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Testing the Export Led Growth Hypothesis in context of the Indian Economy A study from 1980 – 2020

By

Naga Lavanya Desiraju

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Faculty Advisor: Kotaro Yoshida

Abstract

The relationship between exports and economic growth has been analyzed by many empirical studies in the past. This paper examines the sources of economic growth for India for the period 1980 to 2020. It empirically investigates the relationships in the short run as well as the long run between exports and GDP, exports and GDP net exports. The latter half of the paper focuses on assessing the impact of diversification of exports on the growth of GDP, instead of just considering the level of exports. Using the inverse of the Herfindahl index to construct the diversification index, both short and long-run relationships between diversification and GDP growth are tested. Relevant variables such as Foreign direct investment, Capital formation, Human Capital (Secondary Enrolment ratio), etc. are used in the analysis. The following hypotheses are tested in this paper. (i) whether exports, imports, and GDP have a long-run relationship using the Johansen cointegration test; which showed no evidence of a long term relationship between exports and GDP growth, using a variety of control variables (ii) whether exports and GDP are cointegrated using the Breitung test; which also provided evidence against existence of a long term relationship (iii) if export growth Granger causes GDP growth; where through the Granger causality test, it was found that exports granger cause GDP growth but GDP growth does not granger cause Export growth (iv) whether diversification of exports has an impact on the growth of GDP; which through the use of the inverse of the Herfindahl index, evidence was found against the growth of GDP through diversification of exports (v) whether factors such as human capital and foreign investments cause an impact on GDP growth, where it was found that human capital and FDI have a positive impact on the GDP growth. Impulse response functions are also drawn for change in exports and diversification of exports, to assess the impact of macroeconomic shocks on the economic system, where it can clearly be seen that a one SD shock in exports, caused a change in the GDP, which eventually died out, indicating a more short- term impact and not long-term impact.

Section I: Introduction

The government, led by Prime Minister Pandit Jawaharlal Nehru, after India's independence from British rule, followed mostly in the footsteps of the socialist Russian government. Conservative policies in terms of international trade were adapted leading to a mostly closed economy, till the late 1980s. The high but fragile growth of GDP during *1988-1991*, is most commonly cited as the cause and culmination of the economic crisis that occurred in June 1991. Resulting from a twin deficit, a deficit in the balance of trade, due to the swelling of imports since 1985 and a huge fiscal deficit, the economic crisis of 1991 called for a variety of changes in the Indian economy to ensure recovery.

The PV Narasimha Rao-led Congress government, under the auspices of the finance ministry led by Dr. Manmohan Singh, came up with the Liberalization, Privatisation, and Globalisation (LPG) reforms. This led to the opening up of the economy, and exports started increasing post these reforms. A lot of economists attribute the growth that occurred in the Indian economy in the 90s to these measures, and specifically to the rise in exports.

Likewise, after the historic win of PM Narendra Modi in the 2014 elections, the Bharatiya Janata Party-led National Democratic Alliance propagated the importance of export-led growth. Special initiatives including setting up and strengthening the special economic zones

were done. (Through the amendment in 2019 to Special Economic Zones Act 2005). Nationwide initiatives were also launched by the government in August 2021 to boost exports and reach the 1 trillion Dollars target of exports in merchandise, among many other commodities.

It has been argued that the export-led growth hypothesis held true for middle Eastern economies such as Turkey. (Taban and Akhtar, 2006). The same was proved in small economies such as the Caribbean islands. There is little to no evidence in the context of large economies such as India, showing that export growth caused economic growth. Sharma and Panagioditis (2005) strengthen this claim using rigorous statistical techniques such as the Johansen cointegration test, Breitung cointegration test and Impulse response functions of the Vector Auto Regression model created using a panel data of variables such as unemployment, exports, imports, GDP and capital formation in India.

While exploring the idea that export growth causes economic growth in economies, an important concept is the composition of the export basket. Historically, more developed nations tend to have technologically sophisticated exports whereas developing nations have their exports majorly comprised of labor-intensive goods and services. (Anand, Kochhar, Mishra (2015)). That being said, the Indian export composition has changed greatly in the past 4 decades. The idea that these changes in composition might contribute to economic growth has also been explored. Anand, Kochhar, and Mishra (2015) in their paper analyze the level of diversification of Indian exports and also help identify which exports can drive growth in the future in the Indian Economy, and ensure sustainability in the growth.

The idea that export growth is one of the major determinants of output growth (viz. the export-led growth (ELG) hypothesis) is a recurrent one. Export growth can affect output growth through positive externalities on non-exports, through the creation of more efficient management styles, improved production techniques, increased scale economies, improved allocative efficiency, and a better ability to generate dynamic comparative advantage. (Sharma et al 2005). This was clearly seen in the paradigm shift from import substitution industrialization to export led growth regime in the Four Asian tiger economics (Hong Kong, Singapore, South Korea and Taiwan). Starting in early 1970s and up to 1985, these countries saw the adoption of export led growth strategies and it is deemed that this strategy led to their subsequent economic success.

Razmi and Hernandez (2011) in their paper analyze the validity of the export led growth strategy for East Asian economies and discuss the impacts of a financial crisis on these economies following ELG strategy. Statistical evidence is provided proving that for these economies, the ELG strategy is sustainable both at the firm level as well as at the macro level. Kokko (2002) also analyzed the ELG in East Asian economies and how they can be adapted to growing European economies at the time. This paper also provides evidence supporting the ELG hypothesis in East Asia and how the same had happened in the late 80s in Germany. Following suit of the Four Asian tigers, the Mexican economy opened itself up in late 80s and eventually entered Free trade agreements, causing a huge rise in the Economic growth.

Given the above, and because of the focus given to export in the development plans of India, this paper aims to investigate the relationship between export growth and economic growth for India in the period 1980 to 2020, while also considering the impacts of diversification of exports. The paper is structured as follows: Section II provides an overview and analysis of existing literature on these subjects and includes the contributions of this work in the same. Section III provides some facts on the relationship between exports and economic growth. Section IV presents the empirical evidence and the results obtained from the statistical analysis conducted in the Indian context. It also includes the empirical evidence of export diversification impacting growth. Finally, Section V draws a few conclusions and outlines possible interventions to induce growth in the Indian Economy.

Section II: Literature Review

This paper, using the international trade data from 1990 to 2021, aims at exploring the impact of exports on Indian economic growth and tests if the export-led growth hypothesis holds true in the case of India. Export-led growth hypothesis refers to the policies when a country seeks economic development by engaging in international trade.

History of the Indian Economy

Aravind Panagariya's work in the IMF, specifically in the paper "India in the 1980s and 1990s: A Triumph of Reforms (2004)" identifies and outlines the various reasons why the Liberalization-Privatisation-Globalization (LPG) policy helped India recover from the economic crisis, and provides strong evidence supporting the ELG hypothesis. Citing systematic evidence, Panagariya in the paper argued that low and/or declining barriers to trade constitute a necessary condition for sustained rapid growth. Using a similar approach to analyze the impact of tariffs on exports, I wish to extend the analysis to the Modi era as well, finding how the trade patterns have changed in the past 8 years.

Statistical Methodologies

The fundamental analysis in testing the ELG hypothesis would be to find a cointegrating relationship between Exports and GDP over time. But before finding this relationship, there has to be a preliminary check about which variable causes the other one to change. The methodology used by Abhijit Sharma and Theodore Panagiotidis in the paper "An Analysis of Exports and Growth in India: Cointegration and Causality Evidence (1971–2001)" provides a concrete framework superior in terms of robustness of statistical models, in analyzing the exports and the ELG hypothesis. Using a similar approach to finding cointegrating relationships, this paper shall include a model with more variables to account for changes in the GDP.

Export growth and GDP growth relationships

Many studies have found some relationship between exports (or export growth) and output (GDP) levels (or output growth). In the case of developing countries, a lot of work originally focused on correlations between exports and income (Emery, 1967; Kravis, 1970; Maizels, 1968), moving on to studies with limited samples (Balassa, 1978), followed by studies focusing on aggregate production functions, that included exports as an explanatory variable (Feder, 1983). There have been studies on the existence of a threshold effect, as well (Kavoussi, 1984; Kohli and Singh, 1989; Moschos, 1989). These have been bolstered by causality tests (Chow, 1987; Jung and Marshall, 1985). The methods used in this analysis

have been influenced by the work of Granger (1969, 1988), Sims (1972), Engle and Granger (1987), Johansen (1988, 1995), and Johansen and Juselius (1990), among others.

Export diversification

This points toward export diversification as a great option for the developing nations to ensure export growth persists and sustains. Studying the importance of diversification, a paper by the IMF (2015), "Make in India: Which Exports Can Drive the Next Wave of Growth?" written by Rahul Anand, Kalpana Kochhar, and Saurabh Mishra, also provides evidence indicating the favorable impacts diversification of exports can create. In this paper, the diversification analysis conducted by IMF (2015) paper has been used as a basis, that will help in ensuring that the impacts of diversification of exports in the rise of exports are not misconstrued as those which are causing the rise in the GDP.

Sannassee, Seetanah, and Lamport (2014), "Export diversification and Economic Growth: The case of Mauritius" gives an insight into the importance of diversification of exports for developing economies. This paper uses the statistical framework Sannassee, Seetanah and Lamport employed to find the impact of diversification of exports on the Indian economy along with evidence and theory from Anand, Kochhar, and Mishra (2015).

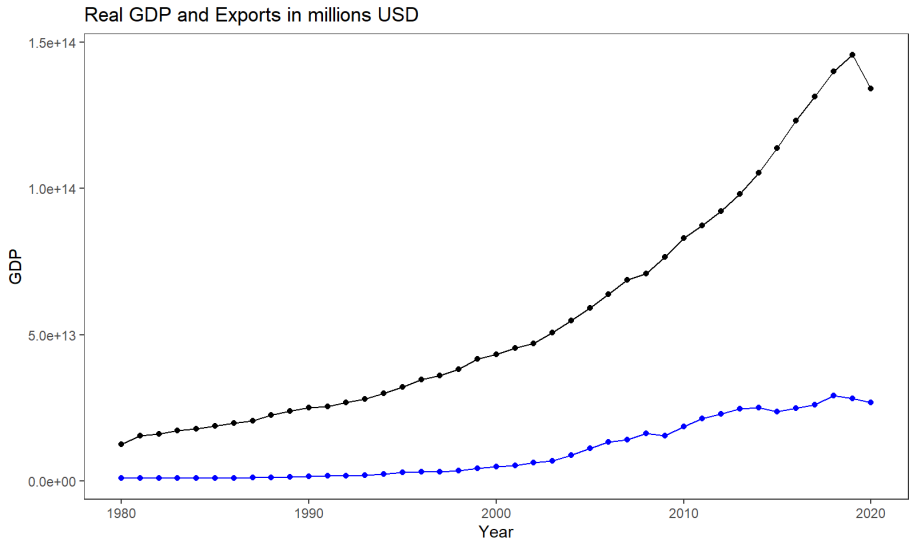
Section III: Data description and relationship between exports and growth

The data relating to economic variables in India has been obtained largely from the aggregates created by the Reserve Bank of India, from sources including the World Bank and the RBI itself. These include Gross Domestic Product, Foreign Direct Investments, Gross Domestic Capital Formation rate, Secondary Enrolment ratio, and the rate of Inflation. Data on exports and imports have been obtained from UN COMTRADE, while the Herfindahl Index was obtained from the Department of Commerce, Ministry of Finance, and the Government of India.

It is also imperative to note that GDP is taken at constant prices in this paper. Exports are adjusted using the relevant deflators to permit intertemporal comparisons. The unit price index has been used for exports and the GDP deflator is used for variables such as foreign direct investment.

It is very often argued that the level of exports in an economy impacts economic growth. Subrahmanian and Chatterjee (2020) provide stylized facts and evidence showing that growth was closely linked to exports in India between 1990 and 2020. To analyze the same, exports and GDP have been plotted together. The graph (Graph 1) shows that both of these variables increased over time but the rate of increase is different.

Graph 1: Indian GDP and Exports from 1980 to 2020

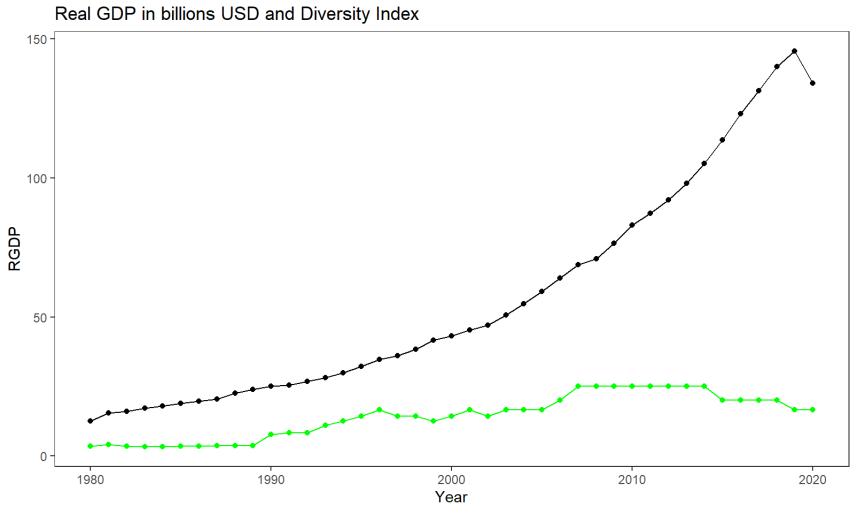


Not only does the level of exports, but also evidence suggests diversification of exports has an impact on the economy. Recent literature has found that countries appear to diversify in terms of production and exports as they grow. These findings compel an investigation into the relationship between the diversification of exports and the growth rate of GDP. Diversification is indicated by the inverse of the Herfindahl index in this paper, as done by Sannassee, Seetanah, and Lamport (2016). Graph 2 plots GDP as well as the Diversity index over time. We can see that they are positively correlated. The Indian economy has not reached the level of diversification of developed economies as seen from the upward trend in diversification.

The Herfindahl index is a measure of market concentration, but when inverted, it is an "effective number of" whatever grouping you might be interested in. The inverse of Herfindahl can be interpreted as, "Individual sample points are distributed across groups in such a way that they are as concentrated as they would be if divided across [HHI value] groups evenly."

Hence, in this case the inverse of the HHI would provide a diversity index in a way that, "Each product participating in the export basket in India is distributed across different groups (such as disappearing products, classic products, and emerging products) in a way that they are as concentrated as they would be if they were present across the product groups evenly.

Graph 2: Indian GDP and Diversity Index from 1980 to 2020



Section IV: Empirical Analysis

Before conducting statistical analysis, all the series are converted into stationary series. Differencing these series, helped to convert the series into stationary series. The ADF tests are conducted on these series to ensure stationarity. The test intercepts are obtained by:

$$\Delta x_t = a_0 + b_0 x_{t-1} + \Sigma c_0 \Delta x_{t-1} + w_t$$

where Δ is the difference operator, a_0, b_0 and c_0 are coefficients to be estimated, x is the variable whose time series properties are examined and w is the white-noise error term. The lags of the dependent variable used to obtain white-noise residuals are determined using Akaike Information Criterion (AIC). The null and the alternative hypotheses are respectively $b_0 = 0$ (series is non-stationary) and $b_0 < 0$ (series is stationary). The results are in Table 1.

Table 1: The results from the Augmented Dickey-Fuller test

Data	P-value	Dickey-Fuller Intercept
GDP	0.02589	-3.8486
Exports	<0.01	-1.9071
Imports	0.0297	-3.814
Capital Formation	0.02361	-3.9016
Foreign Direct Investment	<0.01	-4.2746
Inflation	<0.01	-6.5211
Exchange rate	0.03352	-3.7562
Herfindahl Index	<0.01	-5.0127

To ensure the viability of the statistical analysis, and check that Export growth is not impacted by the growth in GDP, a Granger causality test is done. The results are in Table 2 and indicate that export growth granger causes GDP growth but not the other way around.

Table 2: Results from the Granger Causality test

Equation	P-value
GDP ~ Exports	0.00735
Exports ~ GDP	0.34

The next step in the analysis is to check if there is a long-term relationship between exports and economic growth. To do the same, we check if there are any cointegrating relationships between the variables. Two tests have been conducted here. The Johansen cointegration test has been conducted. Following a multivariate approach, the cointegration hypothesis between output (GDP), exports, imports, FDI, Capital formation, Inflation, and the exchange rate between Indian Rupee and the US Dollar. These variables have been chosen for analysis for the following reasons. Firstly, Riezmann et al. (1996) with robust analysis suggested that imports are an important variable while considering causality between exports and growth, and omission of imports could lead to biased results. Second, given that there is an ideology that export-led growth can lead to lessening the problems of foreign exchange constraints, the variables FDI and exchange rate with the US Dollar have been included. Third, given that the export-led growth hypothesis puts forth that there might be a net positive impact on the economy in improving the exports of the economy, even if it has potential costs for the economy, it was important to include an indicator of the domestic economy which has been done in the form of inflation.

Table 3: Results from the Johansen Test for each possible pair of variables

Pairs of variables	No. of lags in VAR	Trend assumption	Null hypothesis	Trace statistic	Maximal eigenvalue statistic
GDP, Exports	3	1	$r = 0$ $r \leq 1$	29.08 8.1	0.4416105
GDP, Imports	3	2	$r = 0$ $r \leq 1$	32.96 13.90	0.4111640
GDP, CF	3	1	$r = 0$ $r \leq 1$	26.78 6.09	0.4371433
GDP, FDI	4	1	$r = 0$ $r \leq 1$	33.99 12.91	0.4432898
GDP, Inflation	3	1	$r = 0$ $r \leq 1$	36.54 13.95	0.4660171
Exports, Imports	2	3	$r = 0$ $r \leq 1$	15.67 2.43	0.3076824
Exports, CF	2	1	$r = 0$ $r \leq 1$	25.98 6.64	0.4155637
Exports, FDI	4	1	$r = 0$ $r \leq 1$	23.44 6.63	0.37302111
Exports, Inflation	3	1	$r = 0$ $r \leq 1$	27.02 5.76	0.4459272
Imports, CF	3	2	$r = 0$ $r \leq 1$	28.13 7.73	0.4326183
Imports, FDI	3	3	$r = 0$ $r \leq 1$	35.75 15.55	0.4294327
Imports, Inflation	4	2	$r = 0$ $r \leq 1$	13.57 30.82	0.3807056
CF, FDI	3	1	$r = 0$ $r \leq 1$	23.31 5.25	0.3943960
CF, Inflation	2	1	$r = 0$ $r \leq 1$	28.54 5.81	0.4681261
FDI, Inflation	3	1	$r = 0$ $r \leq 1$	30.40 11.75	0.4044348

The Johansen test used here has a constant term, and no trend term. The null hypothesis for both forms of test are that there are no cointegrating equations. The difference is in the alternate hypothesis: the trace test alternate hypothesis is simply that the number of cointegrating relationships is at least one (shown by the number of linear combinations). The maximum eigenvalue test has an alternate hypothesis of $K_0 + 1$ (instead of $K > K_0$). Rejecting the null hypothesis in this situation is basically stating there is only one combination of the non-stationary variables that gives a stationary process. The trace aproach is used here. The lag length in this test was determined using the Akaike Information Criterion (AIC).

The Johansen procedure shows that there are no cointegrating relationships among the variables, when bilateral relations are looked at, as well as the for the VAR model which consists of the variables. That indicates that there is no long-term relationship between these variables.

To check for cointegrating relationships using the Johansen test, one should look at the critical values indicated as 10 pct, 5 pct and 1 pct in the below table, and compare it with the test statistic. Starting with the bottom most row, with R=0 (The rank of the matrix that will help form stationary series, or essentially the number of cointegrating relationships is 0). If the value of the test statistic is greater than the value of the test statistic, we stop, and deduce that there are no cointegrating relationships. We can clearly see that this is the case for the test conducted here.

Table 4: Results from the Johansen Test (GDP, Exports, Imports, FDI, Inflation, Capital formation, exchange rate)

	Test	**10 pct**	**5 pct**	**1 pct**
R <= 5	7.83	7.52	9.24	12.97
R <= 4	32.12	17.85	19.96	24.60
R <= 3	61.63	32.00	34.91	41.07
R <= 2	95.84	49.65	53.12	60.16
R <= 1	138.84	71.86	76.07	84.45
R = 0	223.17	97.18	102.14	111.01

The same test was also conducted taking all the variables the same as above, but GDP less exports in place of GDP to avoid the ‘accounting bias’. The results from the test are very similar to that of the previous test and indicate no presence of a long-term cointegrating relationship.

Table 5: Results from the Johansen Test (GDP net exports, Exports, Imports, FDI, Inflation, Capital formation, exchange rate)

	Test	**10 pct**	**5 pct**	**1 pct**
R <= 5	5.63	7.52	9.24	12.97
R <= 4	18.11	17.85	19.96	24.60
R <= 3	44.36	32.00	34.91	41.07
R <= 2	84.13	49.65	53.12	60.16
R <= 1	140.91	71.86	76.07	84.45
R = 0	242.83	97.18	102.14	111.01

As the Johansen test is parametric and requires us to pick the lag lengths arbitrarily, the results might be slightly skewed. In order to eliminate that bias, another test called the Breitung cointegration test is conducted in line with the analysis conducted by Sharma et. Al. (2005). This test was also conducted twice as above, once with GDP as a variable, and once with GDP less Exports as a variable.

The Breitung cointegration test is a unit root test without specification of the short-run dynamics. The variance ratio statistic is similar to the test statistic suggested by Kwiatkowski et al. (J. Econom. 15 (1992) 159) but assumes non-stationarity under the null hypothesis. A straightforward generalization of the variance ratio statistic, which is presented below was suggested by Breitung et. Al (2002), which can be used to test the cointegration rank in the spirit of Johansen test. The results from the Breitung cointegration test uses a similar format to the Johansen test in terms of specification. Breitung's variance ratio is given by the formula: $Rho = \Sigma(cumsum(Y)^2)/\Sigma(Y^2)/T$, where T is the length of the vector Y.

In this case, Y is the vector {GDP, Exports} for the first test and {GDP less exports, Exports} for the second.

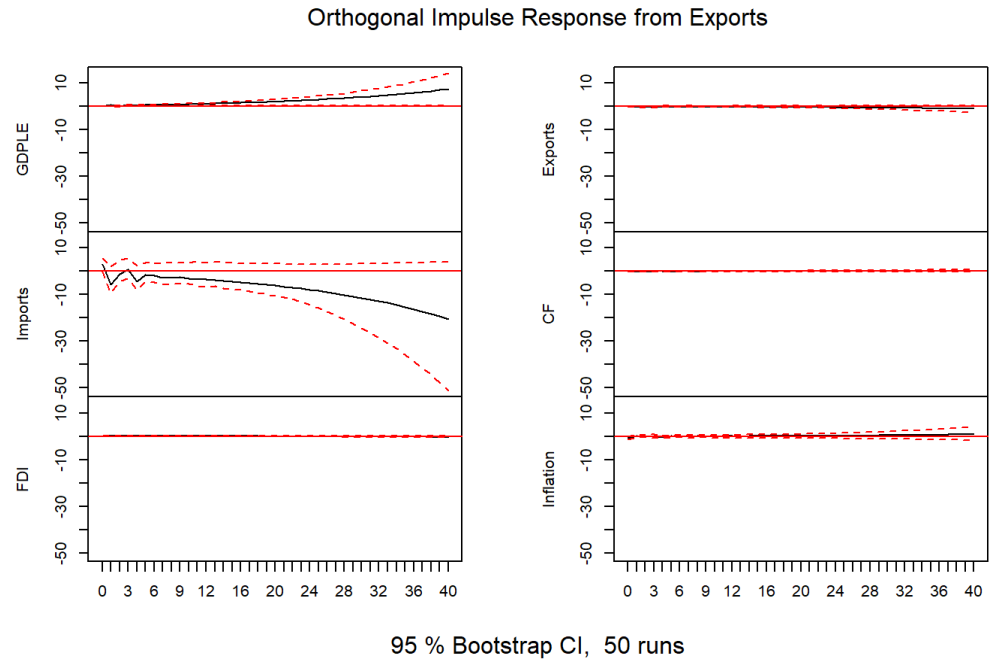
Table 5: Results from the Breitung Cointegration Test

Variable	P-value	Rho-value
GDP	0.006007	0.41678
GDP less Exports	0.001247	0.56831

The p-value is less than 5% in both cases, and hence the null hypothesis that there is a cointegrating relationship has to be rejected. Both the cointegration tests, hence provide evidence that there is no long-term cointegrating relationship among the variables and hence bolster the claim against the Export-led growth hypothesis in India.

The next step in the analysis was to create impulse response functions. These were created by using the VAR model employed in the Johansen test, by converting them in levels into a Vector Error correction model or a VECM, and then employing one standard deviation shocks. Also, it is important to note that the growth of the variables, with respect to the last period was used in this exercise. For example, GDP in this exercise for 2017 is actually the growth rate of GDP from 2016 to 2017. Impulse response functions help understand the reaction of the system to a macroeconomic shock in the variable of interest. In this case, it will help understand the impact of a one Standard deviation shock in a variable on all the other variables. The most important impulse response to observe is the impact of a change in exports on GDP, as it will clearly depict if the relationship between GDP growth and export growth, if there exists any is short term or long term. Graph 3 plots the orthogonal impulse response function of a change in exports on GDP less exports. The other impulse response plots are posted in the appendix.

Graph 3: The impulse response from Exports on the other variables



From the plot, we can see that when there is one Standard deviation shock in exports, the impact on the other variables, is not statistically significant, except in the case of imports. As India closely monitors the balance of trade and tries not to let it go down too much into deficit, usually an export-promoting environment is accompanied by one that of import restriction, causing a fall in the imports. It is important to note that the impact on GDP less exports here, is negligible too, consistent with the cointegration tests we conducted and also this shows the lack of a short-term relationship as well.

The impact of export diversification on Indian exports

The next set of analyses shows the relationship between the diversification of exports and economic growth. To do the same, as a preliminary step, the Diversification index and GDP are plotted together (Graph 2). We can see that, overall, there has been an upward trend in the GDP, whereas the diversification has been very volatile. Even so, the level of sophistication of the export basket has been varying over time, and efforts have been made to diversify exports so as to mitigate the risks of losing major revenues in case tariffs and quotas are employed by a few nations.

Sarin and Mahapatra (2020) examined and reviewed the full text of eighty-eight important and relevant research articles published in various scholarly journals related to export diversification and economic growth. Many articles provided robust evidence about the positive impact of export diversification on economic growth. The paper recommended using time series analysis and considering long time periods. Anand, Kochhar, and Mishra (2015) analyzed the impact of diversification of exports in terms of products as well as trading partners. In the paper, they also assessed how export performance is dependent on: (i)

diversification across destinations, products, and services (ii) composition of the export basket measured by technological content, quality, sophistication, and complexity of exports, and (iii) how closely related a country's goods and services exports are to globally-traded products and services.

As we can see from many research papers, there are various ways to perform an empirical analysis examination of a dynamic relationship between export diversification and growth. In this paper, a dynamic time series framework has been applied in the period 1980 to 2020, in India. This will also help to analyze the causality between export diversification and economic growth, both in the short run and long run. For the short run, a multivariate regression model has been employed to understand the relationship, and for the long run, a cointegrating relationship is found.

The multivariate regression model can be written as follows:

$$\mathbf{Y \sim A_1X_1 + A_2X_2 + \ldots + intercept}$$

Where Y – GDP less exports, X_i – Diversity index, trade openness, FDI, Gross domestic capital formation, Secondary enrolment ratio.

The results from this analysis revealed no relationship between export diversification and economic growth for India. Trade openness, human capital, and capital formation are found to significantly contribute to economic performance.

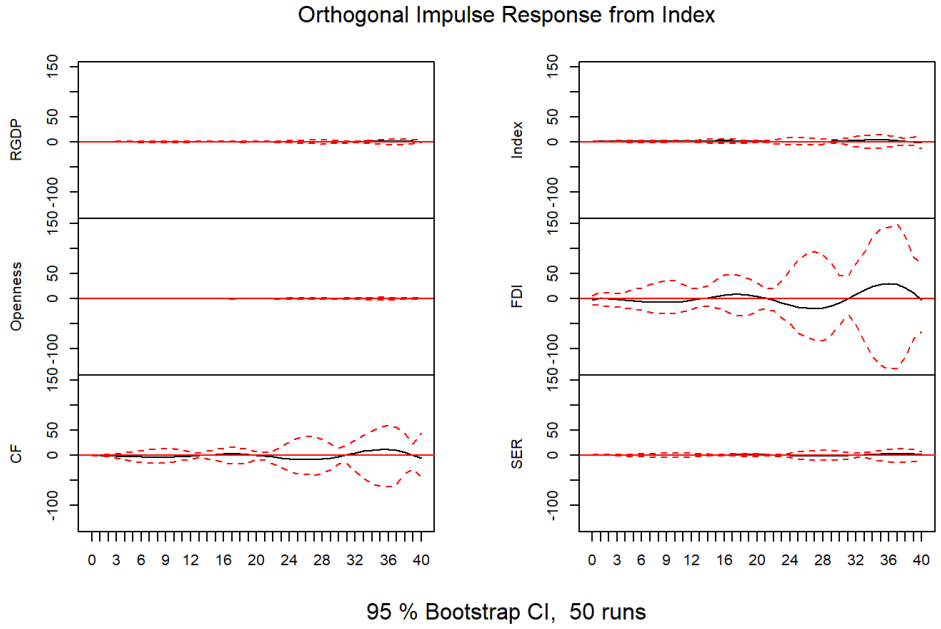
Table 6: The results from multivariate regression

	Estimate	Standard Error	t-value	Pr (< | t |)
Intercept	-3.09382	1.10620	-2.797	0.00833**
Index	-0.03091	0.05178	-0.597	0.55436
Trade openness	-0.06523	0.03025	-2.156	0.0381*
FDI	0.35071	0.25574	1.371	0.17898
Capital formation	0.07925	0.01486	5.333	5.85e-06***
Secondary enrolment ratio	0.16450	0.03032	5.425	4.42e-06***

Significance codes:
'***' - 0.001 '**' 0.01 '*' 0.05 '.' 0.1

Similar to the method used above to test the short term impact of a change in one variable on the other variables in the model, impulse response functions are used. The impulse response function is drawn for one Standard deviation change in the diversification index to assess the change in GDP less exports. We can see that the diversification index did not cause any statistically significant change in the GDP, but had a divergent impact on domestic capital formation and Foreign direct investment in India. This is most likely due to the impact of the Exports and imports on the money markets in India. Due to international trade, specially exports, there is a rise in the income of the people engaged in the trades, and this contributes to capital formation in the country. Coupled with higher interest rates in India as compared to most western economies, India's rise of international trade participation also led to an increase in the Foreign Direct Investments.

Graph 4: The impulse response function for one SD change in the Diversification index



Since short term relationships have been established using the Impulse response functions, long term relationships are now established. To test if there exist long term relationships, the Johansen cointegration test is conducted. For this test, the methodology is the same as for the ones conducted for export growth and GDP. The table 7 describes the test results using a VAR model created using all the variables in the analysis above (Diversification index, trade openness, Capital Formation, Secondary enrollment ratio, and FDI)

Table 7: The results from the Johansen cointegration test

	Test	10 pct	5 pct	1 pct
R <= 5	5.63	7.52	9.24	12.97
R <= 4	18.11	17.85	19.96	24.60
R <= 3	44.36	32.00	34.91	41.07
R <= 2	84.13	49.65	53.12	60.16
R <= 1	140.91	71.86	76.07	84.45
R = 0	242.83	97.18	102.14	111.01

From the results of the above model, we can see that there are no cointegrating relationships. Hence, there is no long-term relationship found between these variables, when all of them are analyzed together.

Now, the same test has been conducting for all possible pairs of variables. The results of this analysis are in the underlying table. The lag lengths for the underlying VAR model for this test are decided using the Akaike Information criterion (AIC).

Table 8: Results from the Johansen Test for each possible pair of variables

Pairs of variables	No. of lags in VAR	Trend assumption	Null hypothesis	Trace statistic
GDP, Diversification Index	2	1	r = 0 r ≤ 1	28.35 4.03***
GDP, Openness	4	2	r = 0 r ≤ 1	24.50 4.23**
GDP, FDI	4	1	r = 0 r ≤ 1	28.74 5.99**
GDP, Capital Formation	3	2	r = 0 r ≤ 1	23.89 4.00**
GDP, Secondary Enrolment Ratio	3	3	r = 0 r ≤ 1	24.76 5.75**
Diversification Index, Openness	2	2	r = 0 r ≤ 1	9.18 4.20**
Diversification Index, FDI	3	1	r = 0 r ≤ 1	14.03 3.63***
Diversification Index, Capital formation	4	1	r = 0 r ≤ 1	17.20 5.26**
Diversification Index, Secondary Enrolment Ratio	3	3	r = 0 r ≤ 1	9.05 2.51***
Openness, FDI	3	2	r = 0 r ≤ 1	31.69 2.47***
Openness, CF	3	1	r = 0 r ≤ 1	24.35 4.73**
Openness, SER	4	1	r = 0 r ≤ 1	17.52 2.82***
CF, FDI	3	1	r = 0 r ≤ 1	26.45 2.75***
FDI, SER	2	3	r = 0 r ≤ 1	18.30 4.58**
CF, SER	3	1	r = 0 r ≤ 1	16.10 7.34***

Significance codes:
'***' - 0.001 '**' 0.01 '*' 0.05 '.' 0.1

Looking at the results from the above bilateral relationships as well, we can see that there is no evidence of a long term cointegrating relationship found here, as at 5% level of confidence, we can see that all the combinations of variables show no cointegrating relationships (R=0).

Section V: Conclusions and Policy recommendations

In this study, we test the export-led growth (ELG) hypothesis for the case of India as well as assess the impact of diversification of Indian exports on the economic growth, using different approaches and employing a robust data set spanning over 40 years. Most studies conducted so far on this topic examine the data for about 5-10 years after LPG in 1991. But this study examines data for a period of ten years before the reform and about 30 years after. Hence, it is better able to show the effects of LPG on exports and output growth in the years following the implementation of the policy. Both short and long-run relationships are examined by employing the Johansen cointegration test and Breitung's cointegration test.

Taking in the footsteps of Sharma et. Al (2005), a Breitung cointegration test is employed to avoid the problem of picking the lag lengths arbitrarily. The Johansen test results for the VAR model consisting of all relevant variables, as well as all possible pairs of variables showed that there were no cointegrating relationships present. The same results were seen by rejecting the null hypothesis in the Breitung cointegrating test indicating there were no cointegrating relationships.

The following hypotheses are investigated in this paper. (i) whether exports, imports, and GDP have a long-run relationship using the Johansen cointegration test; (ii) whether exports and GDP are cointegrated using the Breitung test; (iii) if export growth Granger causes GDP growth; (iv) whether diversification of exports has an impact on the growth of GDP and ; (v) whether factors such as human capital and foreign investments cause an impact on GDP growth.

In the next step, the concept of impulse response functions has been used to further investigate how the system responds to a shock in exports. This approach shows the effect of one Standard deviation shock on the economic system. The VAR model which was built to conduct the Johansen test, was converted to a Vector Error correction model or VECM which was used to create the IRFs. The IRFs show that shocks in exports did not cause a significant change in GDP or GDP less exports.

The limitations of this methodology include firstly the problems that arise from using the Johansen test. There has been research that proved that Engle-Granger test is more robust than the Johansen test in many cases, in the sense that it performs better even when a few assumptions are altered. The large sample property of the Johansen test is also of concern, as the sample taken over time here has only 40 observations per variable. It also includes the issues that arise with the use of Impulse response functions employed on growth of the variables such as GDP, Exports, Imports, etc. Although the impulse response functions show the impact of a macroeconomic shock on the system, they do not help decompose the forecast error variance. The forecast error variance decomposition would help understand the contributions from various exogenous shocks at once, instead of IRFs which show the reaction to a shock in one variable in this case.

For the effects of diversification of exports on the Indian economy, both short-term and long terms relationships are tested. The analysis does not support the existence of a short-term or long-term relationship between the diversification of exports and economic growth. The analysis was done by trying to find correlation among the variables, as well as cointegration. The impulse response functions showed that a one standard deviation shock to the

diversification index, did not cause a significant response in the GDP growth rate. Through the Johansen test conducted on the VAR model consisting all relevant variables, as well as all possible pairs, also came up with no evidence supporting existence of a cointegrating relationship. The results from the basic multivariate regression model did indicate that the change in the diversification index caused a significant change in FDI and Gross Domestic capital formation in the short run. There were no statistically significant effects found in the long run.

All these results indicate towards India being not very export led in terms of its growth strategy. There has been evidence proving that India is still is an import-substituting economy (Kochhar et al (2015)), despite taking drastic measures during and since the early 1990s to promote exports.

It is said that the current as well as the erstwhile government's steps towards building better Special Economic Zones and promoting the Make in India campaign did cause a rise in exports. This rise in exports did not contribute significantly cause an impact on the growth of the Gross domestic product, according to both the short run and long run tests conducted in this paper.

Kochhar et Al. (2015) using long term data explains that there is a great need for India to diversify its product indices more so than trade partners, towards more technologically sophisticated ones, in order to compete with Export-led countries such as China and Vietnam, to remain globally competitive. Research by the International Monetary funds, over time has shown that countries with export baskets closely correlated to the globally trade goods, fare well in causing economic growth due to exports. The Indian export basket is still not enough closely correlated to the globally traded goods to be able to make significant strides in causing changes in the GDP of the country.

While a lot of policies in India such as Make in India, the dedication of New Special Economic Zones, increasing the number of export processing zones, Merchandise Exports from India Scheme (MEIS Scheme), Duty Drawback Scheme, Interest Equalization scheme (IES) exist, there is a lack of proper implementation of them. The schemes also do not take into consideration the fact that India faces issues such as low elasticity of demand, lack of access to financial services among the poor, corrupt bureaucracy, barriers to market entry, inadequate infrastructure, and lack of skilled manpower. In order to reap the true benefits of the policies, implementation has to be improved and human capital needs to be enhanced. Investing in education, research and development, and finding ways to provide skill-oriented training to the youth step in the right direction. Along with that, maintaining cordial relationships with trading partners, ensuring a stable financial environment in the country, and making financial facilities more accessible to the rural population are vital.

Bibliography

Bhagwati, Jagdish, "Directly Unproductive Profit Seeking (DUP) Activities," Journal of Political Economy 90 (1982):988–1002

Breitung, Jörge, "Nonparametric Tests for Unit Roots and Cointegration," Journal of Econometrics 108 (2002):343–64.

Cadot, O., C. Carrère and V. Strauss-Kahn (2011a), "Export diversification: What's behind the hump?", The Review of Economics and Statistics 93(2): 590-605

Chow, Peter C. Y., "Causality Between Export Growth and Industrial Development: Empirical Evidence from the NICs," Journal of Development Economics 26 (1987):55–63.

Darrat, Ali F., "Are Exports and Engine of Growth? Another Look at the Evidence," Applied Economics 19 (1987):277–83.

DGCIS (various issues), Monthly Statistics of the Foreign Trade of India: Vol. I Exports (Annual Number), Directorate General of Commercial Intelligence and Statistics, Ministry of Commerce, Calcutta: Government of India Press.

Dhawan, Urvashi and Bagala Biswal, "Re-examining Export Led Growth Hypothesis: a Multivariate Cointegration Analysis for India," Applied Economics 31 (1999):525–30.

Greenaway, D., W. Morgan and P. Wright (1999), "Exports, export composition and growth", Journal of International Trade and Development 8(1): 41-51.

Gutiérrez-de-Piñeres, S. A. and M. Ferrantino (1997), "Export diversification and structural dynamics in the growth process: The case of Chile", Journal of Development Economics 52(2): 375-391.

Herzer, D. and F. Nowak-Lehmann (2006), "What does export diversification do for growth? An econometric analysis", Applied Economics 38(15): 1825-1838.

Jansen, M., Jallab, M. S., & Smeets, M. (2014). *Connecting to Global Markets: Challenges and Opportunities: Case Studies (WTO Dispute Settlement: One-Page Case Summaries)*. World Trade Organization.

Johansen, Søren, "Statistical Analysis of Cointegration Vectors," Journal of Economic Dynamics and Control 12 (1988):231–54.

Joshi, Vijay and I. M. D. Little, 1994, India: Macroeconomics and Political Economy: 1961– 91, Washington, DC: World Bank.

Kohli, Inderjit and Nirvikar Singh, “Exports and Growth: Critical Minimum Effort and Diminishing Returns,” Journal of Development Economics 30 (1989):391–400

Panagariya, A. (2004). India in the 1980s and 1990s: A Triumph of Reforms.

Panagariya, Arvind, 1990, “Indicative Planning in India: Discussion,” Journal of Comparative Economics 14, 736–74

Riedel, James, “Trade as the Engine of Growth in Developing Countries, Revisited,” Economic Journal 94 (1984):56–73.

Riezmann, Raymond, Charles H. Whiteman, and Peter M. Summers, “The Engine of Growth or Its Handmaiden? a Time-Series Assessment of Export-Led Growth,” Empirical Economics 21 (1996):77–110.

Sharma, A. and T. Panagiotidis (2005), “An analysis of exports and growth in India: Cointegration and causality evidence (1971-2001)”, Review of Development Economics (9)2: 232-248

Srinivasan,T. N.,“Neoclassical Political Economy, the State and Economic Development,” Asian Development Review 3 (1985):38–58

SSRN Electronic Journal. https://doi.org/10.2139/ssrn.878866

Wallack, Jessica, 2003, “Structural breaks in Indian Macroeconomic Data,” Economic and Political Economy, October 11, 4312–4315