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GLOBALISATION, TRADE AND GROWTH DYNAMICS: AN EMPIRICAL INVESTIGATION FOR THE INDIAN ECONOMY

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Abstract: *The purpose of the study is to gauge the empirical dynamics between India's trade, globalisation, and GDP growth from 1980-2015. To test the presence of unit-root, ADF test is used. Along with the ADF test, PP and KPSS techniques are also used to check for stationarity. Johansen's co-integration analysis suggests evidence for the presence of co-integration. VEC Model is used to adjudge the adjustment of the variables. Wald test and Toda-Yamamoto Granger causality follow in analysis to understand the causality. To estimate the response path, impulse response functions are created. The study has been able to explain the positive effect of globalization and the negative impact of trade on economic growth. However, contrary to the perception of New Growth Theory, globalisation and rising trade do not have an impact on the economic growth in long-run. The study attempts to enrich literature on causality trends. An augmented version of the KoF Index is used to avoid collinearity.*

Keywords: *Trade; Globalisation; Growth; Openness; KoF Globalisation Index*

Subject classification codes: F00; F10; F13; F15

INTRODUCTION

Up until the colonial invasion by the Britishers, India was a significant trading partner of Europe and the Middle East. Although colonialism directed this trade towards one country, policies like import substitution closed the economy further. It took India four decades and an economic crisis to recalibrate with the rest of the world.

Post globalisation, India has witnessed a phenomenal growth in trade, but there have been contentions whether globalisation has anything to do with this growth. The paper, thus, attempts to relook the nexus between growth, openness and trade in light of new econometric techniques.

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The paper is divided into five sections. Section two critiques the literature related to the interconnectedness between globalisation, international trade and growth. The third highlight methodology, primarily focusing on the use of a specially designed and augmented KoF index to portray a long- and short-term relationship, along with the results. The fifth draw conclusion, put forward the suggestions and the limitations. Appendix to the paper presents the results.

LITERATURE REVIEW

While India has been riddled with the problem of balance of payment crisis, the situation worsened after the Bangladesh war in 1972 followed by the oil crisis of 1973-74. By the 1980s, India was struggling with a high exchange rate. In 1991, it had no option but to privatise, liberalise and globalise following the International Monetary Fund mandate.

Following this chronology, Aggarwal and Kumar (2012) suggested a division of India's growth history into two policy regimes. Pre-1980 period India followed the state-led growth model. A similar approach is adhered to, but instead of taking 1980 as the breakpoint, the study indicates 1991 as the watershed year for trade turnaround.

Globalisation and its measures

As globalisation is attributed as the root cause of India's growth since 1991, it is vital to analyse this phenomenon. A specific definition of globalisation, hence, needs to adhere. Dreher (2006) suggests the phenomenon of globalisation as the phenomenal process of establishing linkages across countries separated by distance through flow of goods, services, information, ideas and people.

Nayak, Chakravarti, & Rajib (2005), explain the concept of globalisation concerning the inception and its attributes for the Indian economy. The study concludes that there is globalisation in India, which is attributed to the country attracting Foreign Direct Investment and Multinational Companies. However, lesser linkages are found for the globalisation of the economy, apparent from the absence of Indian companies (Tata, Reliance) on a global scale.

The next contention arises with measurement of globalisation. Over the years, studies have tried to measure globalisation with trade, but this growth-oriented approach does not sit well with those who also wish to look at qualitative measures of globalisation. Lee, Ricci, & Rogobon (2004) find the use of four proxies for measuring openness, viz.-a-viz., trade-GDP ratios, imports, exports and total trade volume.

A better approach to measure openness has been the creation of indices as trade – GDP ratios could not capture multiple perspectives related to trade.

Kearney (2004) constructed the first quantitative globalisation index, capturing activities in different domains. It considers four components of globalisation:

economic integration, personal connects, political influence and technological connectivity. Lockwood & Redoano (2005) proposed the CSGR globalisation index, complementary to the Kearney Index using Principal Component Analysis (PCA) for weighing the variables.

Dreher (2006), further work on the approach by Lockwood & Redoano (2005), proposed Konjunkturforschungsstelle (KOF) globalisation index, which constitutes the components of Social, Economic and Political Globalisation

Salvatore (2010) suggests the KOF Index as the best proxy because it evaluates a cardinal measure of the degree of globalisation. Trade and financial flows measure economic globalisation. Social globalisation characterises the spread of notions, the flow of information, data on personal contacts, images and people with the rest of the nations. Political globalisation expresses the country's participation in international organisations and the diffusion of government policies.

Samimi, Lim, & Buang (2011) address the problem with these indices. They suggest that the use of many variables and data, limit data collection across all the countries.

Trade, Growth and Globalisation

Researchers have investigated and established positive and negative relation of globalisation, trade and growth. Samimi's opinion that the import of goods can be detrimental to the local industries highlights the negative impact. Batra (1992), Edwards (1998) have found a negative correlation between trade growth and globalisation.

Alesina, Spolaore, & Wacziarg (2000) and Adit & Gassebner (2001), enriched the literature by assessing the benefit of globalisation to economic growth. Edwards (1992) and Dollar (1992), establish a positive linkage of globalisation and growth.

Shreds of evidence from the developed nations

Most of the developed countries are said to have export-led growth. Dollar & Kraay, (2004), Kim & Lin (2009), opine the benefits of globalisation have been manifested mostly in advanced nations, however, in developing economies, higher trade openness impacts growth negatively.

Gries & Redlin (2012) estimated long-run causality between growth and openness for 158 economies for the period between 1979-2009.

Using the ARDL bounds test approach, Rahman, Shahbaz, & Farooq (2015) find exports, imports and openness to be a significant positive driver of growth for Australia during 1965-2010.

Yanikaya (2003), however, is unable to find any significant association between the openness of economies and growth patterns, employing panel data analysis for 100 countries from 1970 to 1997. He highlights the positive significance of trade barriers with economic growth.

Developing nations

Tsaurai (2017) reveals a weak, yet definite, bi-directional causality from openness to growth; indicating causality of financial development with growth in Argentina for 1994-2014.

Zahonogo (2016) uses a growth model for 42 SSA countries between 1980 to 2012, reporting a crucial impact of trade openness on growth, yet only up to a threshold level of growth. Sakyi, Villaverde, Maza, & Reddy Chittedi (2012) address a similar and significant long-run relationship for 85 middle-income economies for a period of 39 years from 1970 to 2009. The model also suggests bi-directional causality.

Kim & Lin (2009) estimated a non-linear relationship using Pooled Mean Group estimation for 42 Sub-Saharan economies, for the period 1980-2012.

Erfani (1999) estimated a significantly positive association of export and economic growth for developing economies in Asia and Latin America from 1965 to 1995. Paul & Das (2012) also reported similar results for Sri Lanka, Pakistan, India and Bangladesh using Vector Autoregressive Model and innovation accounting for the period 1960-2010.

Evidence from India

An interconnected world is not a new phenomenon for India, Bagchi (2002) asserts that since an early 20th century, India has been indulging in trade actively. Political patronage helped British Companies to establish themselves and flourish in India. Post-independence, there was a need to protect domestic industries from the competition driven by international players. Hence, before the 1980s, the policy framework was not very favourable for trade. It was in the mid-eighties that India changed its stance, strengthening foreign trade policies. The results showing the consociation of globalization, international trade and economic growth for India is obscuring.

The argument from Kim D. (2001) suggested that higher openness is negatively related to growth for developing economies. Vohra (2001) a decade from Kim, established contrary results, for India, Philippines, Thailand, Malaysia and Pakistan, explaining the relationship between exports and growth between 1973-1993. The empirical investigation using Engle and Granger two-step co-integration does not suggest any long-run relationship. However, a short-run connection is estab-

lished with an emphasis on the fact that the impact is more significant only after the economy has achieved some level of economic development.

Techniques of assessing long- and short-run relationship

A divergence of opinion exists both in matter of policy and methodology. Over the years, varying statistical and econometric techniques are used to explain the ramification of globalisation on trade and growth.

Shahbaz, Mallick, Mahalik, & Loganathan (2015) suggested that greater extent of globalisation implies higher levels of economic growth. The study uses Bayer- Hanck Co-integration test to estimate this relationship. The author uses this technique over Engle & Granger (1987), and Engle & Yoo (1991) methodologies as these tests have low explanatory powers. Hence, the results drawn can be biased. These tests require the estimators of the co-integrating vectors to be normally distributed.

In using, ARDL approach, Hye & Lau (2015) applied a rolling window regression technique highlighting positive impact of openness on economic growth in short-run and a detrimental impact in long-run. The focus of their study, using three proxies of openness, was on the construction of a composite index. They discover that the ARDL model can be applied to any regression model regardless of the degree of co-integration as it is free from the problems of endogeneity and serial correlation. The empirical results infer a negative openness-growth effect. Rolling window technique establishes the impact not being stable throughout the sample.

Drawing inferences from the endogenous models and the new trade theory, Kind (2002) attributed the ambiguity, in the impact of full trade-liberalisation on growth, to the differences in the size of the local markets.

Khan (2003) and Dash & Sharma (2008) posit a positive association of GDP and exports using Johansen co-integration and bounds testing, respectively. They also suggest a bi-directional causality, asserting that higher levels of openness enhance economic growth.

Sims (1980) procedure in addressing the issue of causality is weaker in comparison to Granger (1969) because the former leaves fewer degrees of freedom, making the statistical inference uncertain. Another disadvantage associated with the methodologies is that the co-integrating properties of the time-series variables are ignored.

The theoretical literature is, thus, obscured to suggest an apparent solution to the trade-growth nexus. Studies provide pieces of evidence of both a positive and a negative association of globalisation, trade and growth.

VARIABLES

This study is conducted for the Indian economy during the period 1980-2015, with a structural break in the year 1991. Real Gross Domestic Product (RGDP) measures growth. To measure trade, total trade volume (sum of totals exports and imports) has been used. Data for Real GDP and volume of trade is taken from UNCTAD data centre.

To quantify globalisation, KoF Globalisation has been used. Revised KoF Index (2018) introduce de facto and de jure measures of globalization. KoF index of globalisation is augmented to avoid the problem of simultaneity. The components of the KoF globalisation index, which are already included in the calculation of GDP are removed from the index. Re-evaluation of the index is done by taking a weighted average of other components. (Appendix A 1)

RESEARCH METHODOLOGY AND RESULTS

The study tried to look for evidence of short and long-run causality. Chow test is undertaken to check for the presence of structural break in the year 1991.

Unit Root and Stationarity Test

Gujarati & Porter (2011) suggests that usually, time-series data exhibits a trend and non-stationary. Tests for unit root and stationarity are required to remove this problem. The current study employs ADF test and PP test to check the unit-root and KPSS for stationarity. Combined use of the above said three tests make it confirmatory data analysis for the test of a unit root. Choi and Chung (1995) assertions on the Phillips-Perron test technique to be more powerful are taken into consideration, as Enders (2004) suggests that the testing power of Dickey-Fuller tests are low. Hence, Unit Root tests on globalisation index, trade volumes and gross domestic product are evaluated (Table 3). The statistics diagnose presence of unit root at level in the variables, implying the series to be non-stationary, which suggests the zero-order integration. H_o of unit root is hence not rejected. However, upon the first differencing, variables are stationary and are free from unit-root, inferring an integration to order one.

Johansen Co-integration test

The optimal lag length is determined with AIC or SBC before investigating for co-integration. Johansen's co-integration method suggests co-integrating vectors and checks for the long-run association between the said variables. The test comprises of Trace Statistics and Eigenvalue statistics. The two likelihood ratios confirm the result, as displayed in Table 4. It is inferred that the λ_{Trace} Statistics, as well as λ_{Max} Statistics, is higher than the critical value (None), establishing a long-run co-integration relationship.

VEC Model

Sims C. (1980) extensively propagates Vector Autoregressive models to investigate the interaction between variables. If the variables are integrated, VAR estimation are found to be ill-suited as the variables are found to be associated in long-run, hence, VECM can be used.

A restricted version of VAR is VECM, which is employed when the series is non-stationary as well as co-integrated. Thus, in the short-run, model adjusts the dynamics of the endogenous variables, restricting their long-run tendency to converge to their co-integrating relation. The coefficient of the EC term represents velocity of the adjustment to short-run deviations. The model is as follows:

$+ \gamma_1 EC_{t-1}$

$+ \gamma_2 EC_{t-1}$

$+ \gamma_3 EC_{t-1}$

The VECM equation for the dependent variable Real Gross Domestic Product is estimated as:

$$D(\text{Ln GDP},2) = \alpha_1 * (D(\text{Ln GDP}(-1)) - 0.117060017862 * D(\text{Ln TR}(-1)) + 0.00237899334248 * D(\text{GI}(-1)) - 0.0022605960753 * D1(-1) - 0.0212320290835) + \alpha_2 * D(\text{Ln GDP}(-1),2) + \alpha_3 * D(\text{Ln GDP}(-2),2) + \alpha_4 * D(\text{Ln TR}(-1),2) + \alpha_5 * D(\text{Ln TR}(-2),2) + \alpha_6 * D(\text{GI}(-1),2) + \alpha_7 * D(\text{GI}(-2),2) + \alpha_8 * D(D1(-1)) + \alpha_9 * D(D1(-2)) + \alpha_{10}$$

Where, Ln GDP is taken as the dependent variable and Ln TR and GI are taken as the independent variable. The coefficient of the co-integrating equation is given by α_1 is the coefficient of the co-integrating equation, and α_2 to α_9 are the coefficients of the variables suggesting long run causality and short run causality respectively. The intercept is given by $\alpha_{10.}$ R squared and Adjusted R squared values are 0.675496 and 0.542745 respectively.

From the VEC Model, the ER term is negative (-2.605425) and is highly significant at 1%. It suggests that trade and globalisation have long-run causality on Real GDP. Since the EC term is significant and is negative, the underlying hypothesis of no long-run causality between the three variables is rejected. It is further evaluated using Toda- Yamamoto Granger causality. Further, the coefficients for the lagged values of the independent variable are significant except the two lagged value of the globalisation index, which suggests that the effect of the model does not go beyond short-run. The results also suggest that the dummy is insignificant at its first lag. However, it is significant in its two lagged value. This is a clear indication that laying the policies do not yield the results immediately and takes time for its effect to be realised. The results validate that there exists long run relationship between the three phenomena of trade, globalization and growth. The

results from the current study are in consensus with the results, as suggested by Hye & Lau (2015) and Tsaurai (2017).

Wald Test

Wald test is employed to gauge the short-run causality. It gives the chi-squared statistics of the coefficient for the lagged endogenous variables. A short-run causality from growth to trade is witnessed. Yet no short-run causality between globalisation and GDP is diagnosed.

Toda Yamamoto Granger Causality

Dynamic Granger causality estimated from the VECM checks the long-run causality. However, it suffers from the problem of specification bias and hence, spurious regression. Using MWALD (Modified Wald Test), Toda & Yamamoto (1995) introduced Granger non-causality. MWALD is suggested to be paramount to Granger causality as the former does not require prior testing for variables to be co-integrated and also averts the potential bias arising with the presence of unit root.

The results of Toda Yamamoto Granger Causality test (Table 7), suggest long-run bi-directional causality between international trade and growth. However, long-run causality between globalisation index to economic growth is not witnessed.

Impulse Response Functions

IRFs suggests the direction of transmission of each variable to innovation in others, giving the response path. The effect of an exogenous impulse in one variable on a few or all other variables is traced out to study the causality. Figure 1 estimates Impulse Response Functions (IRF) to identify and understand the response of a variable due to an innovation in another. While the response of trade to GDP is on expected lines, the change in one standard deviation for GDP brings about a negative response for globalisation. Although this may not hold for other countries, if it does, it would surely be indicative of the reverse globalisation or protectionism of higher-income economies. More critical, response functions indicate that the effect does not taper off for each of the indicators as the transmission carries off throughout the ten periods. Despite the negative impact of trade on globalisation, it cannot carry many connotations. On the other hand, the surprising result is the effect of globalisation on growth, which is mostly negative and mellowed, whereas the impact on trade is much more subdued.

Diagnostic tests (Table 8) are undertaken to assess the robustness of the model. The model is examined for autocorrelation, heteroscedasticity and normality. The results conclude the robustness as the VECM residual qualifies all diagnostic tests.

CONCLUSION

As the economy has entered the fourth decade of globalisation, the government has unleashed a flurry of reforms by opening up new sectors of the economy and signing multiple Free Trade Agreements. Trade has suffered a blowback after the recent crisis. This has not only got countries to reconsider globalisation but has also led to a relook in need for an open and connected economy. While India, readies itself to integrate more with the world, western economies, especially the US, have started to reverse the gains of globalisation.

The study endeavoured to re-examine the relationship between international trade, globalisation and economic growth for Indian economy. It suggests a positive association of globalisation and trade with economic growth. Short-run relationships are found between growth, globalisation and trade. Short-run causality is established with Wald Test. However, long-run causality could not be established. The Impulse Response Functions suggest the behavioural reaction of the variables to a given shock.

The study is peculiar because instead of using a proxy for openness, the globalisation index is used to indicate the changing environment for trade growth.

The trade-globalisation-growth dynamics are still ambiguous yet has been seeking deliberations from academicians, researchers and policymakers. The contribution of globalisation to economic growth has been crucial for policymakers. Such work for the Indian economy is conspicuously absent. Following our analysis of data, further research can be initiated for expediting the development of a more advanced globalisation index featuring more variables that capture the domain of openness for economies. The study can be further extended to see a comparison of India with other emerging economies on similar dynamics.

Our approach lacks focus on the increasing role of services in global trade. Even though goods constitute a more visible trade practice, internet and communication technologies have allowed services to become a primary focus of today's companies. Netflix, and, the likes of Udemy, constitute a significant chunk of this group. Even in the case of goods, there is a need to recreate the taxonomy of trade on the basis of new portals like Amazon and Alibaba, which have come to acquire an increasing role in the trade of goods. Amazon Global and Alibaba Global have become brands to transcend borders, and the modicum of trade needs to be reviewed with particular reference to e-commerce giants.

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APPENDIX

Table 1: KoF Globalisation Index restructured, Source: kof.ethz.ch

De facto	Original	Scaled version	De Jure	Original	Scaled version
Total	99.87	100	Total	99.87	100.00
Economic Globalisation	33.30	6.89	Economic Globalisation	***33.30***	***34.53***
Trade Globalisation	*16.65*		Trade Globalisation	16.65	17.26
Trade in goods	6.81		Trade regulations	5.41	5.61
Trade in services	7.49		Trade taxes	5.74	5.96
Trade in services	2.35		Tariffs	5.49	5.70
Financial Globalisation	16.65		Financial Globalisation	16.65	17.26
Foreign direct investment	4.58		Investment restrictions	3.61	3.75
Portfolio investment	2.21		Capital account openness 1	6.51	6.75
International debt	4.53	6.33	Capital account openness 2	6.53	6.77
International reserves	0.40	0.56			
International payments	4.93				
Social Globalisation	33.27	46.53	Social Globalisation	33.27	30.94
Interpersonal Globalisation	11.09	15.51	Interpersonal Globalisation	11.09	11.50
International voice traffic	2.54	3.55	Telephone subscriptions	4.24	4.39
Transfers	3.06	4.28	Freedom to visit	3.46	3.59
International tourism	3.12	4.36	International airports	3.39	3.52
Migration	2.37	3.32			
Informational Globalisation	11.09	15.51	Informational Globalisation	11.09	11.50
Patent applications	3.89	5.44	Television	2.79	2.90
International students	3.46	4.84	Internet user	3.54	3.67
High technology exports	3.74	5.23	Press freedom	1.46	1.52
			Internet bandwidth	3.29	3.41
Cultural Globalisation	11.09	15.51	Cultural Globalisation	11.09	7.95
Trade in cultural goods	2.51	3.51	Gender parity	3.45	3.58
Trademark applications	1.47	2.06	Expenditure on education	3.43	
Trade in personal services	2.84	3.97	Civil freedom	4.21	4.37

McDonald's restaurant	2.57	3.60			
IKEA stores	1.70	2.37			
Political Globalisation	33.30	46.58	Political Globalisation	33.30	34.53
Embassies	11.89	16.63	International organisations	12.32	12.78
UN peace keeping missions	9.09	12.72	International treaties	10.99	11.39
International NGOs	12.32	17.23	Number of partners in investment treaties	9.99	10.36

Table 2: Descriptive Statistics

	Ln GDP	Ln TR	GI
Mean	5.857948	5.127594	42.58279
Median	5.838299	5.017261	42.34009
Maximum	6.360416	6.035963	55.12911
Minimum	5.419582	4.450285	31.50459
Std. Dev.	0.282529	0.555593	9.194859
Skewness	0.186940	0.420318	0.099107
Kurtosis	1.845663	1.743886	1.358677
Jarque-Bera	2.208418	3.426736	4.099844
Probability	0.331473	0.180258	0.128745
Sum	210.8861	184.5934	1532.980
Sum Sq. Dev.	2.793796	10.80392	2959.090

Table 3: Results of ADF and PP Unit Root Test and KPSS test for Stationarity

	At Level			Upon First Dif.		
	ADF	PP	KPSS	ADF	PP	KPSS
Ln GDP	-0.9427	-0.7095	0.2029 ***	-5.3432 ***	-6.1602 ***	0.1487 ***
Ln TR	-2.0677	-2.1318	0.1802 ***	-3.8106 **	-3.7941 **	0.1165 ***
GI	-1.4675	-1.7647	0.1198 ***	-4.1993 **	-4.1878 **	0.2165 ***

Table 4: Johansen Co-integration						
Vector	t-value		Crit. Value 5%		P-value	
	λ_{Trace}	λ_{Max}	λ_{Trace}	λ_{Max}	λ_{Trace}	λ_{Max}
0	48.04200	31.30489	48.04200	31.30489	0.0141	0.0085
1	16.73711	11.69574	16.73711	11.69574	0.4348	0.4440
2	5.041367	5.041367	5.041367	5.041367	0.5905	0.5905

Table 5: VECM				
Variable	**Coeff.**	**Standard Er.**	**t-value**	**P- Value**
α_1	-2.605425	.478100	-5.449545	.0000
α_2	1.428821	.368434	3.878093	.0008
α_3	.640878	.236530	2.709499	.0128
α_4	-0.218193	.051929	-4.201761	.0004
α_5	-0.090225	.032098	-2.810927	.0102
α_6	.002575	.001441	1.786898	.0877
α_7	.002044	.001426	1.433667	.1657
α_8	-0.008498	.009786	-0.868432	.3945
α_9	-0.018432	.010688	-1.724555	.0986
α_{10}	0.000259	.001438	0.179980	.8588

Table 6: Result of Wald Test				
H_0	T- value		df	Prob.
$\alpha_2 = \alpha_3 = 0$	F-statistic	7.545402	(2, 22)	0.0032
	Chi-square	15.09080	2	0.0005
$\alpha_{4=}\ \alpha_{5=}0$	F-statistic	8.827692	(2, 22)	0.0015
	Chi-square	17.65538	2	0.0001
$\alpha_{6=}\alpha_7 = 0$	F-statistic	1.875921	(2, 22)	0.1769
	Chi-square	3.751842	2	0.1532

Table 7: TY Granger Non- Causality				
Dependent Variable	Independent	Chi-square	df	Prob.
Ln GDP	Ln TR	13.76943	4	0.0081
	GI	5.737319	4	0.2196
	All	19.09961	8	0.0143
Ln TR	Ln GDP	17.76455	4	0.0014

	GI	4.810946	4	0.3073
	All	20.06220	8	0.0101
GI				
	Ln GDP	1.612888	4	0.8065
	Ln TR	2.278595	4	0.6847
	All	5.893839	8	0.6591

Table 8: Diagnostic Tests

	Df	t-Statistic	Prob.
Serial Correlation - LM Test	16	13.52766	0.6339
Heteroskedasticity- White Test	2	0.269538	0.8739
Normality – Jacque Bera Test	160	147.9234	0.7439

Figure 1: IRF multiple graphs