Trade-Led Growth in India and China: A Comparative Analysis

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Abstract The trade-led growth theory has received considerable attention over the decades with vast amount of literature devoted to analyse it empirically particularly in case of export-led growth hypothesis. India & China are two large Asian countries experiencing rapid growth during recent decades. For years, India's economic growth rate ranked second among the world's large economies, after China, which it has consistently trailed by at least one percentage point. The present study aims to examine the impact of exports and imports expansion on economic growth for India and China. As India & China are two fastest growing countries of Asia, so it is interesting to compare these economies. By selecting a relatively liberalized period from 1980 to 2012, the comparative study has used multivariate model based on Cobb-Douglas production function by incorporating variables like GDP per capita, exports, imports, gross capital formation and labour. Time series econometric techniques (Johansen Cointegration & Toda-Yamamoto (TY) approach) have been applied to test the hypothesis. The comparison of economic parameters between India and China reveals that early and more efficient reforms are the reason of better economic performance of China. The empirical findings for India suggest unidirectional causality running from GDP per capita to exports. However, no causation was found between imports and GDP per capita. For China, a strong evidence of bi-directional causality was found from GDP per capita to exports/ imports and vice versa. The study concludes that China performed better as compared to India. The difference in performance between India & China is not simply because of timings of changes in policies but the speed of reforms, implementation of policies and nature of political governance also mattered.

Keywords: Trade, Growth, Cointegration, Granger Causality
JEL Classification: C32, F43, O24

1. Introduction

Trade is an important stimulator of economic growth. It enlarges a country's consumption capacities, increases world output, and provides access to scarce resources and worldwide markets for products without which poor countries would be unable to grow. The whole economic basis for international trade rests on the fact that countries do differ in their resource endowments, their preferences and technologies, their scale economies, their economic and social institutions and their capacities for growth and development (Todaro and Smith, 2003). Exports provide foreign exchange that can be used for importing consumption goods, intermediate goods or capital goods and imports of capital goods & intermediate goods can increase economic growth through technological diffusion (Nguyen, 2011). Furthermore, exports can provide foreign exchange that allows for more imports of intermediate goods which in turn raises capital formation and thus stimulates output growth (Awokuse, 2007).

An extensive empirical literature exists on the causal relationship between exports and economic growth. Relative to the empirical literature on exports and economic growth, the empirical studies on the relationship between imports and economic growth is quite limited

(Ogbonna, 2011). The export-led growth (ELG) hypothesis postulates export expansion as one of the main determinants of economic growth. It holds that the overall growth of countries can be generated not only by increasing the amounts of labour and capital within the economy, but also by expanding exports .This type of advocacy has been generated for the following reasons: First, Export growth facilitates the exploitation of economies of scale for even small open economies by expanding demand for the country's output. Second, exports expansion may relax a foreign exchange constraint which makes it easier to import inputs to meet domestic demand, and so enable output expansion. Third, expansion in exports may promote specialization in the production of export products, which in turn may boost the productivity level and may cause the general level of skills to rise in the export sector. This may then lead to reallocation of resources from the (relatively) inefficient non-trade sector to the more productive export sector. The productivity change may lead to output growth. Finally, an outward oriented trade policy may also give access to advanced technologies, learning by doing gains, and better management practices that may result in further efficiency gains Thus, international trade and development theory suggests that export growth due to export-oriented policies contributes positively to economic growth (Eusuf and Ahmed, 2007). The import- led growth hypothesis suggests that economic growth could be driven primarily by growth of imports. Endogenous growth models show that imports can be a channel for long- run economic growth because it provides access of intermediate factors and foreign technology to domestic firms. Growth of imports serves as a medium for transfer of growth enhancing foreign R&D knowledge from developed to developing countries (Awokuse, 2007).

This paper aims to compare the Indian & Chinese economies and analyze the trade-led growth in both the economies. The study also includes the comparison of various economic parameters such as GDP, Export/Import Volume of the two countries.

The study is organised as follows: Section 2 contains a selective review of literature on trade-led growth. Section 3 provides a background of the economy of India & China. Section 4 describes the model, database and methodology. Section 5 presents the empirical results and finally section 6 concludes the discussion.

2. Review of Literature

There is a huge empirical literature available on the export-led growth hypothesis. The theoretical arguments regarding export-led growth hypothesis nexus have been empirically verified by economists & researchers at different times. The export-led growth hypothesis implies that an increase in exports would lead to an increase in economic growth. A feedback relationship between exports and economic growth is also possible. Most recent studies using time series data to investigate the causality between a country's export growth and its economic growth have failed to provide uniform support for the export-led growth hypothesis. The studies have provided mixed conclusions. The literature related to India and China has been reviewed in this section.

A number of studies including Bhat (1995), Ghatak and Price (1997), Dhawan and Biswal (1999), Nataraj, Sahoo and Kamaiah (2001), Chandra (2003), Sharma and Panagiotidis (2004), Padhan (2004), Pandey (2006), Pradhan (2010), Mishra (2011), Ray (2011), Kaur and Sidhu (2012) and Devi (2013) had adopted time series analysis for exploring the causal relationship between exports growth and output growth for India. The first group of studies concluded in the support of the export-led growth (ELG) hypothesis. The studies used the

Engle-Granger (1987) approach to cointegration and error correction modelling for the study of causality. Bhat (1995) and Chandra (2003) employed cointegration technique to find the relationship between exports growth and output growth. Both studies found positive relationship. On the other hand, Padhan (2004), Pandey (2006), Ray (2011) and Devi (2013) used bivariate framework to investigate the relationship between export growth and economic growth. These studies also supported ELG hypothesis. However, Pradhan (2010), Kaur and Sidhu (2012) used multivariate framework to examine relationship and supported ELG hypothesis. The second group of studies which does not support ELG hypothesis includes Ghatak and Price (1997), Dhawan and Biswal (1999), Nataraj, Sahoo and Kamaiah (2001), Sharma and Panagiotidies (2003) and Mishra (2011). Difference in time periods, variable definitions and techniques are three possible reasons for this. Except Mishra (2011) all the other studies in this group used multivariate framework to examine the relationship between exports growth and output growth but failed to find that exports growth causes GDP growth.

To establish the validity of the ELG hypothesis for China, Kwan & Kwok (1995) supported export-led growth hypothesis. The study reported results supporting the leading role of exports for production as they can be seen as exogenous for China. Further, Tsen (2010) found the evidence for export-led growth hypothesis. The findings also supported a feedback relationship among the variables. Moreover, the evidence for domestic demand-led growth and vice versa was also confirmed. Herreias and Orte (2010) investigated the empirical relationship between the exports, investment and output growth. The study found evidence for both export-led growth and investment-led growth. The empirical results show that investment and exports as well as exchange rate policy were relevant factors in explaining China's long run economic growth over the past four decades (1964-2004). Yao (2006) investigated the relationship between exports, FDI and economic growth for the period 1978-2000. Adopting Pedroni's panel unit root test and Arellano & Bond's dynamic panel data estimating technique, the study found that both exports and FDI have a strong and positive effect on economic growth. Similarly Liu, Burridge and Sinclair (2010) investigated the causal links between trade, economic growth and inward FDI in China at the aggregate level. Long run relationship among these variables has been identified in a cointegration framework. However, multivariate causality test identified bi-directional causality between economic growth, FDI & exports.

3. Economies of India & China

India is the world's largest democracy. Over the past decade, the country's integration into the global economy has been accompanied by economic growth. India now has emerged as a global player (www.worldbank.org). In 1979, India started to make attempts for partial liberalization of imports and exports. For instance in 1979, India introduced an open general licensing list that permitted limited imports of machinery and raw materials not produced domestically. In the mid -1980s a few measures to promote exports were undertaken, including a passbook scheme for duty-free imports for exporters and the setting of the exchange rate at a more realistic level. Partial liberalisation contributed to India's export growth in the second half of 1980s. The post -1991 reforms had a significant impact on India's profile as an international investment destination. In 1991, the government introduced major changes in its policy on trade, foreign investment, tariffs and taxes under the name of 'New Economic Reforms'. The main focus of these reforms has been on liberalization, openness and export promotion activity (Kaur, 2012). Focusing on trade liberalization in particular, a considerable increase in exports took place with tariff reduction and removal of other barriers. Prior to the reforms, all imports were either submitted to licensing or prohibited altogether (Khan, 2005). It was realized that the import substituting inward looking development policy was no longer suitable in the modern globalizing world. Before the reforms, trade policy was characterized by high tariffs and extensive import restrictions. Imports of manufactured consumer goods were completely banned. For capital goods, raw materials and intermediates, certain lists of goods were freely importable, but for most items where domestic substitutes were produced, imports were only possible with import licenses. The criterion for issue of licenses was non-transparent, delays were endemic and corruption was unavoidable. The economic reforms sought to phase out import licensing and also to reduce import duties (www.indianbusiness.nic.in).

China has had a remarkable period of rapid growth shifting from a centrally planned to a market based economy. Today, China is an upper middle-income country (www.worldbank.org). The post -1978 reforms marked the start of a gradual and highly coordinated transition process in China. The initial focus of reform was to promote exports by attracting FDI. In 1979, an export-processing law was passed that provided incentives for the processing and assembly of imported inputs. These incentives were expanded in 1987 to provide for the duty-free imports of all raw materials, parts and components used in export production. Monopoly state trading was liberalized starting in the late -1970s and replaced with a complex and highly restrictive set of tariffs, non-tariff barriers and licenses. Reform of the complex import control regime was more cautious during the early transition years, but was strengthened from 1992 onward by extensive reforms that China agreed to implement as part of the WTO accession process. Accordingly, a dualistic trade regime existed from the mid 1980s onward, one that promoted exports via FDI alongside controlled liberalization of a protected domestic sector (Wignaraja, 2011).

The trends of China's and India's exports of goods & services have been shown in Figure 1. It shows that the total value of exports of goods & services (at constant prices 2005) has increased during 1980-2012 in both the countries. The value of China's total exports of goods & services (at constant prices 2005) has increased from 37,280 US million dollars in 1980 to 1,769,294 US million dollars in 2012. In India, the value of total exports of goods & services (at constant prices 2005) has also shown rise from 13,589 US million dollars in 1980 to 325,029 US million dollars in 2012. China's exports growth of goods & services has been tremendous as compared to India.

The trends of China's and India's imports of goods & services have been exhibited in Figure 2. During 1980-2012, total value of imports of goods & services (at constant prices 2005) has increased in both the countries. China's imports of goods & services have grown from 33,858 US million dollars in 1980 to 1,428,434 US million dollars in 2012 while India's imports of goods & services have surged from 14,180 US million dollars in 1990 to 440,470 million dollars in 2012 at constant prices 2005.China's imports growth of goods & services has also been found greater as compared to India.

In 1980, the economies of China and India were almost at the same level in terms of Gross Domestic Product (GDP) per capita. India's GDP per capita was, in fact, slightly higher than that of its much larger eastern neighbour. During 1980-2012, leaving India far behind, Chinese per capita income grew at an average rate of 8.96 percent at constant prices (see table 1). The trends of GDP per capita of India and China during study period have been shown in figure 3.

The compound growth rates of exports, imports & GDP per capita has been presented in table 1. It clearly shows that China's performance has been better than India during 1980-2012. There is large difference in growth rates of GDP per capita. Chinese GDP per capita growth is double than the Indian GDP per capita growth. However, table shows that decade wise both India's & China's GDP per capita has followed a continuous upward trend. But China miraculously continued to experience high GDP per capita growth rate i.e. over 9 percent in past three decades. The spectacular GDP per capita growth over past three decades indicates China's success.

4. The Model, Database & Methodology

4.1 The Model

The model is based on the Cobb- Douglas production function, i.e.

$$Y=f(K, L) \quad (1)$$

Where Y represents real gross domestic product and K & L represent capital and labour respectively. The study expands this equation by employing other important variables such as exports and imports in multivariate time series model to capture the causal link between exports, imports and economic growth. Therefore the aggregate production function can be expressed as –

$$Y= f(K, L, X, M) \quad (2)$$

In equation (2), X and M have included as exports and imports in aggregate production function.

4.2 Database

The time series data covers the period from 1980 to 2012. The annual data at the 2005 constant US dollar prices been obtained from two sources. Data on real GDP per capita, real exports, real imports, real gross capital formation has been compiled from World Development Indicators while data on total labour force has been collected from UNCTAD. All the variables are taken in their natural logarithms to avoid the problem of heteroscedasticity. The variables used for analysis are-

1. LNGDPPC= Log of Gross Domestic Product per capita.
2. LNEXP= Log of Exports of Goods & Services.
3. LNIMP= Log of Imports of Goods & Services.
4. LNGCF= Log of Gross Capital Formation.
5. LNLAB= Log of total labour force.

The prefix 'LN' stands for natural logarithm & 'D' denotes differencing of the time series. All econometric estimations in this paper have been carried out using E-views 6.

4.3 Methodology

The entire estimation procedure consists of three steps: first, unit root test; second, cointegration test; third causality test.

4.3.1 Unit Root Test

To get reliable & unbiased results the variables of model must be stationary (free from unit root). The non-stationarity of variables can cause 'spurious regression' problem discussed in Granger and Newbold (1974) & Phillips (1986) (Al-Yousif, 1999). Augmented Dickey Fuller (ADF) and Phillips & Perron (PP) tests are carried out to determine the order of integration of each time series used in the analysis so as to determine the appropriate technique that can be used to find out relationship among variables.

Augmented Dickey-Fuller test consists of running a regression of the first difference of the series against the series lagged once, lagged difference terms and optionally, a constant and a time trend. The additional lagged terms are included to ensure that the errors are uncorrelated. This can be expressed as follows:

$$\Delta Y_t = \alpha_0 + \alpha_1 t + \alpha_2 Y_{t-1} + \sum_{j=1}^{p} \alpha_j \Delta Y_{t-j} + \varepsilon_t \qquad (3)$$

Where ε_t is a pure white noise error term and $\Delta Y_{t-1} = (Y_{t-1} - Y_{t-2})$, $\Delta Y_{t-2} = (Y_{t-2} - Y_{t-3})$ etc. The ADF test adjusts the DF test to take care of possible serial correlation in the error terms of adding the lagged difference terms of the regressand. Phillips and Perron use nonparametric statistical methods to take care of the serial correlation in the error terms without adding lagged difference terms. Since the asymptotic distribution of the PP test is the same as the ADF test statistic (Gujarati and Sangeetha, 2010). Phillips- Perron test is used to test null hypothesis that a time series has unit root. It builds on the Dicky-Fuller test of null hypothesis δ=0 in

$\Delta Y_t = \delta Y_{t-1} + U_t$,

Here Δ is the first difference operator. Like the ADF test, the PP test addresses the issue that the process generating data for Y_t might have a higher order of autocorrelation than is admitted in test equation making Y_{t-1} endogenous and then invalidating the Dickey-Fuller t-test. While the ADF test addresses the issue by introducing lags of ΔY_t as regressors in the test equation, the PP test makes a non-parametric correction to the t-test statistics. The test is robust with respect to unspecified autocorrelation & heteroscedasticity in the disturbance process of the test equation (Ray, 2011).

4.3.2 Cointegration Test

Cointegration means that despite being individually non stationary, a linear combination of two or more time series can be stationary. Cointegration of two or more time series suggests that there is a long run or equilibrium relationship between them (Gujarati & Sangeetha, 2010). The Johansen approach to cointegration test is based on two test statistics, viz., the trace test statistic, and the maximum eigen value test statistic.

Trace Test Statistic

The trace test statistic can be specified as:

$$\tau_{trace} = -T \sum_{i=r+1}^{k} \log(1-\lambda_i),$$

where λ_i is the i^{th} largest eigenvalue of matrix Π and T is the number of observations. In the trace test, the null hypothesis is that the number of distinct cointegrating vector(s) is less than or equal to the number of cointegration relations (*r*).

Maximum Eigenvalue Test

The maximum eigenvalue test examines the null hypothesis of exactly *r* cointegrating relations against the alternative of *r* + 1 cointegrating relations with the test statistic:

$\tau_{max} = -T\log(1-\lambda_{r+1})$,

where λ_{r+1} is the $(r+1)^{th}$ largest squared eigen value. In the trace test, the null hypothesis of r=0 is tested against the alternative of r+1 cointegrating vectors (Mishra, 2011).

4.3.3 Multivariate Granger Causality based on Toda- Yamamoto Approach

Toda-Yamamoto causality test overcomes the problem whether the time series are I (0), I (1) or I (2), cointegrated or non-cointegrated. Toda and Yamamoto (1995) augmented granger causality demands that the maximum order of integration (d_{max}) and the lag length of the series (K) be determined so that a VAR (k +d_{max}) has to be estimated to use the Wald test from linear restrictions on the parameters of a VAR (k) that has an asymptotic χ^2 distribution. In this case, k would be determined using sequential modified LR test statistic, final prediction error, Akaike information criterion, Schwarz information criterion and Hannan – Quinn information criterion.

While the Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) unit root test for which the null hypothesis is non stationary were used to test for the stationarity and to determine the maximum order of integration d_{max} for the group of the time series. Toda and Yamamoto (TY) procedure makes parameter estimation valid even when the VAR system is not cointegrated, thus one may not need to test cointegration or transform VAR into ECM (Toda &Yamamoto, 1995).

5. Empirical Results

5.1 Results for India

As shown in table 2 & 3, the results based on ADF and PP tests demonstrate that all the variables LNGDPPC, LNEXP, LNIMP, LNGCF & LNLAB are non- stationary at level but become stationary after first differencing, that is, all series are integrated of order one or I(1). Both tests yield same conclusion. The next step is to test for cointegration using Johansen's cointegration approach.

In the preceding table study found that the five variables of the model are stationary at first difference. Therefore study needs to find out whether these variables are co-integrated before turning to the test of causality. To test the presence of long-run relationship between variables Johansen (1995) cointegration test has been conducted. Johansen cointegration test is a system estimation method, where the number of cointegrating vectors is not fixed *a priori* but determined in the course of estimation. Nevertheless, the Johansen procedure presents greater difficulty in practise. An important question when applying this procedure; is the deterministic terms specification to be used, since results may differ from one to another. To determine most appropriate deterministic specification the study followed *"Pantula Principle"*[1] suggested by Johansen (1992) and chose the third model out of the five possible specifications. The results reported in table 4 show that both trace statistic value and max-eigen value are below than 5% critical value, hence it does not reject null hypothesis of no-cointegration. The results thus suggest that there does not exist long run stable relationship among the five variables namely LNGDPPC, LNEXP, LNIMP, LNGCF & LNLAB for India.

The Causality results using Toda-Yamamoto approach for India have been presented in table 5. The results do not find any support for export-led growth. However, strong evidence for growth-led export was found at 1% level of significance. For India, Imports are not found to be significant in any of these two cases. Thus, the results confirm the validity of growth-led export for India.

5.2 Results for China

The results of ADF & PP tests are reported in table 6 & 7. The variables to be tested are LNGDPPC, LNEXP, LNIMP, LNGCF & LNLAB. The two popular unit root tests do not give same results for China. All the variables are non-stationary at level but become stationary after differencing which indicates that variables are integrated of order one or I (1) except the variables LNGCF & LNLAB. The variables LNGCF & LNLAB are stationary at level that is I (0) by the ADF test but is not I (0) by PP test. PP test indicates series LNGCF is I (1) & series LNLAB is I (2).

Therefore it can be concluded that there exists a complex nature of time series in the data set. Hence, results do not allow the use of Johansen Cointegration.

Modified Wald test (MWALD) for the causality test is used as proposed by Toda & Yamamoto (1995) which avoids the problems associated with the ordinary granger causality test by ignoring any possible non stationary or cointegration between series when testing for causality. The Toda and Yamamoto (1995) approach fits a vector autoregressive model in the levels of the variables thereby minimizing the risks associated with the possibility of faulty identifying the order of integration of the series. This procedure provides the possibility of testing for causality between integrated variables based on asymptotic theory whether the variables are I (0), I (1) or I (2), non- cointegrated or cointegrated of any arbitrary order.

[1] The Pantula Principle involves the estimation of all three models and the presentation of the results from the most restrictive hypothesis (i.e. r= number of cointegrating relations=0 and model 1) through the least restrictive hypothesis, i.e. r =number of variables entering the VAR-1=n-1 and model 4). The model selection procedure then comprises moving from the most restrictive model, at each stage comparing the trace statistic to its critical value, stopping only when we conclude for the first time that the null hypothesis of no cointegration is not rejected. (Asteriou and Hall, 2007)

Before testing for causality, the study examined the econometric & statistical adequacy of model. There is no autocorrelation problem.

The results of Toda-Yamamoto causality test have been summarised in table 8. The results show that there is strong evidence of trade-led growth at 1% level of significance. The study found there is bi-directional causality running from LNGDPPC to LNEXP and vice versa. Similarly, the study also exhibited bi-directional causality running from LNGDPPC to LNIMP and vice versa. Thus the empirical results give strong evidence of bi-directional causality for China. The results suggested that exports/ imports growth has positive influence on GDP per capita; on the other hand GDP per capita growth has also promoted export/ import volume of the country. Therefore it can be concluded that exports/imports and GDP are mutually causal.

6. Conclusion

The aim of the study is to provide a framework that allows us to make comparison of India and China over the past 32 years. Therefore study includes the comparison of various econometric parameters such as GDP, Export/ Import volume. The main objective of the study is to analyze the trade-led growth in both the economies. The study used time series data at the 2005 constant US dollar prices which covers the period from 1980 to 2012. Moreover, the study used econometric techniques such as Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) tests for unit root, Johansen Cointegration test, Pair wise Granger Causality test and Toda- Yamamoto (TY) procedure to examine the relationship between variables like LNGDPPC, LNEXP, LNIMP, LNGCF and LNLAB for India and China.

Reforms in China are older than they are in India. Therefore, a comparison of econometric parameters shows that during 1980-2012 the compound annual growth rates of exports, imports and GDP per capita have been better in China as compared to India. However, table shows that decade wise both India’s & China’s GDP per capita has followed a continuous upward trend. But China miraculously continued to experience high GDP per capita growth rate i.e. over 9 percent in past three decades. The spectacular GDP per capita growth over past three decades indicates China’s success.

For India, the study finds evidence of growth-led export (GLE). The cointegration test does not confirm the existence of long run equilibrium relationship among variables. The Multivariate Granger Causality test gives evidence that there exists unidirectional causality running GDP per capita to exports. No causation was found between imports and GDP per capita. Thus the results of Multivariate Granger Causality test support GLE hypothesis in case of India.

For China, the study found strong evidence of bi-directional causality. The results suggested that both exports and imports growth have positive influence on GDP per capita; on the other hand GDP per capita growth has also promoted Export/ Import volume of the country. Therefore, the results confirmed trade-led growth in case of China.

The study found that India & China had similar level of per capita GDP (at constant prices 2005 US$) in 1980, but China grew much faster and overtook India by the early 1990s. Since then growth in China has been so fast that its per capita GDP is double than that of India. The reason behind it is, China has encouraged FDI by multinationals looking to set up export-oriented manufacturing operations. In contrast, India followed an import-substitution policy and relied on domestic resource mobilisation and domestic firms for long time. China launched its economic transformation by using abundant labour at low wage rate to establish manufacturing for export industries while India focused on service export sector. The success of Special Economic Zones (SEZs) and Export Promoting Zones (EPZs) have also played important role. Small size, lack of incentives and several other constraints lead to poor performance of SEZs & EPZs in India. Chinese SEZs & EPZs promoted Chinese exports as well as attracted FDI. By contrast, SEZs & EPZs in India failed to attract FDI (Bajpai, Jian & Sachs, 1997). Wignaraja (2011) found that China adopted more comprehensive and pro-active approach to trade and industrial policy as compared to India. In its efforts to attract export-oriented FDI, it actively facilitated technological upgrading of FDI & exports, reduced import tariffs and the dispersion of tariffs in a more systematic manner, managed a more predictable and transparent real effective exchange rate (REER).

The study concludes that China performed better as compared to India. The difference in performance between India & China is not simply because of timings of changes in policies but the speed of reforms, implementation of policies and nature of political governance also mattered.

Endnotes

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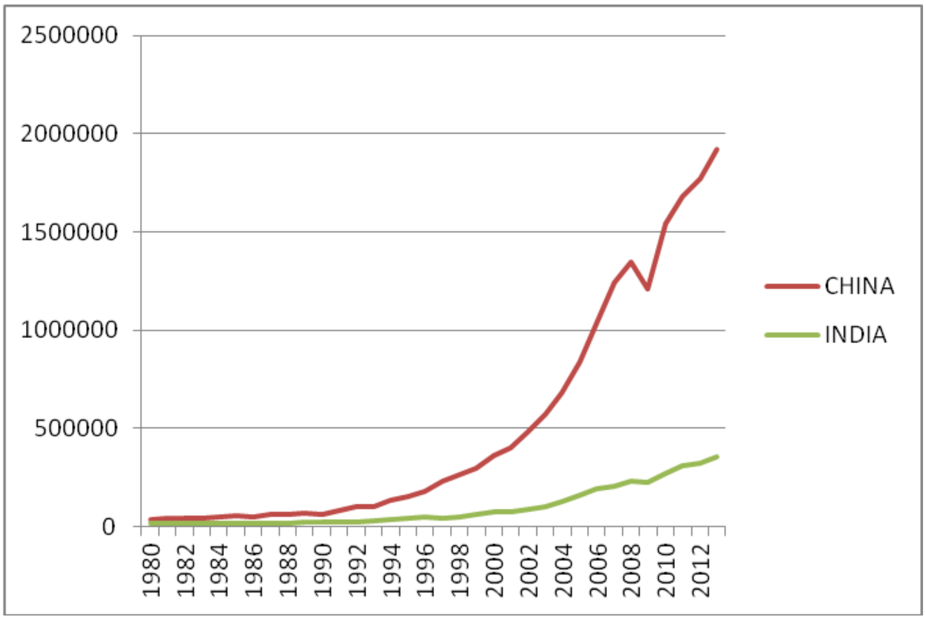
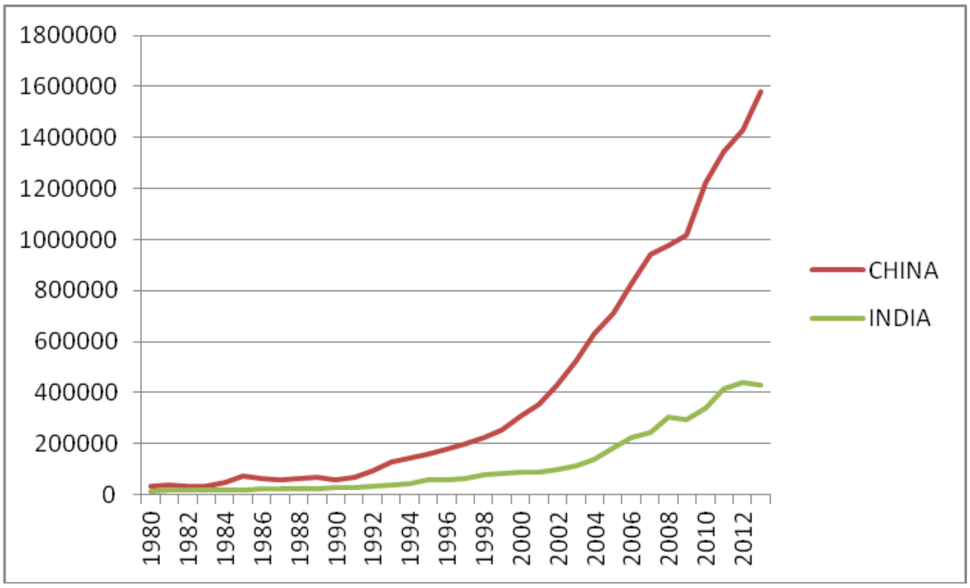
Figure: 1 Exports of Goods & Services (in million US$ at constant prices 2005)



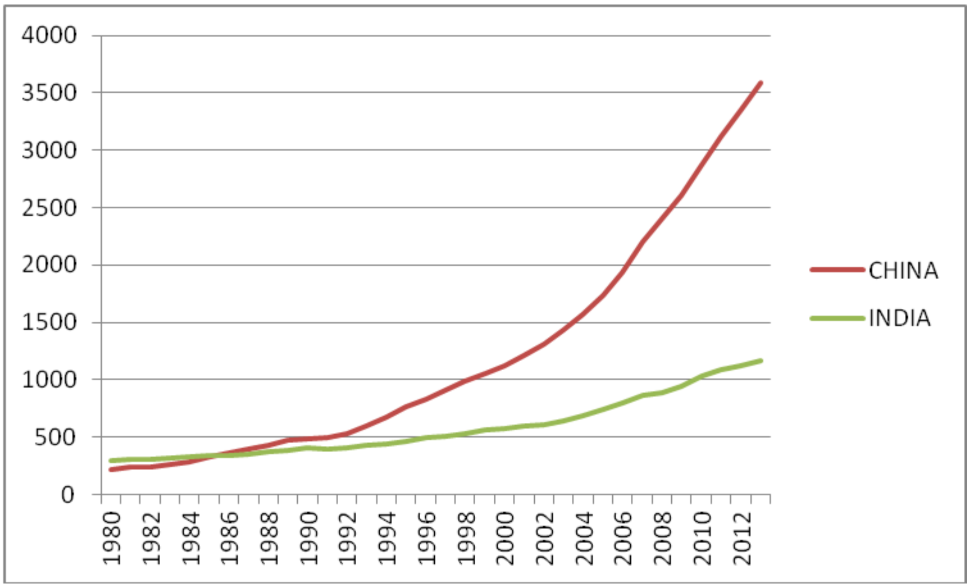
Source: World Development Indicators (WDI)

Figure: 2 Imports of Goods & Services (in million US$ at constant prices 2005)



Source: World Development Indicators (WDI)

Figure: 3 GDP per capita (in US$ at constant prices 2005)



Source: World Development Indicators (WDI)

Table: 1 Compound Growth Rates of Exports, Imports & GDP

Compound Growth Rate of India & China				
	1981-90	**1991-00**	**2001-12**	**1980-2012**
Exports of Goods & Services (Constant 2005 US $)				
India	5.45	12.51	14.16	11.68
China	5.52	18.27	14.61	14.34
Imports of Goods & Services (Constant 2005 US $)				
India	5.84	14.67	16.42	11.79
China	8.18	15.91	13.02	13.68
GDP per capita (Constant 2005 US $)				
India	3.27	4.39	6.37	4.26
China	9.19	9.85	10.13	8.96

Source: Author's Calculations

Results for India

Table: 2 Results of Augmented Dickey-Fuller Test for Variables

LNGDPPC	Test Statistics	1% critical	5% critical	10% critical	p-value	Result
At level	-0.697	-4.273	-3.557	-3.212	0.964	Do not Reject
At first difference	-5.318*	-4.284	-3.562	-3.215	0.000	Reject Null Hypothesis
LNEXP	**Test Statistics**	**1% critical**	**5% critical**	**10% critical**	**p-value**	**Result**
At level	-2.832	-4.273	-3.557	-3.212	0.196	Do not Reject
At first difference	-5.273*	-4.284	-3.562	-3.215	0.000	Reject Null Hypothesis
LNIMP	**Test Statistics**	**1% critical**	**5% critical**	**10% critical**	**p-value**	**Result**
At level	-1.880	-4.273	-3.557	-3.212	0.641	Do not Reject
At first difference	-5.919*	-4.284	-3.562	-3.215	0.000	Reject Null Hypothesis
LNGCF	**Test Statistics**	**1% critical**	**5% critical**	**10% critical**	**p-value**	**Result**
At level	-1.683	-4.273	-3.557	-3.212	0.735	Do not Reject
At first difference	-8.021*	-4.284	-3.562	-3.215	0.000	Reject Null Hypothesis
LNLAB	**Test Statistics**	**1% critical**	**5% critical**	**10% critical**	**p-value**	**Result**
At level	-0.796	-4.284	-3.562	-3.215	0.955	Do not Reject
At first difference	-3.268***	-4.284	-3.562	-3.215	0.090	Reject Null Hypothesis

Note: * and * indicate significance at the 1% and 10% respectively.**

Table: 3 Results of Phillips-Perron Test for Variables

LNGDPPC	Test Statistics	1% critical	5% critical	10% critical	p-value	Result
At level	-0.697	-4.273	-3.557	-3.212	0.964	Do not Reject
At first difference	-5.318*	-4.284	-3.562	-3.215	0.000	Reject Null Hypothesis
LNEXP	**Test Statistics**	**1% critical**	**5% critical**	**10% critical**	**p-value**	**Result**
At level	-2.832	-4.273	-3.557	-3.212	0.196	Do not Reject
At first difference	-5.273*	-4.284	-3.562	-3.215	0.000	Reject Null Hypothesis
LNIMP	**Test Statistics**	**1% critical**	**5% critical**	**10% critical**	**p-value**	**Result**
At level	-1.880	-4.273	-3.557	-3.212	0.641	Do not Reject
At first difference	-5.919*	-4.284	-3.562	-3.215	0.000	Reject Null Hypothesis
LNGCF	**Test Statistics**	**1% critical**	**5% critical**	**10% critical**	**p-value**	**Result**
At level	-1.527	-4.273	-3.557	-3.212	0.798	Do not Reject
At first difference	-8.021*	-4.284	-3.562	-3.215	0.000	Reject Null Hypothesis
LNLAB	**Test Statistics**	**1% critical**	**5% critical**	**10% critical**	**p-value**	**Result**
At level	0.047	-4.273	-3.557	-3.212	0.995	Do not Reject
At first difference	-3.268***	-4.284	-3.562	-3.215	0.090	Reject Null Hypothesis

Note: * and * indicate significance at the 1% and 10% respectively.**

Table: 4 Johansen Co-integration Test Statistics

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**Critical Value (0.05)**	**Prob.****
None	0.622	68.264	69.818	0.066
At most 1	0.474	38.049	47.856	0.299
At most 2	0.335	18.108	29.797	0.558
At most 3	0.154	5.453	15.494	0.758
At most 4	0.008	0.266	3.841	0.605

Trace test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	**Eigenvalue**	**Max-Eigen Statistic**	**Critical Value (0.05)**	**Prob.****
None	0.622	30.215	33.876	0.128
At most 1	0.474	19.941	27.584	0.345
At most 2	0.335	12.654	21.131	0.484
At most 3	0.154	5.187	14.264	0.718
At most 4	0.008	0.266	3.841	0.605

Max-eigenvalue test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table: 5 Multivariate Granger Causality Based on Toda- Yamamoto Approach

VAR Granger Causality/Block Exogeneity Wald Tests					
Dependent Variable	**Independent Variable**				
	LNGDPPC χ^2 (5)	**LNEXP** χ^2 (5)	**LNIMP** χ^2 (5)	**LNGCF** χ^2 (5)	**LNLAB** χ^2 (5)
LNGDPPC	-	0.263 (0.998)	0.978 (0.964)	1.603 (0.900)	5.083 (0.405)
LNEXP	15.429* (0.008)	-	4.703 (0.453)	9.893*** (0.078)	17.219* (0.004)
LNIMP	8.856 (0.114)	20.512* (0.001)	-	3.548 (0.616)	8.241 (0.143)
LNGCF	40.994* (0.000)	12.136** (0.033)	7.509 (0.185)	-	44.079* (0.000)
LNLAB	93.418* (0.000)	70.658* (0.000)	173.519* (0.000)	44.911* (0.000)	-

Note: * and * indicate significance at the 1% and 10% respectively.**

Results for China

Table: 6 Results of Augmented Dickey-Fuller Test for Variables

LNGDPPC	**Test Statistics**	**1% critical**	**5% critical**	**10% critical**	**p-value**	**Result**
At level	-2.974	-4.309	-3.574	-3.221	0.155	Do not Reject
At first difference	-4.258**	-4.296	-3.568	-3.218	0.010	Reject Null Hypothesis
LNEXP	**Test Statistics**	**1% critical**	**5% critical**	**10% critical**	**p-value**	**Result**
At level	-1.483	-4.273	-3.557	-3.212	0.814	Do not Reject
At first difference	-5.378*	-4.284	-3.562	-3.215	0.000	Reject Null Hypothesis
LNIMP	**Test Statistics**	**1% critical**	**5% critical**	**10% critical**	**p-value**	**Result**
At level	0.394	-4.339	-3.587	-3.229	0.998	Do not Reject
At first difference	-3.942**	-4.284	-3.562	-3.215	0.022	Reject Null Hypothesis
LNGCF	**Test Statistics**	**1% critical**	**5% critical**	**10% critical**	**p-value**	**Result**
At level	-3.960**	-4.284	-3.562	-3.215	0.021	Reject Null Hypothesis
LNLAB	**Test Statistics**	**1% critical**	**5% critical**	**10% critical**	**p-value**	**Result**
At level	-3.303***	-4.284	-3.562	-3.215	0.084	Reject Null Hypothesis

Note: *, ** and * indicate significance at the 1%, 5% and 10% respectively.**

Table: 7 Results of Phillips-Perron Tests for Variables

LNGDPPC	**Test Statistics**	**1% critical**	**5% critical**	**10% critical**	**p-value**	**Result**
At level	-2.215	-4.273	-3.557	-3.212	0.465	Do not Reject
At first difference	-3.255***	-4.284	-3.562	-3.215	0.092	Reject Null Hypothesis
LNEXP	**Test Statistics**	**1% critical**	**5% critical**	**10% critical**	**p-value**	**Result**
At level	-1.587	-4.273	-3.557	-3.212	0.775	Do not Reject
At first difference	-5.378*	-4.284	-3.562	-3.215	0.000	Reject Null Hypothesis
LNIMP	**Test Statistics**	**1% critical**	**5% critical**	**10% critical**	**p-value**	**Result**
At level	-1.444	-4.273	-3.557	-3.212	0.827	Do not Reject
At first difference	-3.942**	-4.284	-3.562	-3.215	0.022	Reject Null Hypothesis
LNGCF	**Test Statistics**	**1% critical**	**5% critical**	**10% critical**	**p-value**	**Result**
At level	-2.547	-4.273	-3.557	-3.212	0.305	Do not Reject
At first difference	-3.922**	-4.284	-3.562	-3.215	0.023	Reject Null Hypothesis
LNLAB	**Test Statistics**	**1% critical**	**5% critical**	**10% critical**	**p-value**	**Result**
At level	-3.029	-4.273	-3.557	-3.212	0.140	Do not Reject
At first difference	-1.375	-4.284	-3.562	-3.215	0.848	Do not Reject
At second difference	-5.557*	-4.296	-3.568	-3.218	0.000	Reject Null Hypothesis

Note: *, ** and * indicate significance at the 1%, 5% and 10% respectively.**

Table: 8 Multivariate Granger Causality Based on Toda- Yamamoto Approach

VAR Granger Causality/Block Exogeneity Wald Tests					
Dependent Variable	**Independent Variable**				
	LNGDPPC χ^2 (5)	**LNEXP** χ^2 (5)	**LNIMP** χ^2 (5)	**LNGCF** χ^2 (5)	**LNLAB** χ^2 (5)
LNGDPPC	-	14.072* (0.015)	13.499* (0.019)	4.573 (0.470)	7.729 (0.171)
LNEXP	28.307* (0.000)	-	4.493 (0.480)	17.206* (0.004)	8.450 (0.133)
LNIMP	76.814* (0.000)	9.828*** (0.080)	-	43.442* (0.000)	50.790* (0.000)
LNGCF	26.857* (0.000)	20.975* (0.000)	30.847* (0.000)	-	46.769* (0.000)
LNLAB	15.325* (0.009)	4.303 (0.506)	9.874*** (0.078)	10.648*** (0.058)	-

Note: * and * indicate significance at the 1% and 10% respectively.**