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Exports of manufactured goods and economic growth in India after 1991: A granger causality approach

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Abstract
The purpose of this study is to examine the relationship between manufactured goods exports and economic growth in India. Previous studies have found that exporting manufactured goods has a favorable impact on economic growth in several countries throughout the world. This study takes 30 years after the 1991 economic reformation. Because India's economic growth improved with the adoption of the LPG model, this study aims to evaluate the causal relationship between exports and economic growth in the post-reform era. In this study, the unit root test revealed that the variables are I (1) hence, the Johansen cointegration test is used and the findings showed that there exists no long-run nexus between the variables hence the Granger causality test is performed to determine short-run causality. The test results showed that there is unidirectional causality running from manufactured goods exports to economic growth. Based on the results, this study suggests that the export-led growth hypothesis is applicable in the case of India and recommends that the manufacturing units should be provided with adequate support so that they can improve their production and incentives be given to enhance exports of manufactured goods.

Keywords: Exports, economic growth, manufactured goods, India, granger causality test

1. Introduction
Exports are regarded as the economic growth engine. For many decades, the export-led hypothesis has been a prominent field of study, and numerous studies have revealed the favourable effects of exports on national economic growth. Classical economists such as Adam Smith (1776) [7] and David Ricardo (1817) [5] stressed the necessity of exports for national economic prosperity. Exports, according to Balassa (1978) [1], enable to optimal use of resources and generate maximum advantage through economies of scale and job creation, both of which are crucial for achieving economic growth. Economic liberalisation and globalisation, on the other hand, play a crucial role in increasing trade flows. More trade barriers distort export and import quantities.

India experienced a serious balance of payment problem in the late 1980s, which resulted in the reformation of the country's economic policies. In 1991, India followed the Liberalisation, Privatisation, and Globalisation strategy, which resulted in a dramatic increase in industrialisation, production, and exports. India exports a wide range of items, but manufactured goods account for the lion's share. India has traditionally been an agrarian economy, but it has improved its performance in other sectors, notably manufacturing. The successive governments have implemented initiatives to boost indigenous manufacturing enterprises. Prime Minister Employment Guarantee Programme, Make in India, Stand UP India, and other key initiatives are among them. Prime Minister Narendra Modi's Make in India initiative aims to boost manufacturing and exports. It aspires to make India a manufacturing hub and to supply goods to the rest of the globe. As a result of these factors, it is clear that the government is focusing on manufacturing to increase exports and decrease imports, which will ultimately improve the nation's economic growth. Hence it is imperative to understand the causal link between the export of manufactured goods and economic growth as it holds significance because it can furnish crucial insights for policymakers as well as contribute to academic knowledge.

2. Literature Review
To understand the background and prior findings relevant to the theme of this study review of existing studies published in reputed journals was carried out.

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The findings of the relevant studies are highlighted in the following paragraphs.

Chow (1987) [2] evaluated the relationship between manufactured goods exports and economic growth in eight countries. The study observed a bidirectional causal relationship between the two variables in the cases of Hong Kong, Brazil, Singapore, Korea, and Taiwan, but not in Argentina.

Torayeh (2011) [8] used the cointegration test and the Error Correction Model (ECM) to examine the long-run and short-run causation between manufactured goods exports and Egyptian economic growth from 1980 to 2008. They discovered a bidirectional causal association between manufactured product exports and economic growth in Egypt. They also discovered long-run circular causation between produced items and economic growth.

Shihab, *et al.* (2014) [6] used the Granger Causality test to investigate the relationship between exports and economic growth in Jordan from 2000 to 2012. They discovered a one-way relationship between the two, with causality running from exports to economic growth. Their investigation found no evidence of a causal link between economic growth and exports.

For the period 1981 to 2012, Kalaitzi and Cleeve (2018) [3] investigated the relationship between primary exports, manufactured exports, and the UAE economy. According to the findings of the cointegration test, manufactured goods exports contribute more to economic growth than primary exports.

The Southern African Development Community (SADC) region consists of fifteen nations, including Angola, Botswana, the Democratic Republic of the Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, and Zimbabwe, was the subject of a study by Mosikari, *et al.* in 2016 [4]. They discovered that the SADC countries' economic growth is positively impacted by the export of manufactured goods.

3. Objective of the study
This study is carried out with the following sole objective: To investigate the nexus between exports of manufactured goods and India's economic growth after the economic reformation of 1991.

4. Hypotheses of the study
H₁: Exports of manufactured goods does not cause economic growth.
H₂: Economic growth does not increase the exports of manufactured goods.

5. Methodology of the study
The secondary data gathered from the Centre for Monitoring Indian Economy (CMEI) forms the foundation of this study. The period considered for this study starts from 1992-1993 to 2021-2022 which is 30 years after the economic reformation. The time frame for the study has been selected to look at how the variables relate to one another after the economic reform of 1991. The absolute values of the Manufactured Goods Exports and Gross Domestic Product are collected which is transformed into the log for this study. The Gross Domestic Product is used as a measure of economic growth.

Unit root test is important in any time series analysis to determine the order of integration, which further aids in selecting the suitable econometric model. Thus, the Augmented Dickey-Fuller test is used in this study. When the variables are integrated of first order, the Johansen Cointegration test is employed to determine whether there is a long-term link. To determine the presence and direction of causality between the variables, the Granger Causality methodology is used in this study. The 2 lag length is chosen using the Akaike Information Criterion (AIC). The mathematical equation for the Granger causality test performed in this study can be written as below.

$$LNGDP_t = \alpha + \beta_1 LNMGE_{t-1} + \beta_2 LNMGE_{t-2} + \varepsilon_t \dots (1)$$

$$LNMGE_t = \alpha + \gamma LNGDP_{t-1} + \gamma LNGP_{t-2} + \varepsilon_t \dots (2)$$

Where,
$LNGDP_t$ = log of gross domestic product at time t
$LNMGE_t$ = log of manufactured goods export at time t
α = intercept
β_1, β_2 = coefficients of the lags of the log of manufactured goods exports
γ_1, γ_2 = coefficients of the lags of the log of gross domestic product
ε_t = error term at time T

6. Results and Discussion

Table 1: Augmented dickey-fuller test

Variable	AT I(0)		AT I(1)	
	T-Statistic	P-Value	T-Statistic	P-Value
LNMGE	-1.97	0.29	-3.12	0.03
LNGDP	-0.93	0.76	-4.93	0.0004

Lag length based on the Akaike Information Criterion (AIC)
Source: Authors' calculation

The ADF test findings from this study are shown in Table 1. In the case of the log of manufactured goods export (LNMGE), at level, the T-Statistic is -1.97 and the P-Value is insignificant whereas at the first difference, the t-statistic is -3.12 and the P-value is 0.03 indicating that it is stationary. The gross domestic product log is stable at the first difference because at the level, the t-statistic is -0.93 and the p-value is insignificant, but at the first difference, the t-statistic is -4.93 and the p-value is 0.0004. The variables show stationary properties at first difference therefore the Johansen Cointegration test can be performed to examine their long-term relationship.

Table 2: Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace	0.05	
No. of CE (s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.324435	11.95669	15.49471	0.1590
At most 1	0.049374	1.367127	3.841466	0.2423

Source: Authors' calculation.

The trace statistics' results are shown in Table 2. The trace statistic at r = 0 is 11.95, which is below the Critical value and the p-value is high. At r = 1 as well the trace statistic with 1.367127 is lesser than the critical value. These results indicate that there is no cointegration between the variables at a 5% level of significance.

Table 3: Unrestricted cointegration rank test (Maximum Eigenvalue)

Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.324435	10.58956	14.26460	0.1760
At most 1	0.049374	1.367127	3.841466	0.2423

Max-eigenvalue test indicates no cointegration at the 0.05 level
Source: Authors' calculation.

The Maximum-Eigenvalue test result is shown in Table 3. The Max-Eigen statistic is 10.58 at r = 0, which is below the critical value and the p-value is insignificant. The result is the same even at r = 1. Max-eigenvalue test also indicates no cointegration at the 0.05 level. Hence, the findings of the Johansen cointegration test show that there is no cointegration between manufactured goods export and economic growth in India, implying that there is no long-run relationship between the two.

Although the relationship in the long run is absent there can be temporal nexus between the variables. Therefore to examine the existence of causal relationships and direct causality following test is performed.

Table 4: Granger Causality Tests

Null Hypothesis	OBS	F-Statistic	Prob.
LNMGE does not Granger Cause LNRGDP	28	5.88499	0.0086
LNRGDP does not Granger Cause LNMGE		0.45435	0.6404

Source: Authors' calculation.

The Granger Causality test results are shown in Table 4. Based on AIC, 2 lags were selected for the test. Because the F-statistic is 5.88 and the p-value is 0.0086, the null hypothesis that manufactured goods exports does not granger-cause log of gross domestic product is rejected. However, because the p-value is quite high, the null hypothesis asserting that GDP does not granger-cause manufactured goods exports cannot be rejected. Thus, there is a one-way causal relationship between manufactured goods export and economic growth in India, with the causality running from the former to the latter.

7. Conclusion
Manufacturing units in India are expanding year after year, resulting in increased production and exports of produced goods. According to the literature, exports are a driving force in economic growth, and India has implemented numerous export-oriented policies. The time following economic reform is considered crucial in the history of the Indian economy since numerous changes occurred and development was faster than in the previous.

The results of the tests performed in this study show that there is no long-run causal relationship between manufactured goods exports and economic growth in India, although there is short-run causality between the two variables. It was discovered that there is a unidirectional causal relationship, with the direction of causality running from manufactured product exports to India's economic growth. As a result, the export-led growth hypothesis is proven to be applicable in the case of India. This indicates that manufacturing units must be adequately supported to enhance production and exports and achieve economic growth. The findings also indicated that various programmes and policies implemented to boost the manufacturing of goods and its exports have positively contributed to the economic growth in India. Therefore this study suggests that India needs to focus on further implementing policies meant to enhance mass production of goods and provide necessary incentives for its exports.

8. References
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