

The Synergy among Exports, Foreign Direct Investment and Economic Growth in India: Auto Regressive Distributed Lag Bounds Testing Approach

Dr. Vibha Bhandari (vibhabhandari2006@gmail.com), [ID: https://orcid.org/0000-0001-6516-5621](https://orcid.org/0000-0001-6516-5621), College of Economics and Business Administration, University of Technology and Applied Sciences, Nizwa, Sultanate of Oman

Dr. Piyali Roy Chowdhury (piyali.rc85@gmail.com), [ID: https://orcid.org/0000-0002-0625-4103](https://orcid.org/0000-0002-0625-4103)
Institute of Management Study, Kolkata, India



Copyright: © 2024 by the authors. Licensee [The RCSAS \(ISSN: 2583-1380\)](http://www.thercsas.com). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution Non-Commercial 4.0 International License. (<https://creativecommons.org/licenses/by-nc/4.0/>). Crossref/DOI: <https://doi.org/10.55454/rcsas.4.05.2024.007>

Abstract: *The present study proposes to identify a relationship between exports, foreign direct investment (FDI), and economic growth in India. The study is based on secondary data related to India's FDI, exports, and economic growth in logarithmic form. The data from 1970 to 2019 has been analyzed using the auto regressive distributed lag (ARDL) model for long and short-run causality and cointegration. The analysis of data reveals that in 50 years of study, the inflow of FDI has been stable in the country with minimum dispersion. ARDL testing approach shows the absence of heteroskedasticity, multicollinearity, and auto-correlation in the data set. The test results for the long run further disclose that exports granger cause FDI which results in the country's economic growth. There is a gap in empirical literature to examine the relationship between India's FDI, exports, and economic growth. The ARDL model has been used to identify the interconnections mainly for two variables and scantily for three variables. The present research has been novel in identifying the interconnectedness between India's FDI, exports, and economic growth in the short and long run using the ARDL model. The results of the study have important suggestions for policymakers to boost export-led growth and enhance the flow of investment into the country. All the work has been done in original by the authors, and the work used has been acknowledged appropriately.*

Keywords: ARDL Bounds Testing Approach, Economic Growth, Exports, FDI, GDP, LPG, SAARC

Article History: Received: 08 May- 2024; Accepted: 20 May- 2024; Published/Available Online: 30 May- 2024

1. Introduction

The economic growth of a country is the result of numerous variables and policies. In addition to raising the nation's Gross Domestic Product (GDP), economic growth also raises the living standard of its population. While classical economists emphasized the need for government expenditure (Keynes, 1937) for an increase in economic growth, modern economists stressed the importance of factors like the size and quality of human capital, availability, and richness of local resources (Upreti, 2015), financial capital, technological development (Kuznets, 1968) along with government policies for the growth of the economy.

The Industrial Policy of 1991 ushered in an era of liberalization, privatization, and globalization (LPG) in India. Before the policy of 1991, the economy's progress was crippled by the shackles of licenses for domestic trade and restraints in the form of quotas for international trade. Three decades after the implementation of the Industrial Policy of 1991, the Indian economy has shown tremendous progress.

While Foreign Direct Investment (FDI) brings the needed capital and technology to the country thereby increasing the productive capacity, exports harness this augmented production capacity competitive advantage of the country. Thus, both these factors generate employment and bring within the country required foreign exchange. Due to their importance for an economy's growth, variables related to these factors have been an area of interest for researchers studying economic progress.

The regime of liberalization and globalization has not only led to an influx of foreign capital but also a surge in the country's international trade. India's progress in terms of GDP, FDI, and exports, thirty years after the introduction of the LPG system, is a fascinating subject of study. This study is being undertaken to comprehend the dynamics of growth and the relationship between these variables. The research will not only be a significant addition to the existing body of literature, but it will also reveal the function and interrelationship between FDI, exports, and economic growth in India's economy. The research results will aid policymakers in understanding synergies and implementing suitable policy measures for boosting international commerce and the flow of investment for India's economic growth.

To meet the purpose of this study, it is separated into six primary groups: The second section provides a theoretical foundation and empirical literature review for the investigation. The first section introduces the study, while sections three and four address the technique and data analysis, respectively. In the latter two sections, the results and conclusions of the completed research are discussed.

2. Literature Review

The research in the past has not only focused on the association between exports and economic growth but has also been expanded to look at other factors that may influence trade globally. The studies related to FDI, economic growth, and exports are not limited to a particular country or commodity but also a group of countries and commodities. To understand these relationships, researchers have applied several techniques that explore various aspects.

Kersan-Škabić (2021) studied the information and communication technology (ICT) infrastructures in the South-East European (SEE) region, how they are used, and how well people know how to use them. Application of gravity models to panel data analysis bilateral trade flow, reveals that GDP per capita and Internet usage have an immense and constructive effect on imports, while digital infrastructure and skills have a small yet affirmative effect on exports. Also, it was found that the GDP per person and the use of the Internet helped imports, while digital infrastructure and skills helped exports in a small but positive way. Fedorenko, Yakhneeva, Zaychikova, and Lipinsky (2021) studied the social and economic factors that affected the export and import indicators of Russian ports from 2010 to 2019. Using correlation, regression, panel data analysis, and nonlinear models, it was found that the areas belonging to the Black Sea Corridor (BSC) are all dependent on each other. The study further specified that investments for the betterment of seaports not only boost trade in the port area but also the areas around it indicating integration of the local area with the world economy.

Studies have been conducted for a wide range of products as well as a limited sphere of products traded internationally by countries. For instance, Ethiopia's economic growth from 1980 to 2017 was linked to its coffee exports, according to the Johansen co-integration test, vector error correction model (VECM), and Granger causality test (Gizaw, Abafita, and Merra, 2022). Even though the analysis showed that all variables were linked, it also showed that coffee exports had a small effect on the short-term growth of the economy. The Impulse Response Function showed that, in addition to coffee exports, other factors like real effective exchange rates (REER), employee force, capital creation, and non-coffee exports had a large and positive long-term effect.

Siaw, Jiang, Pickson, and Dunya (2018) carried out a similar exercise to understand the link between a basket of agricultural exports and economic growth for Ghana. From 1990 to 2011, the Autoregressive Distributed Lag (ARDL) model was used on data at the disaggregate level to help policymakers understand the growth pattern. Long-term and short-term data disclosed that while exporting cocoa was conducive to economic growth, exporting pineapples and bananas was not. The study further revealed that exporting bananas in Ghana only led to growth in one direction, exporting cocoa led to growth in both directions, and exporting pineapples did not lead to growth in either direction rendering the export of pineapples irrelevant. Sofla (2021) used panel data to study the effects of foreign trade on the economic growth of a group of ten countries from 2010 to 2019. Focussing his study on the export of crops, the author concluded that some developing countries have been able to export crops and grow their economies due to the constructive effect of real GDP, REER, and net FDI flows.

Several kinds of research have been undertaken to comprehend the effect of foreign trade on a country's growth, for which different parts of a country, the whole country, and groups of countries have been studied. Tah, Czerniak, Levine, Wiggin, and Osondu (2018) studied the effect of foreign trade (economic openness) on the progress of South Africa. They found that both short-term and long-term growth is caused by foreign trade. Using the co-integration test, the Gonzalo-Granger common long-memory test, and the error-correction model, the study established the importance of physical and human capital as important drivers of growth. In the long run, the authors predicted that South Africa's economic growth in the long as well as short run shall be fuelled by its international trade. The results of this study were similar to Sunde (2017) who established that while FDI had a uni-directional relationship with exports and economic growth, a bi-directional relationship existed between economic growth and exports.

From 1991 to 2017, Boukolia (2021) and Singhal, et. al. (2022) investigated the link between Algeria's GDP, exports, imports, and openness of the economy by applying the joint integration test and the ARDL model to Algeria's trade data with other countries from 1991 to 2017. This study indicated an affirmative link between exports and economic growth and that both long-term and short-term parameters were correct. The research further discovered that the dominance of oil and natural gas in Algeria's exports has led to an imbalance in Algerian exports, exposing the country to undulations.

Not just one country, but a group of countries have also been analyzed to understand the dynamics among FDI, economic growth, and exports. Kalirajan, Miankhel, and Thangavelu (2009) looked at the dynamic association of export, FDI, and GDP using a time series framework of the VECM for six countries. Exports have driven both long and short-term growth in countries, but long-term and short-term growth has been very different from one country to the other. In the case of South Asia, it was found that exports in Pakistan and FDI in India are driven by a higher GDP, while in East Asia it was discovered that GDP and FDI share a bi-directional causality. Even though Mexico and Chile in Latin America have different short-term relationships, exports affect the progress of FDI and growth in the long run in both countries. Erum, Hussain, and Yousaf (2016) used the Fixed Effects Model, the neoclassical production function, and the Taylor series approximation to understand the effects of FDI, labor, government spending, and domestic capital. For countries of the South Asian Association for Regional Cooperation (SAARC), the research highlighted the affirmative role of both domestic investment (DI) and FDI for economic growth, however, it was indicated that FDI's role was less significant than private investment from within the country. It was further indicated that even though government spending did not affect GDP, there is a strong affirmative correlation between GDP and labor. The study advocated investment in the development of human capital for achieving long-term benefits of economic growth. Similarly, for BRICS countries, Iqbal, Tang, and Rasool (2022) used ARDL and the Dumitrescu Hurlin panel causality tests to look at how carbon emissions, renewable energy use, FDI, and exports affect economic growth. Using the data from 2000 till 2018, the PMG model indicates that in the long run, carbon emissions coupled with renewable energy, exports, FDI, and savings, trade reticence will help economic growth, while interest rates will hurt it. The data from the Dumitrescu Hurlin panel show the existence of a single-way causal link between economic growth and FDI and a dual-way causal link between the growth of economies and their carbon emissions. Overall, the results show that all BRICS countries' economies have grown thanks to more carbon emissions and FDI. These results are dissimilar to Bhujabal, Sethi, and Padhan (2021) who established a negative of FDI inflows and ICT infrastructure on carbon emissions and pollution in the environment. The results also showed that ICT and FDI in the Asia-Pacific region are both causes and effects of each other.

Do Song Do, Do, Tran, and Nguyen studied how DI and FDI affected Vietnam's exports from 1985 to 2020. While the Johansen test, established the positive influence of DI and FDI on the growth of Vietnam's exports, the variance decomposition showed that export growth was more affected by FDI than DI. For the short term, the Granger causality test showed that FDI and export shared a one-way association, but DI and export did not. Despite the vulnerability of exports to FDI sector shocks, the main driver of Vietnamese exports is believed to be FDI.

Verter and Bevásová (2016) advocated the protection of agricultural exports as the sector is considered the propeller of Nigeria's economic growth. Both the two-way linkage between agricultural exports and economic growth and the one-way linkage between REER and economic growth were shown to be true. The study also found that there was a one-way linkage between REER and agricultural degrees and agricultural exports to REER of openness in the country.

Recent research has also looked at how FDI from a single source or a small number of sources affects a country's economy. Ahmad et al. (2022) used the ARDL method to show how FDI from China and, in particular, renewable energy investments affected Pakistan. Sánchez-Fung (2022) examined various factors like GDP and FDI specifically from China, inflation, trade openness, exchange & interest rates, and remittances and the relation between them from 1990 to 2019. In the long run, the dependent and independent variables showed that China's FDI aids Pakistan's economic growth. It was also found that the economic growth of Pakistan and renewable energy usage have a strong and positive association over time.

In relation to India, numerous types of research on FDI, exports, and economic growth have been carried out. Kautish and Kumar (2018) observed how foreign aid, FDI, trade openness, the exchange rate, government

spending on consumption, improvement of human capital, and price rise have affected the Indian economy's growth over 46 years. Long-term studies using the ARDL bound model show that government spending, foreign aid, and FDI have a strong and positive effect on economic growth yet, these dynamics hurt the exchange rate and the progress of human capital. The research recommended that for the growth of the Indian economy, EXIM and human capital development policies should be re-examined. A long-term link between FII flows and changes in exchange rates was reported by the study. The "adjustment effect of currency rate" means that the real depreciation of the rupee has a long-term effect on long-term stock flows. When the researchers looked at what happened to FII flows when stocks went up, they witnessed something similar to what the Nifty 50 model showed.

The ARDL model has been used sparingly to understand how FDI and exports work together to grow an economy. In 2005, Pahlavani, Wilson, and Worthington looked into how trade affected Iran's GDP while Islam, Saif, and AlShammari (2022) carried out a similar study for the Kingdom of Saudi Arabia. This method has been used to decipher the dynamics between oil prices, exchange rates, and share prices (Hashmi, Chang, Huang, and Uche, 2022), stock prices and exchange rates (Salah and Dennis, 2022), and the long-term demand for money (Bahmani-Oskooee & Ng, 2002). This method was also used to study carbon dioxide (CO₂) emissions (Qayyum et al., 2022), the use of renewable energy (Das, Bera, & Panda, 2022), climate change (Ali Chandio et al., 2022), and evaluations of sustainability (Chopra, 2022).

The preceding studies show that research on economic growth, FDI, and exports has been carried out for a wide range of countries and goods in different time frames. Like other emerging economies, India has followed a policy of liberalization and globalization since 1991 and has invited FDI in various sectors. Encouraging the concept of "Make in India" has furthered not only production but also exports from the country. As evident from the available literature, analogous research has been conducted in India to underline the importance of exports and FDI for the growth of the country's economy along with other factors. Still, there is a dearth of recent research to discover and understand the specific relationship *per se* between economic growth, FDI, and exports. Realizing the prominence of FDI and exports for India's economic growth, this current research aims to unearth the synergy between these three variables. Discovering the interconnections between these variables in the short and long run shall not only lead to meaningful conclusions but shall suggest vital policy implications. Therefore, the study shall employ the ARDL approach to seek insights into the synergies between economic growth, FDI, and exports for India in the long as well as short run.

3. Data Description

In this analysis, logarithmic data from 1970 to 2019 was utilized. It is well known that economic growth is represented by an improvement in GDP per capita or per capita income. This per capita income is calculated by dividing the midyear population by the gross domestic product (GDP). Adding taxes and subsidies to the gross value and subtracting subsidies yields the GDP. The GDP per capita is computed without depreciation.

Export expansion rates are calculated in local currency units. In other words, exports consist of entire goods and services produced by a nation for the rest of the globe. Royalties and license fees; and other services such as financial, informational, personal, and government services are not included in the value of goods, whereas items, freight, insurance, and transportation (including travel) are.

FDI is the net investment required to acquire a long-term management share (10 percent or more of the voting stock) in a corporation operating outside of the investor's native country. The balance of payments includes FDI Equity capital, earnings reinvestment, other long-term capital, and short-term cash. Foreign investment as a proportion of GDP is derived by subtracting new investment from an investment that was sold. Using the data as described above, the research in its current form aims to fulfill the following objectives:

- To discern the long-run cointegration among exports, FDI, and economic growth in India.
- To learn about the long-run impact of exports and FDI on economic growth in India.
- To deduce the short-run granger causality between exports, FDI, and economic growth in India.

To achieve the above objectives, this research aims to test the following hypotheses as listed below

- H₀₁: There is no cointegration among export, FDI, and economic growth in India in the long run.

- H_{02a} : There is no impact of exports on economic growth in India in the long run.
- H_{02b} : There is no impact of FDI on economic growth in India in the long run.
- H_{03a} : Exports do not granger cause FDI
- H_{03b} : FDI does not granger cause exports.
- H_{03c} : Exports do not granger cause economic growth.
- H_{03d} : Economic growth does not granger cause exports.
- H_{03e} : FDI does not granger cause economic growth.
- H_{03f} : Economic growth does not granger cause FDI.
- H_{04} : Serial correlation does not exist in the data.
- H_{05} : The series is homoscedastic in nature.

4. Data Analysis

The descriptive statistics of the dataset are presented in table (I) examining the summary of the data considered for the analysis.

Table (I): Summary of Statistics

Statistics	ln (GDPGR)	ln (EXP)	ln (FDI)
Mean	1.034106	1.122334	0.194544
Median	1.072393	1.176094	0.140584
Maximum	1.184675	1.586112	0.664691
Minimum	(0.213321)	(0.164253)	(0.013086)
Std. Dev.	0.207266	0.354388	0.197042
Skewness	(4.548150)	(1.654923)	0.582881
Kurtosis	27.53928	6.050270	1.976003
Jarque-Bera	1426.914	42.20672	5.015775
Probability	0.000000	0.000000	0.081440
Sum	51.70529	56.11671	9.727192
Sum Sq. Dev.	2.104999	6.153954	1.902455
Observations	50	50	50

The descriptive statistics in the table (I) explain that FDI has a maximum value of its mean (0.194544) and median (0.140584). The export has its maximum value (1.586112) and the growth rate of GDP has its minimum value (-0.213321). The scatteredness in the dataset is represented by standard deviation which has a minimum value (0.197042) for FDI and a maximum value (0.354388) for exports. The value of skewness is highest for FDI (0.582881) and lowest for GDP growth rate (-4.548150). The value of kurtosis is maximum for GDP growth rate (27.53928) and lowest for FDI (1.976003). The Jarque Bera value explains that the FDI time series follows a normal distribution in the dataset. Finally, fifty years of data have been accumulated to calculate the data analysis. Hence, the total number of observations counts to fifty.

In the next stage, the data are tested through the unit root tests to find the order of integration. For finding the roots in the time series, the study has considered Augmented Dicky Fuller (ADF) and Phillips Perron (PP), the results of which are summarized in table (II) and table (III).

Table (II): Summary of ADF and PP at Level

Variable Name	ADF		PP	
	t-Statistic	Prob	t-Statistic	Prob
ln (GDPGR)	(6.606129) **	0.00	(6.642458)**	0.00
ln (EXP)	(6.740600) **	0.00	(6.740600)**	0.00
ln (FDI)	(0.879738)	0.7864	(0.656385)	0.8479

** denotes the value as significant at five percent level

The data in the study are checked with integration in different orders. Hence, it passes through the unit root test considered by Augmented Dicky Fuller (ADF) and Phillips Perron (PP).

Table (III): Summary of Unit Root Test by ADF and PP at First Difference

Variable Name	ADF		PP	
	t-Statistic	Prob	t-Statistic	Prob
ln (GDPGR)	(11.88882) **	0.00	(33.14779) **	0.00

ln (EXP)	(11.88219) **	0.00	(27.85241) **	0.00
ln (FDI)	(7.406414) **	0.00	(7.835232) **	0.00

** denotes the value as significant at five percent level

The study analyses the association between economic growth, exports, and foreign direct investment (FDI) by applying the ARDL bound approach. As specified by Nkoro and Uko (2016), the ARDL model is a single equation model; the current study considers the growth rate of India as a dependent variable and exports and FDI as the independent variables. Table (IV) simplifies the practical rationale for the incorporation of the ARDL model for the variables. It shows the significant probabilistic value of exports to augment the growth rate of the Indian economy.

Table (IV): Conditional Error Correction Model

Variable	Value of the Coefficients	t-Statistic	Probability
ln (GDPGR_1)	(0.489812) **	(3.555679)	0.0009
ln (EXP_1)	0.382864	3.285814	0.0020
Δ ln (EXP)	0.145036	1.431283	0.1593
ln (FDI)	0.263118	1.277214	0.2081

** denotes the value as significant at a five percent level

The conditional error correction model exemplifies the validation of applying the ARDL model in the research. The result shows that lagged exports and lagged GDP growth rate are significant in contributing their roles in determining the rate of growth of GDP in India.

4.1. Long Run Analysis

The principal step of analyzing long-run association is to find out the cointegration between the datasets. The research in this next step finds out the long-run relationship among GDP growth rate, export, and FDI by applying the ARDL model. The result of cointegration is summarized in table (V).

Table (V): Result of Cointegration

Variable Specification		F-Statistic	I (0)		I (1)	
Dependent Variable	ln (GDPGR)	6.321942 **	5%	3.15	5%	4.11
Independent Variables	ln (EXP) and ln (FDI)		10%	2.44	10%	3.28

** explains the value is significant at five percent level

According to table (V), the cointegration value is 6.321942, indicating positive cointegration between the variables. It demonstrates that all three variables move jointly over time. The cointegration result is greater than both I (0) and I (1), where I (0) represents the absence of cointegration and I (1) represents the presence of cointegration. As the calculated value is greater than both the tabular values, the result is statistically significant, and we accept the hypothesis that there is long-run cointegration between the variables under investigation, as stated by H_{11} . The study also determines the model's long-run coefficient by presenting table (VI).

Table (VI): Long Run Coefficient of ARDL

Variable Name	Coefficient	t-Statistic	Probability
ln (EXP)	0.781656 **	8.412873	0.00

** explains the value is significant at five percent level

After specifying the cointegration result, the research emphasizes extracting the long-run coefficient, concentrating on the impact of exports on the GDP growth rate. The long run coefficient is positive (0.781656) proving that the growth rate of exports increases the GDP growth rate in the long run in India. This finding underlines the importance of export promotion in the long run to implement sustainable growth of the Indian economy. It has been demonstrated that FDI has no long-term impact on India's economic growth. Thus, the study failed to accept H_{12b} . On the other hand, it accepts H_{12a} and explicates that exports have a long-term effect on India's economic progress.

4.2. Short-Run Analysis

The short-run ARDL model is justified by the short-run coefficients and the Error Correction Term (ECT) embedded in the model. The respective values are depicted in table (VII).

Table (VII): Result of Error Correction Model

Variable Name	Coefficient	t-Statistic	Probability
$\Delta \ln(\text{EXP})$	0.145036	1.478858	0.1461
$\ln(\text{FDI})$	0.263118	1.680658	0.0998
ECT ₍₁₎	(0.489812) **	(3.595116)	0.0008

** explains the value is significant at five percent level

The result depicted in table (VII) proves that in the short run, there remains no causality between the variables. The ECT value is negative (0.489812) and significant (probability- 0.0008, which proves the long-run unidirectional causality from the growth rate of export to the GDP growth rate.

4.3. Long-Run Causality

The ECT value proves that export growth will positively increase the growth rate of GDP in the long run. Hence, any shocks in the economy will be unconcerned while moving towards long-run stability in India. There remains a 48.98 percent probability of recovering the country from short-run disturbances or external shocks in any economic condition.

4.4. Short-Run Causality

The short-run directional causality is checked through the granger causality test, the results of which are depicted in table (VIII).

Table (VIII): Result of Granger Causality Test

Null Hypothesis Statement	F-Statistic	Probability
$\ln(\text{FDI})$ granger causes $\ln(\text{EXP})$	1.84820	0.1698
$\ln(\text{EXP})$ granger causes $\ln(\text{FDI})$	2.89093*	0.0664
$\ln(\text{GDPGR})$ granger causes $\ln(\text{EXP})$	0.27269	0.7626
$\ln(\text{EXP})$ granger causes $\ln(\text{GDPGR})$	0.68073	0.5116
$\ln(\text{GDPGR})$ granger causes $\ln(\text{FDI})$	1.06814	0.3526
$\ln(\text{FDI})$ granger causes $\ln(\text{GDPGR})$	3.23058**	0.0493

* explains the value is significant at ten percent level

** explains the value is significant at five percent level

As shown in the above table (VIII), the results obtained from the granger causality test confirm the acceptance of H_{13a} and H_{13c} . All the other null hypotheses (H_{03b} , H_{03c} , H_{03d} , and H_{03f}) get their acceptance confirming the absence of granger causation among the respective variables.

Through the Granger causality method, the analysis authenticates that export growth will granger cause foreign direct investment in India, which will ultimately granger cause economic growth in the country. Hence, the unidirectional causality from export growth to GDP growth via FDI again emphasizes the requirement for export promotion in the country. The extensive export valuation will ultimately augment the condition of the economy to its next level.

The use of time series data necessitates the calculation of correlation amongst the variables as presented in table (IX).

Table (IX): Correlation Matrix

	$\ln(\text{EXP})$	$\ln(\text{FDI})$	$\ln(\text{GDPGR})$
$\ln(\text{EXP})$	1	-0.058826	-0.067253
$\ln(\text{FDI})$	-0.058826	1	0.331771
$\ln(\text{GDPGR})$	-0.067253	0.331771	1

The above table shows a persistent positive correlation between GDP growth rate and FDI. This proves the need for enhanced FDI inflows in the economy to improve the growth rate of the country. The variables can be correlated with their own lag values of the past. So it is important that the absence of correlation is confirmed in the analysis. Hence, the study performs the Breusch-Godfrey Serial Correlation LM Test to test the autocorrelation among the datasets. The result of the autocorrelation is presented in table (X).

Table (X): Breusch-Godfrey Serial Correlation LM Test

Null Hypothesis Statement	F-Statistic	Probability
There remains no autocorrelation in the model	1.971785	0.0677

** explains the value is significant at a five percent level

The Breusch-Godfrey Serial Correlation LM Test measures the value of F-statistic (1.971785) along with its probability (0.0677). It signifies that the study is free from autocorrelation, which leads to the acceptance of H_{04} .

The next stage is to prove homoskedasticity in the dataset. The need for the test arises as the variables with different variances may result in biased analysis. The presence of constant variance thus is required for an unbiased estimate of the results. The Breusch-Pagan-Godfrey test of homoskedasticity is presented in table (XI).

Table (XI): Breusch-Pagan-Godfrey Heteroskedasticity Test

Null Hypothesis Statement	F-Statistic	Probability
There remains no heteroskedasticity in the model	1.172115	0.3361

The above table (XI) signifies that the model is free from heteroskedasticity and that all the sample values in the model carry uniform variance in the time series data set. This proves to accept H_{05} .

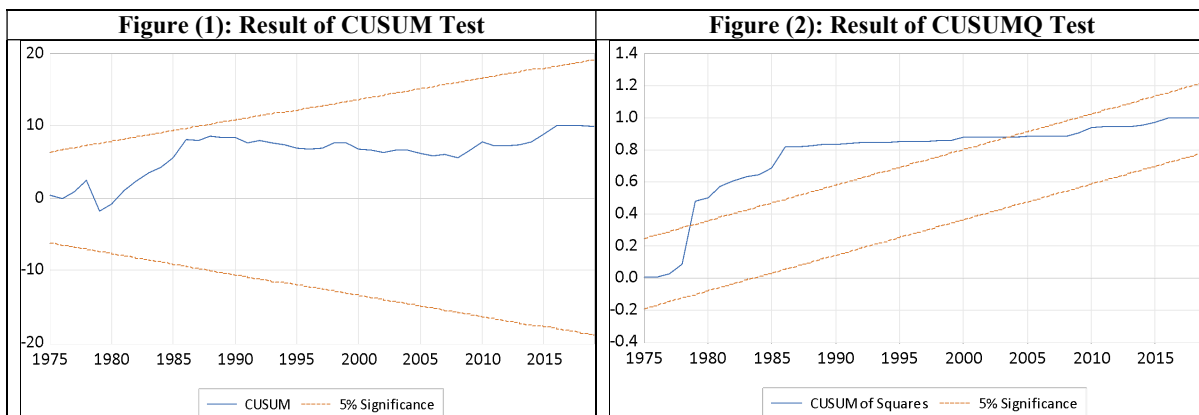
The problem of multicollinearity is addressed here, and the table (XII) depicts the results as derived.

Table (XII): Result of Multicollinearity

Name of the Variable	Coefficient of Variance	Variance Inflation Factor(VIF)
ln (GDPGR)	0.018976	14.95980
ln (EXP)	0.010268	9.896897
ln (EXP) ₍₁₎	0.008559	8.520894
ln (FDI)	0.042440	2.329459

Table (XII) explains the values using the Variance Inflation Factor (VIF) method. Except for GDPGR, all the variables are free from the multicollinearity problem in the dataset. The respective values of the VIF column prove the absence of multicollinearity as all the values are less than 10.

By employing the Cumulative Sum (CUSUM) and Cumulative Sum of Square (CUSUMQ) tests, the stability of the model is judged. Figure 1 and Figure 2 present the results of these tests.



Both Figures 1 and 2 validate the stability of the model used for this analysis.

5. Conclusion

The economic growth of a country is the result of various factors and government policy decisions. The implementation of the Industrial Policy of 1991 ushered in an era of liberalization, privatization, and globalization in India. The policy not only opened the avenues of investment for foreigners but also provided the economy with the needed impetus to encourage exports. Thirty years hence, the adoption of the Industrial policy and suitable policy decisions have resulted in an increase not only in FDI and exports but also in the overall growth of the country. The analysis of data reveals that the inflow of FDI has been stable in the country with minimum dispersion. ARDL testing approach shows the absence of heteroskedasticity,

multicollinearity, and auto-correlation in the data set. The test results for the long run further disclose that exports granger cause FDI which results in the country's economic growth. This result emphasizes the critical importance of exports for FDI and Indian economic growth.

For furthering economic growth, initiatives to promote exports of goods and services from India should be complemented with appropriate policy decisions. The government should adopt innovative measures and strengthen the existing policies to boost export-led growth and enhance the flow of investment into the country. Trade-enhancing initiatives should replace predatory and restrictive measures and mechanisms. To attract foreign investment, industries with FDI restrictions should be unlatched without sacrificing sustainability and national security. These measures will not only generate employment opportunities but also stabilize the economy and sustainably enhance the economic position of India in the global economy.

Although modest in scale, this research is an essential first step in understanding the fundamental synergy between FDI, exports, and India's economic growth since 1970. In the future, this research can be extended to identify the specific industries and sectors that can enhance exports and attract FDI for increasing GDP. Future research can examine further the relationship of economic growth with other factors besides FDI and exports by utilizing comparable or alternative testing methodologies. These upcoming studies will strengthen the foundation for developing and implementing appropriate and timely policy measures for India's sustainable growth, given its significant position of India in today's global economic system.

References

- Agrawal, P., 2014. The role of exports in India's economic growth. *The Journal of International Trade & Economic Development*, 24(16), pp. 835-859.
- Ahmad, M. S. et al., 2022. Does Chinese Foreign Direct Investment (FDI) Stimulate Economic Growth in Pakistan? An Application of the Autoregressive Distributed Lag (ARDL Bounds) Testing Approach. *Energy Policy for a Sustainable Economic Growth*, pp. 1-16.
- Ali Chandio, A. et al., 2022. Assessing the impacts of climate change on cereal production in Bangladesh: evidence from ARDL modeling approach. *International Journal of Climate Change Strategies and Management*, Volume 14 No. 2, pp. 125-147.
- Bahmani-Oskooee, M. & Ng, R. C. W., 2002. Long-Run Demand for Money in Hong Kong: An Application of the ARDL Model. *International Journal of Business and Economics*, 2002, Volume 1, No. 2, 147-155, pp. 147-155.
- Bhujabal, P., Sethi, N. & Padhan, P. C., 2021. ICT, foreign direct investment and environmental pollution in major Asia Pacific countries. *Environmental Science and Pollution Research*, Volume 28, p. 42649–42669.
- Boukha, N., 2021. The importance of developing foreign trade to achieve economic growth in Algeria during the period (1991-2017) using the ARDL model. *International Journal of Economic Performance*, pp. 111-129.
- Carril-Caccia, F. & Pavlova, E., 2018. Foreign direct investment and its drivers: a global and EU perspective. *ECB Economic Bulletin*, Volume 4.
- Chopra, R. R., 2022. Sustainability assessment of crops' production in India: empirical evidence from ARDL-ECM approach. *Journal of Agribusiness in Developing and Emerging Economies*.
- Das, N., Bera, P. & Panda, D., 2022. Can economic development & environmental sustainability promote renewable energy consumption in India?? Findings from novel dynamic ARDL simulations approach. *Renewable Energy*.
- Do, D. A. et al., 2022. The Effect of Foreign Direct Investment Inflow on Exports: Evidence from Vietnam. *The Journal of Asian Finance, Economics and Business*, Volume 9 Issue 2, pp. 325-333.
- Erum, N., Hussain, S. & Yousaf, A., 2016. Foreign Direct Investment and Economic Growth in SAARC Countries. *The Journal of Asian Finance, Economics and Business*, Volume 3 Issue 4, pp. 57-66.
- Fedorenko, R., Yakhneeva, I., Zaychikova, N. & Lipinsky, D., 2021. Evaluating the Socio-Economic Factors Impacting Foreign Trade Development in Port Areas. *Sustainability*. 13(15), 8447, pp. 1-13.
- Gizaw, N., Abafita, J. & Merra, T. M., 2022. Impact of coffee exports on economic growth in Ethiopia; An empirical investigation. *Cogent Economics & Finance* 10(1).
- Hashmi, S., Chang, ., Huang, L. & Uche, E., 2022. Revisiting the relationship between oil prices, exchange rate, and stock prices: An application of quantile ARDL model. *Resources Policy*, 22, 102543.
- Iqbal, A., Tang, X. & Rasool, S. F., 2022. Investigating the nexus between CO2 emissions, renewable energy consumption, FDI, exports and economic growth: evidence from BRICS countries. *Environment, Development and Sustainability*, pp. 1-30.

Islam, M. S., Saif, S. S. A. & AlShammari, A. F., 2022. Export-Growth Nexus in the Kingdom of Saudi Arabia: A Non Linear ARDL Approach. *The Singapore Economic Review*, pp. 1-17.

Kalirajan, K., Miankhel, A. K. & Thangavelu, S. M., 2009. Foreign Direct Investment, Exports, and Economic Growth in Selected Emerging Countries: Multivariate VAR Analysis. *Center for Contemporary Asian Studies. CCAS Working paper*, 23.

Kersan-Škabić, I., 2021. Information and Communication Technology Development and Foreign Trade in the Region of South-East Europe. *South East European Journal of Business and Economics*, pp. 101-113.

Keynes, J., 1937. The General Theory of Interest, Employment and Money. *The Quarterly Journal of Economics*, pp. 209-223.

Kuznets, S., 1968. *Toward a Theory of Economic Growth: With Reflections on the Economic Growth of Modern Nations*. s.l.:Norton.

Nkoro, E. & Uko, A. K., 2016. Autoregressive Distributed Lag (ARDL) cointegration technique: application and interpretation. *Journal of Statistical and Econometric methods*, 5(4), pp. 63-91.

Pahlavani, M., Wilson, E. & Worthington, A. C., 2005. Trade-GDP Nexus in Iran: An Application of the Autoregressive Distributed Lag (ARDL) Model. *American Journal of Applied Sciences*.

Pal, S., 1992. Agricultural Exports of India: Issues of Growth and Instability. *Indian Journal of Agricultural Economics, Indian Society of Agricultural Economics*, 47(2), pp. 185-194.

Qayyum, M. et al., 2022. Financial Instability and CO2 Emissions in India: Evidence from ARDL Bound Testing Approach. *Energy and Environment*, p. 0958305X211065019.

Ramaiah, S. & Roy, G. K., 2021. Determinants of Exports Behaviour of India's Agro-processing Firms: Role of Technology, Imported Raw Materials and Logistics Infrastructure. *Vision: The Journal of Business Perspective*, 25(2), pp. 201-208.

Ram, R., 1985. Exports and Economic Growth: Some Additional Evidence. *Economic Development and Cultural Change*, 33(2), pp. 415-425.

Ray, A., Deepika, M. & Narayan, G. B., 2021. Analysis of India's Competitive Position in RCEP. *Vision: The Journal of Business Perspective*, 25(3), pp. 336-349.

Salah, A. & Dennis, O., 2022. Dynamic relationship between exchange rates and stock prices for the G7 countries: A nonlinear ARDL approach. *Journal of International Financial Markets, Institutions and Money*, 101541.

Sánchez-Fung, J. R., 2022. Inflation, Inflation Expectations and Central Bank Communication in Emerging Markets. *Macroeconomics and Finance in Emerging Market Economies*, 15(3), pp. 215-230.

Sharma, R. & Kautish, P., 2020. Linkages between Financial Development and Economic Growth in the Middle-Income Countries of South Asia: A Panel Data Investigation. *Vision: The Journal of Business Perspective*, 24(2), pp. 140-150.

Sharma, R., Kautish, P. & Kumar, D. S., 2018. Impact of Selected Macroeconomic Determinants on Economic Growth in India: An Empirical Study. *Vision: The Journal of Business Perspective*, 22(4), pp. 405-415.

Siaw, A., Jiang, Y., Pickson, R. B. & Dunya, R., 2018. Agricultural Exports and Economic Growth: A Disaggregated Analysis for Ghana. *Theoretical Economics Letters*, Vol.8 No.11, pp. 691-700.

Siddiqui, S. & Roy, P., 2020. Asymmetric Effects of Exchange Rate and Its Relationship with Foreign Investments: A Case of Indian Stock Market. *Vision: The Journal of Business Perspective*, 25(4), pp. 415-427.

Singhal, N., Goyal, S. & Singhal, T., 2021. The relationship between insurance and economic growth in Asian countries: A regional perspective. *Macroeconomics and Finance in Emerging Market Economies*, 15(3), pp. 301-322.

Sofla, H. V. I., 2021. Investigating the Impact of Foreign Trade on Economic Development (with Emphasis on Crops Marketing). *Agricultural Marketing and Commercialization Journal*, 5(2), pp. 75-89.

Sunde, T., 2017. Foreign direct investment, exports and economic growth: ADRL and causality analysis for South Africa. *Research in International Business and Finance*, pp. 434-444.

Tah, K. A. et al., 2018. Foreign trade and economic growth in South Africa. *Asia-Pacific Journal of Accounting & Economics*, pp. 472-481.

Tyler, W. G., 1981. Growth and export expansion in developing countries: Some empirical evidence. *Journal of Development Economics*, 9(1), pp. 121-130.

Upreti, P., 2015. Factors Affecting Economic Growth in Developing Countries. *Major Themes in Economics*, 17(1), pp. 37-54.

Verter, N. & Bečvářová, V., 2016. The Impact of Agricultural Exports on Economic Growth in Nigeria. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis* 64(2), pp. 691-700.

Funding: There's no specific funding for this research.

Code availability: The software used is E Views.

Conflict of interest: The authors declare that there's no conflict of interest.

AUTHORS' BIO-NOTES



Dr. Vibha Bhandari is a highly qualified professional and an assistant professor at the College of Economics and Business Administration, University of Technology and Applied Sciences, Nizwa, Sultanate of Oman. She is a Certified Management Accountant (CMA) from the USA (2023) and holds a doctorate in International Business, Finance, and Economics from Jai Narain Vyas University Jodhpur, India (2002). Her academic journey includes two Faculty Development Programmes from the Indian Institute of Management Ahmedabad (2008) and the International Programme for Development of Management Professionals from IIM Calcutta (2020). With a passion for research and teaching, she has collaborated with renowned academicians to design and develop various programs and courses at the graduate and post-graduate levels. With almost two decades of academic experience, she is a committed researcher and innovator of pedagogical methodologies. She actively reviews numerous journals, publications and research proposals, and has participated in various conferences as a keynote speaker and participant, with several publications to her credit. Dr. Vibha Bhandari's research interests span macroeconomics, finance, banking, international business, strategic and general management.



Dr. Piyali Roy Chowdhury (ORCID- 0000-0002-0625-4103) is working as an Assistant Professor in Institute of Management Study, Kolkata, India, holds a Doctorate degree in Economics and Finance from Vellore Institute of Technology, Chennai (2022). Also, she holds a Master of Business Administration (MBA) Degree in Finance and Marketing (2009). She has a bachelor's degree in the field of Economics (2006). She is an Indian Institute of Management (IIM) Ahmedabad alumni of Faculty Development Programme held in IIM Ahmedabad. She has many publications in Scopus, Web of Science, UGC and ABDC C category journals. She has attended several workshops based on econometric analysis and methods. She led entrepreneurship teams in different academic fields. She has overall 14 years of academic work experience with four years of experience in retail banking operations. She is a resourceful speaker in management case discussions and a sincere mentor for budding graduates with innovative knowledge and skills. Her current and previous research interests include International Trade, Macroeconomics, Econometrics and Retail Management. She is a lifetime member of The Indian Econometric Society, India. (Membership Number- L /2834/ 19-20)