

An Examination of Two-Way Causality Between Economic Growth and Globalization in the Post-Globalized Scenario in India

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Abstract

The literature on globalization produces mixed findings with regard to the impact of globalization on economic growth of countries while also debating if it is economic growth which attracts globalization rather than the other way round. India embarked upon the path of globalization since the introduction of economic reforms in the 1990s. The impact of reforms started being demonstrated in increased pace of economic growth even as the nature and extent of globalization was seen to expand gradually over the years. Three decades of globalization encompassing economic, financial, political, technological and social dimensions, warrants an examination of the causality between globalization and economic growth over the period from 1991 to 2020. The paper examines the causal relationship between globalization, more precisely, its varied indicators across the five dimensions, and economic growth. The analysis has been carried out using the Granger causality test. The results of the Johansen co-integration test suggest that there exists a long-run relationship between globalization and economic growth. The Granger causality test gives a mixed set of results, with two-way causality is the case of some indicators of globalization, and one-way in some other cases.

Keywords: *Globalization, Economic Growth, Granger Causality, Financial Integration, Globalization Index*

INTRODUCTION

Globalization is a process that is widely known and has evolved with the evolution of human kind along the transition of homo sapiens, trade, diffusion of technology, and capital flows. Countries have embraced globalization for its positive impact on their prosperity through expansion of markets and sources of resources. Growth theories have incorporated globalization through the channels of trade and capital flows. At the same time, there are studies that argue that economic growth has been the engine of globalization. The stage of development of the economy may also have a bearing on the causation between globalization and economic growth. Further, increased interdependence between countries on account of globalization has also demonstrated its challenges as countries are no longer insulated from events occurring in the global economy.

In the case of India, gradual economic reforms encompassing deregulation and globalization were introduced in the late 1980s. However, major economic reform measures were introduced in the 1990s onwards. These resulted into higher rates of economic growth encouraging further liberalization and globalization of the economy. With this premise, the present study seeks to explore the interlinkage between economic growth and globalization in India, to determine the direction of causality between globalization and economic growth.

REVIEW OF LITERATURE

The role of globalization in economic growth has been a matter of research inquiry for many country-specific as well as cross-countries studies. It has been linked with economic growth through alternative channels, most commonly, trade and capital flows.

Studies on Globalization and Economic Growth Using Channel of Trade

The earlier studies related to trade and economic growth professed an outward-oriented approach and believed that export increased economic growth. Baba (1956) analyzed the trade in world trade has impacted the GDP of Japan and found a positive effect of trade on economic growth. Kindleberger (1956) analyzed the effect of trade on economic development of European countries based on the index of industrial exports and imports. On the basis of the index, the study asserts that their terms of trade were unfavourable vis-à-vis the US and therefore, advocates that the terms of trade need to be favourable for positive impact on development. Das (1966) made an attempt to analyze if foreign trade had induced economic growth in Central Africa, and found that the exports in the primary sector and mineral products had increased along with increase in the GDP. Balassa (1968) found a high integration between exports and economic growth using correlation for 11 countries with a developed industrial base, such as India, Chile, Brazil, Mexico, Taiwan, etc. The increase in GNP was found due to the deepening of exports to GNP. Hagen and Hawrylyshyn (1969), however, found low significance of exports and foreign capital inflows for economic growth in a regression analysis of 33 developing countries.

Williamson (1978) analyzed the relationship between economic growth, exports, and foreign capital flows for Latin American countries. Calling it the two-gap model, the study firstly relates the revenue from exports and foreign investment inflows as filling the gaps in the supply of imported goods and total volume of investment. These two in turn help in positively impacting GDP. They term it as the capital supply model. Cardoso and Faletto (1979), Stokes and Jaffee (1982) and Jaffee (1985) growth models are based on export-dependent economic growth and find that an increase in exports proportion of GNP had a positive significant effect on GNP. Similar results are found in Helpman (1988), Bradford and Chakwin (1993), and

Frankel and Romer (1999), who have examined the correlation between trade deepening and economic growth as measured by GDP.

Krueger (1978) and Tyler (1981) assessed the impact of export on GNP and found that an increase in exports leads to an increase in growth. Bardhan and Kletzer (1984) have developed a linkage between the human capital model and international trade, where labour productivity increased because of learning by doing. Leamer (1988) built a theoretical model of openness to determine the degree of openness in absence of the tariff and non-tariff barriers. Edwards (1992) applied regression analysis to the model developed by Leamer (1988) which revealed a significant positive effect of trade deepening on economic growth. Lucas (1988) constructed a theory of growth incorporating international trade, using select indicators of economic development. He considered three models; the first model based on physical accumulation of capital and technological change; the second model is based on human capital accumulation measured by enrolment in schools. The third model is based on human capital accumulation on account of learning by doing. These growth theories postulated that increased openness had a positive impact on growth and productivity through rising imports of goods and services. The study underlined the importance of trade agreements in fostering technological advancement and productivity of countries. Grossman and Helpman (1991) analyzed the growth models involving Research and Development and international trade. They identified the channels for openness in terms of international flow of goods and services, international transmission of ideas and movement of capital. These international transmissions were postulated to improve technologies which lead to increase in the productive capacities, and thereby, economic growth. Likewise, Rivera-Batiz and Romer (1991), and Matsuyama (1992) have examined models which developed a link between growth and foreign trade in terms of knowledge transfer and specialization. They concluded that the international trade would provide opportunities for innovation and leading to technological improvement and it would play a positive role in increasing the growth. Quah and Rauch (1990) and Barro (1991) have used cross-sectional and time-series data of trade to GDP ratio for less developed countries, and pointed out that increasing degree of trade openness raised growth of the economies. Romer (1994) and Pack (1994) have used the endogenous growth models developed by Romer (1986) and Lucas (1988) for analysing the economic growth through international trade and found that trade enables countries to import intermediate inputs from abroad which can increase the productivity. Michael (1997) found trade liberalization as measured by the ratio of exports to GDP for 41 industrial countries to have a favourable effect on economic growth through specialization. However, Matteis (2004) found trade to GDP to negative affect economic growth based on regression analysis on a sample of 82 low, middle and high income countries.

Stoianov (2007) has analyzed the impact of financial and trade openness on the economic growth of nine eastern European countries using GMM estimator. While growth was measured in terms of GDP per capita and its growth rate, trade openness was measured in terms of trade ratio and terms of trade index. Financial openness was measured by the ratio of domestic credit to GDP, FDI to GDP, and net current transfers to GDP. The findings suggest that while trade openness had a significant positive influence on the growth of the countries, financial integration exhibited a negative influence. Another study, were (2015) has examined the effects of trade on economic growth and investment based on 85 cross-country data, using alternative ratios of trade to measure trade openness. The study finds significant positive effect of trade on economic growth and investment. Moghaddam and Redzuan (2012), Antiquisa and Delunathe

(2014), Makhmutova and Mustafin (2017) and Blavasciunaite, Garsviene, and Matuzeviciute (2020) also found a significant impact of trade on economic growth.

Studies on Globalization and Economic Growth Using the Channel of Capital Flows

The literature on globalization has well established the dependence of economic growth on capital formation. The studies based on FDI can be traced to the 1960s, however, the linkages between FDI and economic growth can be found in studies from the 1970s. Papanek (1973) applied regression analysis to examine the association between foreign private investment and growth in 51 less-developed countries and found a positive association between the two. Countries with higher foreign private investment were those with relatively higher economic growth. Likewise, Chase-Dunn (1975) and Bornschier, Chase-Dunn and Rubinson (1978) have analysed the effects of FDI on economic growth and income inequality in 91 countries. Variables such as GDP per capita, the ratio of FDI to domestically owned capital stock as a measure of capital ownership, and GINI index have been used. The results suggest that FDI led to short-run increase in economic growth but it was also found to increase income inequality.

Jackman (1982) has used GNP per capita, gross domestic investment to GDP and foreign investment to GDP for analysing the relationship between foreign investment and economic growth, and found a positive relation for high-income countries and negative relation for medium-income countries. The findings of Firebaugh (1992), however, are at variance from those of Jackman (1982). The latter found that developing countries with higher FDI had higher levels of economic growth. Other studies like London (1987), Boswell and Dixon (1990), Dabour (2000), and Karimi and Yusop (2009) found positive results for FDI and economic growth.

Mclean and Shrestha (2002) have undertaken an empirical analysis to gauge the relationship between financial integration and growth for 20 developing countries and 20 emerging and developing countries in Asian, Latin American, and African continents for the period from 1976 to 1995. For financial integration, exchange arrangements and exchange restrictions (EAER) has been used as a measure and real GDP per capita has been used for economic growth. The regression analysis shows that the link between financial integration and economic growth is weak.

Hsiao and Shen (2003) have examined the relationship of economic growth and FDI inflow using panel data set for 23 developing countries covering the period from 1976 to 1997. They have also analyzed the factors that affect FDI inflow. Results suggested that FDI had a positive effect on GDP. The study also regressed FDI on factors like corporate tax rate, openness index, corruption index, telephone main line as a percentage of urban population and illiteracy rate. It was found that countries having favorable values of these factors attracted greater flow of FDI. Klein and Olivei (2005) have examined the effect of financial openness on financial depth and economic growth from 1986 to 1995 in a cross-country comparison study. The ratio of liquid liability to GDP and the ratio of loans of financial intermediaries to the private sector to GDP have been used as measures of financial depth. Exchange arrangements and exchange restriction (EAER) have been used for capital account liberalization. OLS estimation shows that capital account openness has a significant effect on financial depth and economic growth as measured by real per capita income.

Dreher (2006) has constructed an index covering social, political and economic dimensions of globalization and analyzed the overall impact of globalization on economic growth. The analysis has been carried out using the panel data approach for 123 countries from 1970- 2000.

The finding of the analysis showed that the globalization has a positive effect on social and economic globalization and social globalization does not affect the economic growth. Sehrawat and Giri (2016) have used the globalization index developed by Dreher (2006) and found that financial development and globalization promote economic growth.

Ray (2012) has examined the impact of globalization on India's economic growth using Granger causality. GDP, capital stock, trade to GDP ratio, sum of FDI and FII to GDP, medical and health expenditures have been used to measure the impact of globalization and economic growth. It was found that private investment, openness and human resource development had significant effect on economic growth, while public investment was not found to have a significant effect on economic growth. Another study, Ray (2012), re-examined the relationship between financial integration and economic growth from 1990 to 2010 in India. The results showed that there existed uni-directional causality between financial integration and economic growth, implying that economic growth accelerated financial integration.

Meraj (2013) investigated the impact of globalization and trade openness on the economic growth of Bangladesh from 1971 to 2005. Autoregressive Distributed Lag (ARDL) model and Granger causality test has been used to analyze the impact. The findings show a positive effect of globalization on economic growth in Bangladesh. A similar study by Maqbool-ur-Rahman (2015) investigated the impact of globalization using the globalization index constructed by Dreher (2006) on GDP for three Asian countries (Pakistan, India and Bangladesh) from 1981 to 2011. The Granger causality test reveal that there exists a bi-directional causality in India and uni-directional causality in Pakistan and Bangladesh between globalization and GDP. The study also found a positive association between globalization and economic growth using the OLS technique. Sengupta and Puri (2018) have investigated the relationship between GDP and FDI pattern in India, Pakistan, Nepal, Bangladesh and Sri Lanka from 1995 to 2005. The granger causality test suggests that there exists a unidirectional relation between GDP and FDI in India, Nepal, Sri Lanka and Bangladesh but no relationship between FDI and GDP was found in the case of Pakistan. However, Bhanumurthy and Kumawat (2020) have examined the relationship between financial globalization and economic growth in eight South Asian countries which are members of SAARC from 1990 to 2015 and found that the causation from the financial globalization to growth is weak. Similar result was found by Saafi, Mohamed and Doudou (2016) in their study on 19 developing economies. Hasan (2019) has investigated the overall impact of globalization on economic growth of South Asian countries from 1971-2014 using the KOF index of globalization to measure globalization. The result shows that the overall globalization has a positive effect on economic growth in the long run and negative effect in the short run. Similar studies like Zahonogo (2018), and Bataka (2019) found economic and social globalization promote economic growth but political globalization is found to have a negative effect on economic growth. Kilic (2015) found positive effect of economic and political globalization and negatively effect of social globalization on the economic growth in 74 developing countries from 1981-2011. Another study, Barry (2010), found a positive impact of economic, financial and political globalization on economic growth.

METHODOLOGY OF THE STUDY

Data and Variables

This paper attempts to inquire the fact empirically whether globalization is a cause of India's economic growth in the long run. More precisely, it attempts to inquire into the causal relationship between globalization and economic growth in the case of India. The study period

is from 1990-91 to 2019-20. All necessary data for the sample period has been obtained from the Reserve Bank of India handbooks, reports of the Ministry of Education, Ministry of Science and Technology, Ministry of Tourism, World Bank Development Indicators Database, etc. The data has been analyzed using E-views and Microsoft Excel to examine the relationship between Economic Growth and Globalization. The real Gross Domestic Product (GDP) is used as a proxy for economic growth and globalization is measured using different indicators as presented in Table 1.

Table 1: Indicators of Globalization

Indicators
Export of Service to GDP
Import of Service to GDP
Total Trade in Service to GDP
Trade to GDP
Export to GDP
Import to GDP
Import Duties to Imports
Import Penetration
Revealed Comparative Advantage of Services
India's Trade to World Trade
FDI + FII to GDP
FDI Inflow to Gross Fixed Capital Formation
FDI to GDP
FII to GDP
Foreign Debt to GDP
Foreign Exchange Reserve to Imports
Sectoral FDI
Trade Agreement with Member Countries
Participation in United Nation Peace Making Agreements
Membership in Foreign Organizations
Participation in Trade Agreements
Research and Development Expenditure to GDP
Global Commodities as a Percentage of population

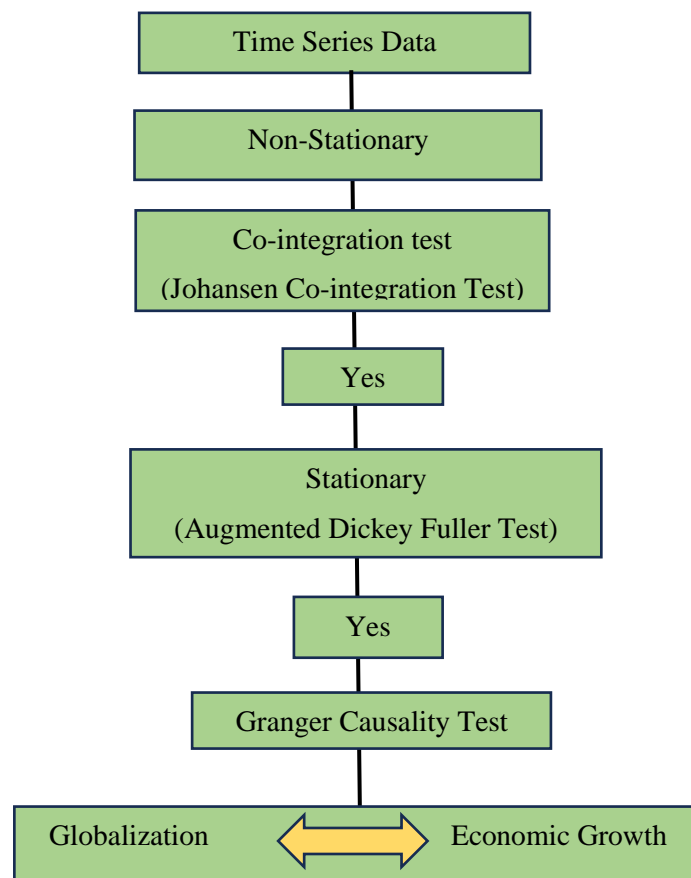
Mobile Subscriptions Per 100 Person
Patent Applications by Non-Resident to Total Population
Remittance to GDP
Foreign Exchange Earnings from Tourists to Foreign Exchange Reserve
Students Going Abroad to Enrolment in HSC
Work Permits Abroad to Total Population (age 15-64 years)
Inbound and Outbound Tourists to Total Population
Students Coming to India to Enrolment in Higher Education

Source: Authors' Compilation

This section deals with the techniques used for examining the relationship between globalization and economic growth. All indicators of globalization, 31 in total, have been used to represent globalization, and economic growth has been measured in terms of GDP at constant prices. The period of analysis is 1990-91 to 2019-20. In dealing with time series data several econometric issues arise, which need to be resolved. The causal relation between globalization and economic growth has been studied using the Granger Causality test on EViews as shown in Fig 1.

The Johansen co-integration test (Johansen 1991) has been used to determine if there exists a long run relationship between indicators of globalization and economic growth. Two approaches, viz., trace statistics and maximum Eigenvalues have been applied to check if the null hypothesis of 'no co-integration' can be rejected. This can be done provided the trace statistics of the variable are greater than the 0.05 critical value. likewise, in the case where maximum Eigenvalues are being used, the null hypothesis can be rejected if the maximum Eigenvalues are greater than the 0.05 critical values. The Augmented Dickey-Fuller (ADF) test has been used to make the data stationary so that it can be fit for the model. The data having unit roots were transformed to the first and second differences as applicable.

Fig 2: Conceptual Framework



Source: Mind Map developed by Authors'

RESULTS AND ANALYSIS

Non-stationary indicators have multi-collinearity which would create an error of the near singular matrix in EViews, if used simultaneously. Therefore, the co-integration of thirty one indicators of globalization and economic growth has been gauged with different sets of equations using different combinations of independent variables with the dependent variable, economic growth. The results of the co-integration test using both criteria are presented in Table 2 and 3, respectively. In the first set of equations, the long run relation between globalization and economic growth has been checked with reference to six variables as mentioned in Table 2. Five co-integration equations have trace statistics greater than the critical values and these are found to be significant at 0.01 and 0.05 levels. The second set of equations deals with seven variables of which at most six co-integrating equations are found to be significant at one percent. The third set of equations includes eight variables. It has at most five co-integrating equations. The fourth set of equations includes eight other variables. Five, at the most, are found to be co-integrating equations in which the trace statistics are greater than the critical values. In the last set of equations comprising eight variables, six equations co-integrate, having trace statistics greater than the critical value. Thus, the indicators of globalization are found to have a long run relationship with economic growth, as most of the

equations have trace statistics greater than the critical values. This reveals that the time series of globalization and economic growth is fit for establishing long-run relationships.

Table 2. Co-integration between Economic Growth and Globalization using Trace Statistics

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05	Prob.**
			Critical Value	
GDP; Export of Services to GDP; FDI+FII to GDP; Export to GDP; FDI to GDP; FDI Inflows to GFCF				
None *	0.974191	246.5737	95.75366	0
At most 1 *	0.905055	144.1765	69.81889	0
At most 2 *	0.764385	78.2516	47.85613	0
At most 3 *	0.548296	37.77599	29.79707	0.0049
At most 4 *	0.420098	15.5236	15.49471	0.0495
At most 5	0.009473	0.26651	3.841465	0.6057
GDP; FII to GDP; Foreign Debt to GDP; Foreign Exchange Reserve to Imports; Foreign Exchange Earnings from Tourists to Foreign Exchange Reserve; Global Commodities as a Percentage of Population				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05	Prob.**
			Critical Value	
None *	0.929561	188.079	95.75366	0
At most 1 *	0.786175	113.7948	69.81889	0
At most 2 *	0.603677	70.60213	47.85613	0.0001
At most 3 *	0.578447	44.68738	29.79707	0.0005
At most 4 *	0.372827	20.50068	15.49471	0.0081
At most 5 *	0.23328	7.437751	3.841465	0.0064
GDP; Import Duties to Imports; Import Penetration; Import of Services to GDP; Import to GDP; Inbound and Outbound Tourism to Total Population; India's Trade to World Trade; Membership in Foreign Organization				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05	Prob.**
			Critical Value	
None *	0.991074	423.5917	159.5297	0
At most 1 *	0.985305	300.9034	125.6154	0
At most 2 *	0.894453	191.1772	95.75366	0
At most 3 *	0.8784	132.7135	69.81889	0
At most 4 *	0.861379	77.93096	47.85613	0
At most 5	0.488648	26.55467	29.79707	0.113
At most 6	0.27671	9.116545	15.49471	0.3547
At most 7	0.026338	0.693965	3.841465	0.4048
GDP; Students Going Abroad to Enrolment in HSC; Mobile Subscription Per 100 Person; Participation in Trade Agreements; Participation in UN Peace Making Agreements; Patent Applications by Non-Resident to Total Population; RandD Expenditure to GDP; Remittances Inflows to GDP				
Hypothesized	Eigenvalue	Trace	0.05	Prob.**

No. of CE(s)		Statistic	Critical Value	
None *	0.995694	409.5497	159.5297	0
At most 1 *	0.969616	267.9112	125.6154	0
At most 2 *	0.895375	177.0712	95.75366	0
At most 3 *	0.837582	118.3795	69.81889	0
At most 4 *	0.691379	71.12228	47.85613	0.0001
At most 5 *	0.650301	40.55558	29.79707	0.002
At most 6	0.391367	13.23782	15.49471	0.1064
At most 7	0.012527	0.327768	3.841465	0.567
GDP; Revealed Comparative Advantage of Services; Sectoral FDI; Students Coming to India to Enrolment in Higher Education; Trade to GDP; Trade in Services to GDP; Trade with Trade Agreement Member Countries; Work Permits Abroad to Total Population				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.991129	341.2338	159.5297	0
At most 1 *	0.895332	213.66	125.6154	0
At most 2 *	0.889975	152.7219	95.75366	0
At most 3 *	0.701103	93.13157	69.81889	0.0002
At most 4 *	0.676755	60.52489	47.85613	0.0021
At most 5 *	0.452254	30.03259	29.79707	0.047
At most 6	0.395556	13.78009	15.49471	0.0892
At most 7	0.006904	0.187044	3.841465	0.6654

* Significant at 1% level; ** Significant at 5% level

Source: Computation using EViews

Table 3 presents the results of the co-integration test for the series of economic growth and globalization based on the decision criteria of maximum Eigenvalue. The co-integration test for the thirty one indicators of globalization with economic growth has been separated into different sets of equations, as taking all the indicators together creates the problem of a high degree of multi-collinearity.

Table 3. Co-integration between Economic Growth and Globalization using Maximum Eigenvalues

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
GDP; Export of Services to GDP; FDI+FII to GDP; Export to GDP; FDI to GDP; FDI Inflows to GFCF				
None *	0.974191	102.3973	40.07757	0
At most 1 *	0.905055	65.92486	33.87687	0
At most 2 *	0.764385	40.47561	27.58434	0.0007
At most 3 *	0.548296	22.25238	21.13162	0.0347
At most 4 *	0.420098	15.25709	14.2646	0.0347

At most 5	0.009473	0.26651	3.841465	0.6057
GDP; FII to GDP; Foreign Debt to GDP; Foreign Exchange Reserve to Imports; Foreign Exchange Earnings from Tourists to Foreign Exchange Reserve; Global Commodities as a Percentage of Population				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05	Prob.**
			Critical Value	
None *	0.929561	74.28423	40.07757	0
At most 1 *	0.786175	43.19268	33.87687	0.0029
At most 2	0.603677	25.91474	27.58434	0.0805
At most 3 *	0.578447	24.18671	21.13162	0.018
At most 4	0.372827	13.06293	14.2646	0.0767
At most 5 *	0.23328	7.437751	3.841465	0.0064
GDP; Import Duties to Imports; Import Penetration; Import of Services to GDP; Import to GDP; Inbound and Outbound Tourism to Total Population; India's Trade to World Trade; Membership in Foreign Organization				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05	Prob.**
			Critical Value	
None *	0.991074	122.6883	52.36261	0
At most 1 *	0.985305	109.7262	46.23142	0
At most 2 *	0.894453	58.46364	40.07757	0.0002
At most 3 *	0.8784	54.78257	33.87687	0.0001
At most 4 *	0.861379	51.37629	27.58434	0
At most 5	0.488648	17.43812	21.13162	0.1523
At most 6	0.27671	8.42258	14.2646	0.3374
At most 7	0.026338	0.693965	3.841465	0.4048
GDP; Students Going Abroad to Enrolment in HSC; Mobile Subscription Per 100 Person; Participation in Trade Agreements; Participation in UN Peace Making Agreements; Patent Applications by Non-Resident to Total Population; RandD Expenditure to GDP; Remittances Inflows to GDP				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05	Prob.**
			Critical Value	
None *	0.995694	141.6385	52.36261	0
At most 1 *	0.969616	90.84002	46.23142	0
At most 2 *	0.895375	58.69173	40.07757	0.0002
At most 3 *	0.837582	47.25717	33.87687	0.0007
At most 4 *	0.691379	30.56671	27.58434	0.0201
At most 5 *	0.650301	27.31776	21.13162	0.0059
At most 6	0.391367	12.91005	14.2646	0.0809
At most 7	0.012527	0.327768	3.841465	0.567
GDP; Revealed Comparative Advantage of Services; Sectoral FDI; Students Coming to India to Enrolment in Higher Education; Trade to GDP; Trade in Services to GDP;				

Trade with Trade Agreement Member Countries; Work Permits Abroad to Total Population				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05	Prob.**
			Critical Value	
None *	0.991129	127.5738	52.36261	0
At most 1 *	0.895332	60.93807	46.23142	0.0007
At most 2 *	0.889975	59.59037	40.07757	0.0001
At most 3	0.701103	32.60668	33.87687	0.0703
At most 4 *	0.676755	30.4923	27.58434	0.0206
At most 5	0.452254	16.2525	21.13162	0.2105
At most 6	0.395556	13.59305	14.2646	0.0636
At most 7	0.006904	0.187044	3.841465	0.6654

* Significant at 1% level; ** Significant at 5% level

Source: Computation using EViews

The results with reference to the first set of equations reveals that five co-integration equations have maximum Eigenvalues greater than the critical values. The second set of equations tests for co-integration for another set of indicators of globalization as listed in the Table 3. It is found that there are at most six co-integrating equations, significant at 0.01 level. Likewise, the third and the fourth set of equations, which includes seven different indicators of globalization, have at most five co-integrating equations. The last model has at most six co-integrating equations. Thus, all the indicators of globalization are found to have a long run relationship with economic growth as all variables have the maximum Eigenvalues greater than the critical values. This reveals that the time series of globalization and economic growth are fit for establishing long-run relationships.

Causality between Globalization and Economic Growth:

Two-way Causality:

The results of the Granger causality test are presented in Table 4. It is found that there is a two-way causality between some pairs of variables. These are, GDP with imports of goods to GDP, trade in goods to GDP ratio, import penetration, and foreign debt to GDP ratio. In other words, these four indicators of globalization accelerate economic growth, and economic growth also accelerates globalization when represented by these four indicators.

Table 4. Granger Causality between Indicators of Globalization and Economic Growth

Granger Causality Test	F-Statistic	Prob.
Two-way Causality Between Globalization and Economic Growth		
Imports of Goods to GDP Granger Cause GDP	5.22209*	0.0135
GDP Granger Causes Imports of Goods to GDP	3.94339**	0.0337
Import Penetration Granger Causes GDP	3.18075***	0.0603
GDP Granger Causes Import Penetration	3.22957**	0.0581
Trade in Goods to GDP Granger Causes GDP	5.22963*	0.0134
GDP Granger Causes Trade in Goods to GDP	2.57202***	0.0982
Foreign Debt to GDP Granger Causes GDP	2.64102***	0.0928
GDP Granger Causes Foreign Debt to GDP	4.25052**	0.0269

One-way Causality: Globalization to Economic Growth		
Exports of Goods to GDP Granger Cause GDP	5.07440*	0.0149
Foreign Exchange Reserves to Imports Granger Cause GDP	2.90993***	0.0747
Number of Sector with 100 percent FDI Permits Granger Causes GDP	3.80371**	0.0374
Membership in Foreign Organization Granger Causes GDP	2.81817***	0.0804
Remittances to GDP Granger Cause GDP	3.43320**	0.0496
Work Permits Abroad to Total Population Granger Causes GDP	3.56763**	0.0455
One-way Causality: Economic Growth to Globalization		
GDP Granger Causes FDI + FII to GDP	8.42097*	0.0018
GDP Granger Causes FDI to GDP	8.51742*	0.0017
GDP Granger Causes FDI Inflows to GFCF	5.23174*	0.0134
GDP Granger Causes Foreign Exchange Earnings from Tourists to Foreign Exchange Reserves	4.62565**	0.0205
GDP Granger Causes Foreign Students coming to India to Enrolment in Higher Education	3.06194***	0.0662
GDP Granger Causes Inbound and Outbound Tourists to Total Population	4.36395**	0.0247
GDP does not Granger Causes Students going Abroad to Enrolment in HSC	2.79348***	0.0820
GDP Granger Causes Global Commodity as a percentage of Total Population	5.48769*	0.0113
GDP Granger Causes Patent Applications by Non-Residents to Total Population	5.18338*	0.0139

*Significant at 1% level; ** Significant at 5% level; *** Significant at 10% level

Source: Computation using EViews

The findings are as expected because they imply that as the ratio of trade to real economy increases, it will enhance economic growth because India heavily depends on imports of productive inputs for its industries (Topalova and Khandelwal 2011, Rijesh 2015, and Rijesh, 2021). The economic growth resulting from increased productive inputs would further give an impetus for imports to increase as the capacity of the country to pay for imports increases. Increased level of India's foreign trade is also expected to increase its GDP as exports determine the earning capacity while imports are essential for the domestic industrial sector of India, leading to greater productive capacity as measured by GDP.

As the proportion of imports vis-à-vis the domestic demand components increases, it tends to give momentum to GDP. Likewise, an increase in GDP enhances purchasing power, enabling more imports. In the major part of the first half of the study period, the ratio of external debt to GDP has hovered at ten percent, meaning that there has been relatively equal-paced growth in the two variables. In the second half of the study period, the external debt ratio has risen consistently, reaching a level three times higher, that is, at 30 percent at the end of the study period. This phenomenon also converges with the findings that in the latter half of the study period, the gap between imports and exports of goods have increased, leading to an increase in

trade deficit. Increased trade in goods in turn has accelerated GDP. Similarly, higher levels of real GDP enhance the country's ability to bear external debt. Although quantifying this circular chain of effects is not within the scope of the present study, it may be modestly claimed that this chain of effects provides justification for the two-way causality between external debt ratio and GDP.

One-way Causality: Globalization to Economic Growth

Uni-directional causality implies that it is either globalization that Granger causes economic growth or it is economic growth that Granger causes globalization, but not both. The findings of the test reveal that the one-way causality runs from some indicators of globalization to economic growth. These are, ratios of exports of goods to GDP and foreign exchange reserves to imports, number of sectors with 100 percent FDI permit, membership to foreign organizations, ratio of remittances to GDP, and work permits abroad to total population. These indicators of globalization in India are found to have a positive effect on GDP. Al-Mamun and Nath (2005), Anderson (2007), Palley (2002), Maneschiold (2008), and Hossain et al. (2009) also found similar results for the exports to GDP in the context of different countries. It is well established in the literature that as foreign trade increases and as more and more sectors are opened to liberal FDI norms, it will accelerate economic growth (Dreher, 2006; Ray, 2012). As foreign exchange reserves increase, it raises the capacity of the country to import. Membership in regional and multilateral international organizations also increases the prospects for growth as the country's concerns get a platform for being placed and discussed and the common economic interests of the member countries are more likely to prevail. Likewise, as more Indians get work permits abroad, the remittances to India would increase and positively influence several factors that make for higher economic growth.

One-way Causality: Economic Growth to Globalization

The one-way causality running from economic growth to globalization is found in the case of several indicators of globalization. Economic growth is found to Granger cause FDI plus FII to GDP ratio, FDI inflows to GFCF ratio, foreign exchange earnings from tourism to foreign exchange reserves ratio, foreign students coming to India as a ratio to enrolment in higher education in India, inbound and outbound tourists to the total population, ratio of students going abroad to enrolment in HSC in India, global commodities as a percentage of population, and patent applications by non-residents to total population. The results are plausible because economic growth as measured by real GDP is a measure of prosperity and purchasing power of the economy, positively affecting the prospects for higher rates of return on investments, and is therefore, one of the important pull factors for foreign investment. With economic growth, a range of services including tourism, education, infrastructure, etc., become more accessible and advanced, encouraging foreign citizens to come to India for recreational and medical tourism, and education. Higher economic growth also enables more Indian students to study abroad, keeping other things constant.

It may be said that the economic dimension of globalization appeared to give greater impetus to economic growth, and as the country grew, it attracted more foreign investments, innovations and products, tourists, and students. Higher growth is also found to have enabled more Indians to study abroad with increased purchasing power.

While the findings of this section have plausible explanations, it may be noted that the results depend on how the indicators of globalization have performed in the study period. A particular indicator may *a priori* Granger cause economic growth, but if its values have not been very promising in the case of India, they may not be found to have a statistically significant causation

effect. The results of the Granger Causality test in this section, thus, are specific to the Indian economy.

CONCLUSION

The empirical analysis of the impact of globalization on the Indian economy, starting with the Granger causality test, suggests that both, globalization and GDP, Granger cause each other. In some cases, economic growth is found to Granger cause financial, technological, and social globalization, while economic, financial, political, technological, and social levels of globalization are found to Granger cause economic growth. The Granger causality was also tested with the individual indicators of globalization. The results suggest uni-directional and bi-directional causality for different indicators of the globalization-growth relationship. The government is committed toward improving the lives of rural poor, developing the infrastructure facilities and implementing the economic reforms in order to boost the economic performance in India.

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