Least Square Model.

The rest of the paper is organized as follows. Section 2 of the paper presents the theoretical and empirical literature review on the nexus of trade openness and economic process. Section 3 establishes the empirical methodology to look at the hypothesis that whether the symptoms of trade openness ends up in the economic process both in the short and long run. Section 4 discusses the results, and the major finding of the study followed by the conclusion in Section 5.

2. Literature review

The impact of trade openness and the level of economic development is a long-standing debate in the literature. The literature strengthens the argument that trade openness stimulates economic development as well as economic growth. However, the empirical result is mixed and

there is no near agreement on the conclusion of the relationship between trade openness and economic growth. This is partly because most of the empirical studies used different indicators to measure the economic growth and trade openness along with the other control variables by employing the different empirical methodologies in both time series and panel data. The economic growth and development are measured in terms of Gross Domestic Product (GDP) in both nominal and real terms. This is also measured in terms of GDP per capita income in both nominal and real terms as well. The trade openness indicator is measured in both nominal and real term and as expressed as the sum of total exports and imports as a per cent of GDP. The other trade openness indicators considered in the literature are export of goods and services as a per cent of GDP, import of goods and services as a per cent of GDP, per cent of World exports, per cent of World imports export growth, import growth, trade balance, export partner share, index of export market penetration and import market penetration etc. The other control variables considered in the literature are financial openness indicators, foreign investment indicators, economic globalization index, and other macroeconomic fundamental factors.

Edwards (1993, 1998) studied the causal relationship between openness and economic growth in specific countries and led the cross-country analysis. He found that the import substitution strategy does not generate long-term growth of production, but the outward-oriented strategy was efficient in attaining the same. The cross-country literature suggested a positive relationship between openness and growth. Awokuse (2008) examined the relationship between trade openness and economic growth in Argentina, Colombia, and Peru for the period from 1993 to 2004. The study emphasized that imports are too important as exports when analyzing the relationship between trade openness and economic growth. Gries and Redlin (2012) studied the short-term and long-run dynamics between per capita GDP growth and openness for 158 countries over the period 1970-2009. The study used panel cointegration tests and panel error-correction models (ECM) in combination with GMM estimation to see out the causal relationship between these two variables. The outcomes propose a long-run relationship between openness and economic development.

Dao (2014) investigated the relationship between trade liberalization and economic growth of 71 countries worldwide over 6 five-year periods from 1980 to 2010. By employing an OLS regression model, the study found that there is a positive relationship between trade shares and economic growth. Jawaid (2014) tried to examine the impact of trade openness on the economic growth of Pakistan for the period from 1981 to 2009. The study bases that there is a positive long-run relationship between exports and economic growth but imports hurt economic development. Sakyi *et al.* (2015) looked into the long-run impact of foreign direct investment and trade openness on economic growth in Ghana for the period 1970 to 2011 using the ARDL model. The results validate the Bhagwati (1978) hypothesis by suggesting that the interaction of foreign direct investment and exports has been crucial in fostering growth in Ghana.

Idris *et al.* (2016) investigated the causal relationship between trade openness and economic growth in 87 countries which include both organizations for Economic Co-operation and Development (OECD) and developing countries for the period 1977-2011. By using dynamic panel data and GMM estimation, the study reveals that there is a bidirectional causal relationship for both OECD and developing nations. The study bears out the endogenous growth theory which states that trade openness leads to high economic growth. Keho (2017) attempted to investigate the relationship between trade openness and economic growth for Cote D'Ivoire over the period 1965 to 2014. By employing the Autoregressive Distributed Lag bounds to test to cointegration and the Toda and Yamamoto Granger causality tests, the study found that trade openness has positive effects on economic growth both in the short and long run. Khobai *et al.* (2017) studied the long-run relationship between trade openness and economic growth in Ghana and Nigeria for the period from 1980 to 2016. To analyze the long-run relationship between the variables, the Autoregressive Distributed Lag (ARDL) model was applied in this study. The findings of the study suggested the existence of a long-run relationship among the variables for both countries. The result also indicated that trade openness has a positive impact on economic growth in Ghana while in Nigeria trade openness has a negative but insignificant effect on economic growth.

Malefane and Odhiambo (2018) examined the impact of trade openness on economic growth in South Africa for the period from 1975 to 2014 by considering ARDL model, and four proxies of trade openness such as ratio of exports plus imports to the gross domestic product, ratio of exports to GDP, the ratio of imports to GDP and last an index of trade openness for the size of the country and geography. The study found that international trade plays a significant role in South Africa's economic growth. Trade openness has a positive impact on the economic growth of South Africa. Cevik *et al.* (2019) explored the relationship between trade openness and economic growth in Turkey for the time 1950 to 2014 by employing Breitung and Candelon's frequency domain Granger-causality test. The study found that there is a feedback relationship between trade openness and economic growth in Turkey, which is known as 'sequential feedback'.

Ramphul (2010) proved to analyze the causal connection between trade openness and economic growth in India for the period from 1950-2008. By using the time series techniques such as cointegration and granger causality test the study found that there is a long-run equilibrium relationship between trade openness and economic growth in India. The study concluded that trade openness has a positive impact on economic growth. Chatterji *et al.* (2014) tried to ascertain the relationship between trade openness and economic growth in India for the period 1970 to 2010. By using a Vector Autoregression method the study found that growth in trade volume has accelerated economic growth of India since 1980-81 onwards. The survey did not detect any significant connection between trade barriers and economic growth.

Hye and Lau (2015) analyzed the connection between trade openness and economic growth in India. The study utilized a new endogenous growth model for theoretical support and empirically tested through the ARDL model and rolling window regression method. The study concludes that human capital and physical capital are positively related to economic growth in the long run. Burange *et al.* (2019) analyzed the causal relationship between trade openness and economic growth (on GDP per capita) for the member countries of BRICS by employing techniques of time series analysis. They found that India follows growth-led trade in services hypothesis. The study also supports the growth-led export and growth-led import hypothesis for China and export- and import-led growth in South Africa. However, no causal relationship was evident for Brazil and Russia.

3. Data and methodology

The hypothesis to be examined in this study is that the phase of economic development is being stimulated by the trade openness indicators in the context of India. To test this hypothesis, we have considered the Cobb-Douglas production function as follows:

$$Q_t = X_t K_t^\alpha L_t^{1-\alpha} \quad (1)$$

where Q is the real economic output at the time 't', K is capital stock, L is labor force and X is technological progress at the time 't'. The Cobb-Douglas production function is extended here by assuming that technological progress can be influenced by trade openness. This leads to specify X as follows:

$$X_t = \gamma TO_t^{\delta_1} \varepsilon_t^{\rho} \quad (2)$$

where 'TO' stands for trade openness and ' ε ' represents other factors that may influence the state of technology. Substituting the Value of X_t in Q_t gives:

$$Q_t = \gamma TO_t^{\delta_1} K_t^\alpha L_t^{1-\alpha} \varepsilon_t^{\rho} \quad (3)$$

Dividing both sides by labor and taking logs, the above equation can be modeled as follows:

$$Y_{it} = \beta_0 + \beta_1 K_{it} + \beta_2 L_{it} + \beta_3 TO_{it} + \varphi_{it} \quad (4)$$

where Y, K, L and TO represent the log of GDP per capita, log of capital stock, log of labor force participation, and log of trade openness respectively. The trade openness is measured by the different indicators as explained below.

In this study, we have considered the GDP per capita, current U.S. dollars as the proxy to measure the economic growth, Capital investment as a percent of GDP and labor force participation rate. The trade openness indicators are measured as exports plus imports as per cent of GDP, exports of goods and services as per cent of GDP, imports of goods and services as per cent of GDP, percent of world exports, percent of world imports, export growth and import growth. The other control variable used in this study is an economic globalization index (0-100). The different trade openness indicators are explained in detail as follows:

Exports plus imports as per cent of GDP: The average of this indicator at the World level for 2018 was 97.82 per cent. The highest value was in Luxembourg: 415.48 per cent and the lowest value was in Sudan: 22.59 per cent. The average value for India during that period (1991-2018) was 35.85 per cent with a minimum of 16.99 per cent in 1991 and a maximum of 55.79 per cent in 2012. This is presented in Figure 1. India ranks at 115, which is above China (120) out of 129 rankings of all the countries.

Figure 1. Exports plus imports as per cent of GDP: India

Source: Author's compilation based on Global Economy (2019)

Exports of goods and services as a percent of GDP: Exports of goods and services represent the total value of all other goods and market services provided to the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. The average of this for 2018 was 46.79 per cent. The highest value was in Luxembourg: 224.76 per cent and the lowest value was in Ethiopia: 8.37 per cent. India (19.70) ranks at 113 among 129 countries ranking in the World, which is above than China (19.51 per cent) ranked at 114. In the context of India, the highest ratio (25.43) is achieved in the year 2013 and the lowest (8.49) in the year 1991. The average ratio during the period 1991 to 2018 for India is 16.7 per cent (Figure 2).

Figure 2. Exports of goods and services as a percent of GDP: India

Source: Author's compilation based on Global Economy (2019)

Imports of goods and services as per cent of GDP: Imports of goods and services represent the value of all other goods and market services received from the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. The average of this indicator for 2018 was 51.06 per cent. The highest value was in Luxembourg: 190.71 per cent and the lowest value was in Sudan: 12.35 per cent. India (23.43) stood at 114 ranks above than China (18.73), which stood at 125 ranks among the total 129 countries ranking in the World. The highest ratio (31.26) is achieved in the context of India in 2012 and the lowest (8.49) in the year 1991. The average ratio is 19.15 during the period from 1991 to 2018 (Figure 3).

Figure 3. Imports of goods and services as percent of GDP: India

Source: Author's compilation based on Global Economy (2019)

Trade balance as a percent of GDP: External balance on goods and services (formerly resource balance) equals exports of goods and services minus imports of goods and services (previously nonfactor services). The average trade balance as a percentage of GDP for 2018 was -4.27 per cent. The highest value was in Macao: 50.49 per cent and the lowest value was in Somalia: -73.67 per cent. India (-3.73) stands at 77th ranking, while China (0.78) stands at 47th

of World ranking. The trade balance as a per cent of GDP figures from 1991 to 2018 in the context of India is plotted in Figure 4.

Figure 4. Trade balance as a per cent of GDP: India
Source: Author's Compilation based on Global Economy (2019)

Economic globalization index (0-100): Economic globalization has two dimensions: actual economic flows and restrictions to trade and capital. As per the 2017 Country rankings, the average for 2017 was 59.01 points. The highest value was in Singapore: 94 points and the lowest value was in Ethiopia: 26.58 points. India (41.71) stands at 151st rank out of 186 countries considered for the ranking, while China (47.87) stands at 136th rank. The economic globalization index (0-100) from 1991 to 2018 is presented in Figure 5.

Figure 5. Economic globalization index (0-100): India
Source: Author's compilation based on Global Economy (2019)

Per cent of world exports: The share of world exports equals the exports of a particular country as per cent of the total exports of all countries around the world. The average country (170) ratings for 2017 was 0.59 per cent. The highest value was in China: 10.83 per cent and the lowest value was in Belize: 0 per cent. India (2.22) stands at 13th rank. The per cent of world exports in the context of India are plotted in Figure 6.

Figure 6. Percent of world exports: India

Source: Author's compilation based on Global Economy (2019)

Percent of world imports: The share of world imports equals the imports of a particular country as per cent of the total imports of all countries around the world. The average country rating for 2017 was 0.59 per cent. The highest value was in the USA: 13.41 per cent and the lowest value was in Belize: 0 per cent. India (2.67) stands at 9th of country ratings. The time series of the per cent of world imports is presented in Figure 7.

Figure 7. Percent of world imports: India

Source: Author's compilation based on Global Economy (2019)

Export growth: This is measured as the percentage change in the value of exports relative to the previous year. The time series of export growth from 1991 to 2018 are plotted in Figure 8.

Figure 8. Export growth (%): India

Source: Author's compilation based on Global Economy (2019)

Import growth: This is measured as the percentage change in the value of imports relative to the previous year as presented in Figure 9.

Figure 9. Import growth (%): India

Source: Author's compilation based on Global Economy (2019)

The data for the study is based on the annual data sourced from the Global Economy.com and the study period is spanning from 1991 to 2018. To examine the short-run and the long-run dynamic relationship between the level of economic growth and the indicators of trade openness in the Indian context, the time series econometric techniques such as Toda Yamamoto Granger's Non-causality test in the Vector Auto Regression (VAR) block Exogeneity form, Johansen's Maximum Likelihood Procedure of Cointegration test, Fully Modified Ordinary Least Square Method is employed. As the variables considered here in the paper are time series in nature, the Unit root tests such as Augmented Dickey-Fuller test with the trend and intercept is used to make the variables stationary and to check their order of integration. The diagnostic test such as Wald statistics is used to check the robustness of the coefficients of FMOLS model. As these techniques are most celebrated models in the time series

econometrics literature and are available in any standard textbook, we are not attempting to discuss these further here.

4. Results and discussion

As discussed in the previous section, all the variables considered in the study are used to estimate the model. Yet, needless to mention, only statistically significant outcomes are described in this section. To begin with, the summary of the statistical moments of all the considered variables is shown in Table 1, from which it can be surmised that the coefficient of skewness, an index used in the distribution analysis as a sign of asymmetry for all the variables is larger than zero. This is farther indicated that all the variables are negatively skewed distribution except LGDPPC and LCI and most of these variables are concentrated on the right of the mean, with extreme values to the left. The kurtosis coefficient, a measure of the thickness of the tail of the distribution is quite low. This is further strengthened by Jarque Bera test for normality which in our case rejects the null hypothesis of normality at any conventional levels for all the variables.

Table 1. Summary of the statistical moments

	LGDP				LEGSP LIGSP				
	PC	LCI	LLPR	LTO	GDP	GDP	LEGI	LPWE	LPWI
Mean	2.86	1.49	1.74	1.52	1.19	1.24	1.49	0.06	0.12
Median	2.82	1.48	1.76	1.58	1.26	1.30	1.59	0.08	0.13
Maximum	3.30	1.62	1.76	1.74	1.40	1.49	1.66	0.34	0.42
Minimum	2.47	1.36	1.71	1.23	0.92	0.92	1.18	-0.27	-0.26
Std. Dev.	0.28	0.08	0.02	0.16	0.15	0.17	0.16	0.22	0.24
Skewness	0.14	0.15	-0.60	-0.24	-0.26	-0.23	-0.68	-0.09	-0.09
Kurtosis	1.48	1.60	1.60	1.60	1.56	1.65	1.83	1.41	1.42
Jarque-Bera	2.79	2.39	3.99	2.55	2.72	2.37	3.79	2.95	2.93
Probability	0.24	0.30	0.13	0.27	0.25	0.30	0.15	0.22	0.23
Sum	80.23	41.73	48.94	42.70	33.51	34.97	41.98	1.71	3.37
Sum Sq. Dev.	2.16	0.17	0.01	0.75	0.65	0.84	0.75	1.37	1.65

Source: Author's estimation

To analyze the co-movement analysis, the correlation matrix is built among the variables, which will help for further empirical analysis in the later part. The pairwise correlation coefficient along with their corresponding statistical significance is reported in Table 2. The pairwise high positive correlation with statistical significance is found among the level of economic growth, indicators of trade openness, capital investment and labor force participation rate.

Table 2. Correlation analysis

	LGDPPC	LCI	LLPR	LTO	LEGSPGDP	LIGSPGDP	LEGI	LPWE	LPWI
LGDPPC	1								
LCI	0.72 (0.00)	1							
LLPR	0.93 (0.00)	-0.49 (0.00)	1						
LTO	0.89 (0.00)	0.91 (0.00)	-0.74 (0.00)	1					
LEGSPGDP	0.89 (0.00)	0.90 (0.00)	-0.74 (0.00)	0.99 (0.00)	1				
LIGSPGDP	0.89 (0.00)	0.92 (0.00)	-0.73 (0.00)	0.99 (0.00)	0.99 (0.00)	1			
LEGI	0.86 (0.00)	0.84 (0.00)	-0.66 (0.00)	0.95 (0.00)	0.96 (0.00)	0.95 (0.00)	1		
LPWE	0.98 (0.00)	0.78 (0.00)	-0.88 (0.00)	0.94 (0.00)	0.94 (0.00)	0.93 (0.00)	0.91 (0.00)	1	
LPWI	0.98 (0.00)	0.81 (0.00)	-0.88 (0.00)	0.95 (0.00)	0.94 (0.00)	0.95 (0.00)	0.91 (0.00)	0.99 (0.00)	1

Note: p-values are given in parantheses.

Source: Author's estimation

Taking into account the non-stationary nature of the most of the time-series data, the Augmented Dickey-Fuller Test with trend and Intercept is conducted to check the stationary property of the data and their corresponding order of integration. The results are reported in Table 3.

Table 3. Unit root test

Level		First Difference	
Variables	With Trend and Intercept	Variables	With Trend and Intercept
LGDP	-1.98 (0.58)	LGDP	-4.55 (0.00)
LTO	-0.53 (0.97)	LTO	-4.78(0.00)
LEGSPGDP	-0.55(0.97)	LEGSPGDP	-5.69 (0.00)
LIGSPGDP	-0.66(0.96)	LIGSPGDP	-4.39(0.00)
LPWE	-0.83(0.94)	LPWE	-4.22(0.01)
LCI	-0.87(0.94)	LCI	-5.02(0.00)
LLPR	-0.87(0.78)	LLPR	-3.76(0.00)

Note: Figures in the parentheses () are p-values.

Source: Author's estimation

From Table 3, the results show that the null hypothesis of Unit Root cannot be rejected for the variables at their level. However, the null hypothesis of unit root is rejected for all the variables at their first difference level, and, hence, it can be concluded that they are integrated of order $I(1)$ and all the variables at their first difference level are stationary.

To examine the long-run equilibrium relationship between the economic development and the indicators of trade openness along with the controlled variables such as labor force participation rate and the proxy for gross fixed capital formation, we have employed Johansen Maximum Likelihood procedure of cointegration test, which is reported in Table 4.

Table 4. Johansen test results for cointegration among trade openness and economic growth

Null Hypothesis	Alternative Hypothesis	λ Trace Statistic	5% Critical Value	P-Value
$r = 0$	$r > 0$	211.66	125.61	0.00
$r \leq 1$	$r > 1$	119.58	95.75	0.00
$r \leq 2$	$r > 2$	71.23	69.81	0.03
$r \leq 3$	$r > 3$	41.96	47.85	0.15
Null Hypothesis	Alternative Hypothesis	λ Max Statistic	5% Critical Value	P-Value
$r = 0$	$r = 1$	92.07	46.23	0.00
$r = 1$	$r = 2$	48.34	40.07	0.00
$r = 2$	$r = 3$	29.27	33.87	0.16

Source: Author's estimation

The test of trace statistics shows that the null hypothesis of the variables is not cointegrated ($r = 0$) against the alternative hypothesis of one or more cointegrating vectors ($r > 0$). Since 211.66 is greater than at five per cent critical value of λ_{Trace} statistic, we reject the null hypothesis of no co-integrating vectors and accept the alternative of one or more co-integrating vectors. Similarly, we have analyzed λ_{Trace} statistic of 1 to 3 and concluded that there is a possibility of the existence of two cointegrating vectors. If we use the λ_{Max} statistic, the null hypothesis of no cointegrating vectors ($r = 0$) against the specific alternative hypothesis ($r = 1$) is already rejected. The calculated value $\lambda_{\text{Max}}(0,1) = 92.07$ exceed the five percent level of critical value. Hence, the null hypothesis is rejected. Similarly, we have concluded that two cointegrating vectors are existing among the set of the considered variables. Given the results obtained from the cointegration, it can be said that our results support Ramphul (2010), who also found the existence of a long-run equilibrium relationship between economic growth and trade openness.

As a part of the long-run dynamic relationship between the level of economic growth and the indicators of trade openness, the Fully Modified Ordinary Least Square (FMOLS) Model to provide optimal estimates of cointegration regressions is employed. It uses kernel estimators of the nuisance parameters that affect the asymptotic distribution of the OLS estimator. The results are presented in Table 5.

Table 5. Fully Modified Least Squares (FMOLS): Dependent variable LGDPPC

Variables	Coefficients
C	28.36*** (0.00)
LTO	64.97*** (0.00)
LEGSPGDP	29.84*** (0.00)
LIGSPGDP	34.62*** (0.00)
LPWE	1.15*** (0.00)
LCI	0.42*** (0.01)
LLPR	3.47*** (0.00)
R ²	0.993
Adj. R ²	0.991
D-W Statistic	1.233

Note: *, **, *** represent 10%, 5%, 1% significance levels. p-values are given in parantheses.

Source: Author's estimation

From the results reported in Table 5, it can be seen that all the explanatory variables preserve the expected sign. As it can be observed, the adjusted R² and R² value of 0.993 and 0.991 are quite high and indicates a good fit. From the results, it can be surmised that the trade openness indicators such as trade openness, the export of goods and services as a per cent of GDP, imports of goods and services as a per cent of GDP, percent of world exports have a strong statistically significant positive relationship with the level of economic growth as measured by GDP per capita income. The elasticity of LGDPPC concerning trade openness is 64.97, suggesting that if trade openness goes up by one per cent, on average, the GDP per capita income goes up by about 64.97 per cent. Similarly, one per cent increase in exports of goods and services as a per cent of GDP increases the GDP per capita income by 29.84 per cent. A one per cent increase in imports of goods and services as a per cent of GDP increases the GDP per capita income by 34.62 per cent, which is higher than LEGSPGDP. However, the elasticity of LGDPPC to per cent of word exports is 1.15 per cent. The elasticity of LGDPPC to LCI and LLPR is 0.42 and 3.47 per cent respectively. Thus, GDP per capita income as a measure of economic growth is very responsive to changes in the indicators of trade openness. As a sensitivity analysis, to control the robustness and the specification bias of the FMOLS model, the Wald test is conducted on the explanatory variables. As the Wald test is coming significant, we would conclude that the parameters associated with these variables are not zero. Thus, the variables should be included in the model. This is presented in Table 6.

Table 6. Diagnostic tests: Wald test

Wald Test:			
Test Statistic	Value	df	Probability
F-statistic	1154.791	(6, 20)	0.0000
Chi-square	6928.747	6	0.0000

Source: Author's estimation

After confirming the long-run equilibrium relationship among the variables, the short-run dynamic relationship between the variables is explored by applying the Toda Yamamoto's Granger's Non-causality test in the VAR Block exogeneity form. This test is also applied as a diagnostic test for a long-run equilibrium relationship, which is conducted in the previous section by applying the Johansen Maximum likelihood test. The result of the Wald statistic of causality test is reported in Table 7.

Table 7. Granger's Non-Causality Test / Block Exogeneity Wald Test

<i>Bidirectional Causality</i>		
	χ^2 - Statistics	P-Value
LPWE ↔ LGDPPC	10.31	0.00
LGDPPC ↔ LPWE	22.84	0.00
LPWE ↔ LTO	4.74	0.09
LTO ↔ LPWE	7.09	0.02
LPWE ↔ LEGSPGDP	6.50	0.03
LEGSPGDP ↔ LPWE	6.91	0.03
LCI ↔ LLPR	12.14	0.00
LLPR ↔ LCI	4.84	0.08
<i>Unidirectional causality</i>		
LLPR → LTO	9.44	0.00
LLPR → LEGSPGDP	8.14	0.01
LLPR → LIGSPGDP	7.67	0.02
LIGSPGDP → LPWE	7.01	0.03
LCI → LPWE	5.18	0.07
LLPR → LPWE	19.47	0.00

Note: ↔ represents bidirectional causality, → represents unidirectional causality

Source: Author's estimation

From Table 7, it can be surmised that there exists bidirectional causality between the pairs of GDP per capita income and per cent of world exports; trade openness and per cent of world exports; exports of goods and services as a per cent of GDP and the per cent of world exports; capital investment and labor force participation rate. The unidirectional causality found between total labor force participation and total trade openness; labor force participation and export of goods and services as a per cent of GDP; labor force participation and total import of goods and services as a per cent of GDP; import of goods and services as a per cent of GDP to the total percentage of world exports; capital investment and the total per cent of world exports; and total labor force participation rate and the per cent of total world exports. These findings are in the line of Ramphul (2010), who found that trade openness has a positive impact on economic growth. Nevertheless, we have also detected a feedback relationship between economic growth and trade openness in our study.

5. Conclusion

This paper explored the impact of the trade openness on the level of economic growth in the context of Indian experience. The trade openness is measured by the indicators such as the sum of total exports and imports as a per cent of GDP, total exports of goods and services as per cent of GDP, total imports of goods and services as a per cent of GDP, per cent of total world exports and the per cent of total world imports. Aside from this, the variables such as capital investment, labor force participation rate, economic globalization index are also reckoned as the manipulated variables. The level of economic growth is measured by the GDP per capita income. The study is grounded on the annual data from 1991 to 2018 keeping the current economic slowdown of the Indian economy in mind. The study employed Toda Yamamoto Granger's non-causality test, Johansen's Maximum Likelihood procedure, Fully Modified Ordinary Least square Model to examine both the short term and long term dynamics. The major findings of the study reveal that the GDP per capita income is positively statistically defined by the trade openness, exports of goods and services as per cent of GDP, imports of

goods and services as a per cent of GDP, per cent of total world exports, capital investment, and labor force participation rate. This finding supports the trade-led growth hypothesis, which indicates that trade openness affects economic growth by stimulating the total factor productivity, optimum utilization and efficiency by adopting the advanced technological know-how from developed countries.

There exists a long-run equilibrium relationship between the level of economic development and trade openness indicators considered in the study. The short-run bi-directional causality found between the pairs of GDP per capita income and per cent of world exports; trade openness and per cent of world exports; exports of goods and services as a per cent of GDP and the per cent of world exports; capital investment and labor force participation rate. However, the unidirectional causality is reported among the pairs of total labor force participation and total trade openness; labor force participation and export of goods and services as a per cent of GDP; labor force participation and total import of goods and services as a per cent of GDP; import of goods and services as a per cent of GDP to the total percentage of world export; capital investment and the total per cent of world exports; and total labor force participation rate and the per cent of total world exports.

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