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The Dynamics of Relationship between Exports, Import and Economic Growth in India

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Abstract:
This study examines the relationship between gross domestic product (GDP), Export and Import in India using time series data from 1976 to 2014. This study uses the ADF unit root test, Johansen co-integration and Vector Error Correction techniques to investigate the long run causality between gross domestic products (GDP), Export and Import in India. From the above study, it can be concluded that the Augmendented Dickey Fuller unit root tests show that GDP, Export and Import series become stationary when first difference is considered. The empirical result reveals a long run co-integrating relationship between gross domestic products (GDP), Export and Import in India. We found evidence of unidirectional causality running from GDP to Export, it means in long term GDP lead to Export but Export does not lead to GDP. The result revelled that there is no causality between GDP and Import; it means GDP does not lead to Import and Import does not lead to GDP. We also found evidence of unidirectional causality running from Export to Import, it means in long term Export lead to Import but Import does not lead to Export.

Keywords: *Causality, Co-integration, Export, GDP, Import*

Jel Classification: F14, C03, C32

1. Introduction

The main objective of any economy is development. The basic of economic development is economic growth. Trade plays an important role in economic growth. Export and Import are potential weapons of development. So policy makers and academics have shown great interest in exploring the possible relationship between international trade and economic growth. There are many different approaches to achieve economic development and growth. One possibility is to find new export markets for goods and services, as exports, along with the imports of new technologies, is an important engine of development. This strategy, however, raises the question: should a country promote exports and/or imports to speed up economic development and growth, or should the primary focus be on economic growth to generate international trade?

There has been considerable debate on the export-led growth (ELG) and growth-driven exports (GDE) hypotheses, with special regard to their implications on development policies and international trade. A large number of empirical studies have focused on this issue.

After the new economic policy of India has entered into the era of trade reforms and has been moving gradually towards an open economy since then. It is widely believed that exports are crucial in providing the impetus for economic growth in developing countries. Thus, export led growth has been put forward as an efficient alternative to inward-oriented strategy of development. Outward orientation is said to lead to higher total factor productivity growth (Bhagwati 1978, Krueger 1978, Kavoussi 1984, Ram, 1987) and encourages capital material investment including foreign direct investment. The pressure to compete with the best in the world may lead to better products and

service quality and force the domestic producers to reduce inefficiencies. For example, foreign exchange liberalisation, which is an important component of the export-led growth strategy, is likely to reduce the allocation inefficiencies of exchange control. MacDonald (1994) argues that the imports of final and intermediate goods will force domestic producers to innovate and increase their efficiency to compete with foreign imports.

Anoruo and Ahmad (2000), referring to Esfahani (1991) and Ram (1990), note that imports have positive influence on economic growth. Imports of capital goods are especially important for developing countries which depend on foreign capital for their economic development programmes. However, to be beneficial, imported capital must be productively engaged in the production of goods and services. Piana (2001), while discussing exports, advocates that increasing exports raise production, GDP, and employment. Thangavelu and Rajaguru (2004) suggest that trade has an important impact on productivity and output growth in the economy, however it is imports that provide the important 'virtuous' link between trade and output growth.

So the current study is a modest attempt to further investigate the relationship between Indian exports, imports and GDP growth, and to re-address the export-led growth (ELG), import-led growth (ILG), and growth driven export/import (GDE/GDI) hypotheses. Specifically, our aim is to study the potentially causal relationship between the logarithms of exports, imports, and GDP in India from 1976 to 2014.

2. Review of Literature

Sani Hassan Hussaini, Bashir Ado Abdullahi, Musa Abba Mahmud (2015) in their paper “Exports, Imports and Economic Growth in India: An Empirical Analysis” testing the Export Led Growth Hypothesis for India with annual time series data from 1980 to 2013.they found that within the period of 1980 to 2013, the variables are cointegrated and there exist bidirectional relationship between GDP and Export.

G.Jayachandran (2013) investigates the impact of exchange rate volatility on the real exports and Imports in India using annual time series data for the period 1970 to 2011. He found that GDP has a positive and significant impact on India s real exports in the long-run, but the impact turns out to be insignificant in the short-run.

Pradeep Agrawal (2014) in his paper entitled “The Role of Exports in India's Economic Growth” examines the relationship between export and economic growth. The results of the causality analysis and suggest that the rapid growth of exports has played a substantial role in increasing the growth rate in India following trade liberalization in 1991.

Rajwant Kaur, Amarjit Singh Sidhu (2012) in their paper “Trade Openness, Exports and Economic Growth Relationship in India ” examine the validity of the export-led growth (ELG) hypothesis implemented in India during the Post WTO Period. The study is based upon quarterly time series data covering the period from 1996-97 to 2008-09. The results revealed that the existence of long-run equilibrium relationship between export growth and economic growth. The unidirectional causality has also been observed among trade openness and economic growth (GDP), which is running from trade openness to GDP. In the light of above findings, the study supports the hypothesis that there is a positive correlation between export growth and economic growth in India during the post reforms.

Deepika Kumari and Neena Malhotra (2014) in their entitled paper “Export-Led Growth in India: Cointegration and Causality Analysis” explores the causal relationship between exports and economic growth by employing Johansen cointegration and Granger causality approach. Annual time series data from 1980 to 2012 have been used. Granger causality test exhibits bidirectional causality running from exports to GDP per capita and GDP per capita to exports.

Kaur & Sidhu (2012) examine the causality between Real GDP, real export, trade openness using annul data from 1996-97 to 2008-09. They found that unidirectional causality running from exports to GDP.

Ray, S. (2011) in his work "A Causality Analysis on the Empirical Nexus between Export and Economic Growth: Evidence from India" found that unidirectional causality running from exports to GDP.

Mishra, P. K. (2011) study "The Dynamics of Relationship between exports and economic growth in India" found that no causality exist between exports and GDP.

Devi, S. S. (2013) in paper "Export, Economic Growth and Causality- A Case for India" examines the relationship between Export and Economic Growth. The result revealed that uni directional causality running from exports to GDP.

3. Data Source and Methodology

In this study, annual data is used from 1976 to 2014. All the data were collected from HAND BOOK OF INDIA (RBI) 2014-15. Variables used in this study and the definitions are GDP (log of Gross Domestic Product), Export (log of Export) and Import (log of Import).

The data is analyzed to determine the causality GDP, Export and Import. Before analyzing the causal relationship between GDP, Export and Import, data has been transformed in to natural logarithms, and then possible existence of unit roots in the data is examined. The stationarity of each series is investigated by employing Augmented Dickey-Fuller unit root test. The number of lagged differences included is determined by the Schwarz Information Criterion and Akaike Information criteria. Further proceed with the VAR lag order selection criteria to choose the best lag length for the VAR time series model to examine the Granger Causality test for all the series is performed. Johansen co-integration test is also applied to test for co-integration.

The basic empirical investigation has two purposes. The first one is to examine the long-run co-integration between GDP, Export and Import while the second is to examine the long-run dynamic causal relationship between GDP, Export and Import. The basic testing procedure requires three steps. The first step is to test whether the variables contain a unit root to confirm the stationarity of each variable. This is done by using the Augmented Dickey–Fuller tests (ADF). In the second step we test the existence of a long-run co-integrating relationship between the variables. This is done by the use of the Johansen co-integration test. Finally, the last step, if all variables are integrated in the same order and co-integrated then long run causality test can be computed using the vector error correction model (VECM) method suggested by Engle and Granger (1987).

4. Empirical Results

4.1 Result of Stationarity Test

One of the most important attributes of a time series variable is its order of integration. Hence, we first perform unit root tests in levels and first differences in order to determine the order of integration of the series. To test the order of integration, we employ the conventional augmented Dickey-Fuller (ADF) test.

Table 1: ADF Unit Root test for Log GDP

Log GDP series from 1976-2014				
Log GDP (Level)				
	ADF	**Prob.**	**AIC**	**SBC**
None	3.0506	0.9991	-4.2777	-4.1897
Intercept	-0.0933	0.9427	-4.2963	-4.1644
Intercept with Trend	-2.3575	0.3942	-4.4007	-4.2247
Remark:	**Intercept coefficient is not statistically significant**			
	Intercept and Trend coefficient is statistically significant			
Log GDP (First Difference)				
	ADF	**Prob.**	**AIC**	**SBC**
None	-0.7979	0.3634	-4.0913	-4.0473
Intercept	**-3.6682**	**0.0090**	**-4.3516**	**-4.2636**
Intercept with Trend	-3.6082	0.0432	-4.2961	-4.1641
Remarks:	**Intercept coefficient is statistically significant**			
	Intercept and Trend coefficient is statistically significant			
Log GDP (Second Difference)				
	ADF	**Prob.**	**AIC**	**SBC**
None	-7.6964	0.0000	-4.2092	-4.1648
Intercept	-7.5817	0.0000	-4.1532	-4.0643
Intercept with Trend	-7.5663	0.0000	-4.1175	-3.9842
Remarks:	**Intercept coefficient is not statistically significant**			
	Intercept and Trend coefficient is not statistically significant			
Result: Log GDP Stationary at First Difference with Intercept.				

Table 1 gives value of various test statistics used for testing stationarity of the Log GDP series. As it can be seen from this table, the augmented Dicky-Fuller (ADF) test statistics in level shows presence of unit root in Log GDP (level). Here Intercept coefficient is not significant and intercept with trend coefficient taken together are statistically significant but ADF statistic is not significant. Therefore, it may conclude that the Log GDP series (level) is not stationary.

The Log GDP series (First difference) does not have a unit root problem and intercept coefficient as well as intercept and trend coefficient both are significant and the both criteria AIC as well as SBC – are minimized at Log GDP (First difference) with intercept and trend.

The log GDP series (second difference) does not have a unit root problem but intercept coefficient as well as intercept and trend coefficient both are not significant suggest that the Log GDP (First difference) with intercept series is found stationary.

Table 2: ADF Unit Root test for Log Export

Log EXPORT series from 1976-2014				
Log EXPORT (Level)				
	ADF	**Prob.**	**AIC**	**SBC**
None	11.032	1.0000	-1.9804	-1.9368
Intercept	1.3103	0.9982	-1.9320	-1.8449
Intercept with Trend	-2.8437	0.1917	-2.1114	-1.9808
Remark:	**Intercept coefficient is not statistically significant**			
	Intercept and Trend coefficient is statistically significant			
Log EXPORT (First Difference)				
	ADF	**Prob.**	**AIC**	**SBC**
None	-0.8616	0.3356	-1.7370	-1.6481
Intercept	**-5.6309**	**0.0000**	**-1.8997**	**-1.8117**

Intercept with Trend	-5.7796	0.0002	-1.8867	-1.7548
Remarks:	**Intercept coefficient is statistically significant**			
	Intercept and Trend coefficient is statistically significant			
Log EXPORT (Second Difference)				
	ADF	**Prob.**	**AIC**	**SBC**
None	-12.225	0.0000	-1.7719	-1.7274
Intercept	-12.055	0.0000	-1.7162	-1.6274
Intercept with Trend	-11.966	0.0000	-1.6723	-1.5390
Remarks:	**Intercept coefficient is not statistically significant**			
	Intercept and Trend coefficient is not statistically significant			
Result: Log EXPORT Stationary at First Difference with Intercept.				

Table 2 gives value of various test statistics used for testing stationarity of the Log Export series. As it can be seen from this table, the augmented Dicky-Fuller (ADF) test statistics in level shows presence of unit root in Log Export (level). Here Intercept coefficient is not significant and intercept with trend coefficient taken together are statistically significant but ADF statistic is not significant. Therefore, it may be concluded that the Log Export series (level) is not stationary.

The Log Export series (First difference) does not have a unit root problem and intercept coefficient as well as intercept and trend coefficient both are significant and both the criteria AIC as well as SBC – are minimized at Log Export (First difference) with intercept.

The log Export series (second difference) does not have a unit root problem but intercept coefficient as well as intercept and trend coefficient both are not significant suggest that the Log Export (First difference) with intercept series is found stationary.

Table 3: ADF Unit Root test for Log Import

Log IMPORT series from 1976-2014				
Log IMPORT (Level)				
	ADF	**Prob.**	**AIC**	**SBC**
None	10.605	1.0000	-1.8048	-1.7613
Intercept	0.4694	0.9833	-1.7929	-1.7058
Intercept with Trend	-1.7524	0.7071	-1.8303	-1.6997
Remark:	**Intercept coefficient is not statistically significant**			
	Intercept and Trend coefficient is not statistically significant			
Log IMPORT (First Difference)				
	ADF	**Prob.**	**AIC**	**SBC**
None	-1.1241	0.2319	-1.5657	-1.431071
Intercept	**-4.8126**	**0.0004**	**-1.7778**	**-1.6898**
Intercept with Trend	-4.7612	0.0026	-1.7294	-1.5975
Remark:	**Intercept coefficient is statistically significant**			
	Intercept is statistically significant but Trend coefficient is not statistically significant			
Log IMPORT (Second Difference)				
	ADF	**Prob.**	**AIC**	**SBC**
None	-7.2411	0.0000	-1.5846	-1.4948
Intercept	-7.1218	0.0000	-1.5289	-1.3943
Intercept with Trend	-7.0036	0.0000	-1.4701	-1.2906
Remark:	**Intercept coefficient is not statistically significant**			
	Intercept and Trend coefficient is not statistically significant			
Result: Log IMPORT Stationary at First Difference with Intercept.				

Table 3 gives value of various test statistics used for testing stationarity of the Log Import series. As it can be seen from this table, the augmented Dicky-Fuller (ADF) test statistics in level shows presence of unit root in Log Import (level). Here Intercept coefficient is not significant and intercept with trend coefficient taken together are sta tistically significant but ADF statistic is not significant. Therefore, it may concluded that the Log Import series (level) is not stationary. The Log Import series (First difference) does not have a unit root problem and intercept coefficient as well as intercept and trend coefficient both are significant and the both criteria AIC as well as SBC – are minimized at Log Import (First difference) with intercept.

The log Import series (second difference) does not have a unit root problem but intercept coefficient as well as intercept and trend coefficient both are not significant suggest that the Log Import (First difference) with intercept series is found stationary.

4.2 Result of Lag Order Selection Criteria for GDP, GDS and GDI

For getting optimal lag Length for co integration analysis, we have used five criteria namely, LR test statistic, Final prediction error, Akaike information criterion, Schwarz information criterion and Hannan-Quinn information criterion. Most of the criteria have suggested a leg length of 1 as a optimal leg length.

Table 4 VAR Lag Order Selection Criteria for GDP, GDS and GDI

Lag	Log L	LR	FPE	AIC	SC	HQ
0	-6.851846	NA	0.000365	0.597082	0.733128	0.642857
1	160.6235	294.3507	2.47e-08*	-9.007487*	-8.463302*	-8.824385*
2	167.8561	11.39681	2.79e-08	-8.900371	-7.948048	-8.579943
3	174.5047	9.267690	3.35e-08	-8.757859	-7.397398	-8.300106
4	189.6194	18.32093*	2.49e-08	-9.128451	-7.359851	-8.533371
5	196.3695	6.954559	3.26e-08	-8.992088	-6.815350	-8.259682

*** indicates lag order selected by the criterion**
LR: sequential modified LR test statistic **HQ: Hannan-Quinn information criterion**
FPE: Final prediction error **AIC: Akaike information criterion**
SC: Schwarz information criterion

4.3 Result of Co-Integration Test Based on Johnson Juselius Method

Once we have the results of unit roots, the next step is to determine whether there exists co-integration, using the same order of integrated variables. To test for co-integration, the Johansen and Juselius (1990) procedure was used, which leads to two test statistics, trace test and maximum eigenvalue test, for cointegration.

Table: 5 Result Of the Co-integration Test based on Johnson Juselius method

Johansen Test for Co-integration (Trace Test)				
Hypothesized No. of CE(s)	**Trace Statistic**	**0.05 Critical Value**	**Prob.**	**Conclusion**
None	29.87252	29.79707	0.0489	One Co integrating Relationship
At most 1	8.682039	15.49471	0.3956	
At most 2	0.006491	3.841466	0.9352	
Johansen Test for Co-integration (Maximum Eigen value Test)				
Hypothesized No. of CE(s)	**Max-Eigen Statistic**	**0.05 Critical Value**	**Prob.**	**Conclusion**
None	22.49048	21.13162	0.0413	One Co integrating Relationship
At most 1	8.675548	14.26460	0.3142	
At most 2	0.006491	3.841466	0.9352	

Table 5 expresses the results of the co-integration test. There are two test statistics for co-integration, the Trace test and Maximum Eigen value test. The Trace-Statistic value is shown to be greater than the critical values at 5% levels. Therefore, we reject the null hypothesis of no co-integrated equation among the variables. Thus, we conclude that there is at most one co-integrated equation among the variables. The results of Maximum Eigen value test statistics also express same here. Finally, we can say that there is a long run relationship between gross domestic product (GDP), Export and Import.

4.4 Result of Granger Causality Test Based on VECM

4.4.1 Long run Causality Test Based on VECM

The VECM long run causality result presented in Table 6 reveals the causal relationship among gross domestic product (GDP), Export and Import. The result showed that the error correction term for co-integrating equation with gross domestic product (GDP) as a dependent variable is negative but not significant at one percent, implying that there no long run relationship running from Export to gross domestic product (GDP). However, the error correction term for co-integrating equation with Export as a dependent variable is negative and significant. . It means that there is long run causal relationship running from economic growth (GDP) to Export. Therefore, we conclude that there is uni-directional causality running from economic growth (GDP) to Export to in long run.

The coefficient of error correction term with gross domestic product (GDP) as a dependent variable was negative but not significant at one percent, implying that there is no long run relationship running from Import to gross domestic product (GDP). The error correction term for co-integrating equation with Import as a dependent variable was negative but not significant at one percent, implying that there is no long run relationship running from gross domestic product (GDP) to import.

The coefficient of error correction term with Export as a dependent variable is negative but not significant at one percent, implying that there no long run relationship running from Import to Export. However, the error correction term for co-integrating equation with Import as a dependent variable is negative and significant. . It means that there is a long run causal relationship running from Export to Import. Therefore, we conclude that there is uni-directional causality running from Export to Import in long run.

Table 6: Long run Causality Test Based on VECM

Causality	ECM_{t-1}	T-Statistic	Prob.	Result
Long run causality from GDP to Export	**-0.210213**	**-2.246721**	**0.0324**	Uni directional Causality
Long run causality from Export to GDP	-0.070134	-1.731449	0.0940	
Long run causality from GDP to Import	-0.068689	-0.966562	0.3418	No Causality
Long run causality from Import to GDP	-0.030645	-1.173886	0.2500	
Long run causality from Export to Import	**-0.244964**	**-2.206650**	**0.0354**	Uni directional Causality
Long run causality from Import to Export	-0.018604	-0.169388	0.8667	

5. Conclusion

In this paper, we have examined the relationship between gross domestic product (GDP), Export and Import in India using time series data from 1976 to 2015. This study uses the ADF unit root test, Johansen co-integration and Vector Error Correction techniques to investigate the long run a causality between gross domestic products (GDP Export and Import in India. . From the above study, it can be concluded that the Augmendented Dickey Fuller unit root tests show that GDP, Export and Import series become stationary when first difference are considered. The empirical result reveals a long run co-integrating relationship between gross domestic products (GDP), Export and Import in India. We found evidence of unidirectional causality running from GDP to Export, it means in long term GDP lead to Export but Export does not lead to GDP. The result reveled that there no causality between GDP and Import, it means GDP does not lead to Import and Import does not lead to GDP.

We also found evidence of unidirectional causality running from Export to Import, it means in long term Export lead to Import but Import does not lead to Export.

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