IMPACT OF FOREIGN DIRECT INVESTMENT, EXPORT, IMPORT AND INFLATION ON ECONOMICS GROWTH IN INDIA: AN EMPIRICAL ANALYSIS

Abstract

This study explores the relationship between foreign direct investment (FDI), exports, imports, inflation, and economic growth in India. The research employs the Autoregressive Distributed Lag (ARDL) bounds testing technique to examine long-term co-integration, and the Error Correction Model (ECM) is used to analyze short-term dynamics. The findings reveal a long-term relationship between FDI, exports, imports, inflation, and economic growth. Moreover, FDI inflows, exports, and inflation in India show a positive but insignificant effect on economic growth, while imports appear to have a negative and insignificant impact. Ultimately, the study suggests that more favorable government policies towards FDI could help stimulate a more dynamic Indian economy.

Keywords:Foreign Direct Investment, Inflation , *ARDL, ECM*

I. Introduction

Since the implementation of economic liberalization measures in the early 1990s, India has emerged as one of the fastest-growing economies globally. For instance, between 1992 and 2010, India experienced an average annual growth rate of nearly 7%. This economic surge coincided with a significant rise in foreign direct investment (FDI) inflows. From 2001 to 2010, the annual average FDI inflows into India reached $18.5 billion, which was more than six times the average during the 1995–2000 period. Consequently, India became one of the most rapidly growing recipients of FDI among developing nations during that decade. This trend raises a compelling research question: what role does FDI play in driving economic growth in India?The relationship between FDI inflows and economic growth in developing countries has been extensively explored in academic literature. Studies such as those by Tsai (1991), Wang and Swain (1997), Liu et al. (1997), Borensztein et al. (1998), Zhang (2001), Sun and Parikh (2001), Bende-Nabende et al. (2001), Liu et al. (2002), Shan (2002), Hansen and Rand (2005), Yao (2006), and Chang (2006) generally report a positive impact of FDI on economic growth. These studies

emphasize that FDI can enhance economic performance by introducing advanced technologies, fostering capital accumulation, and increasing productivity.However, despite the increasing inflow of FDI in recent years, the specific impact of FDI on India's economic growth has not been thoroughly investigated. To the best of current knowledge, only a limited number of studies have addressed this issue, yielding mixed results. For example, Pradhan (2002), Basu (2002), Sahoo and Mathiyazhagan (2003), Agrawal (2005), Chakraborty and Nunnenkamp (2008), Agrawal and Khan (2011), and Dash and Parida (2013) have made attempts to analyze the FDI-growth relationship in India.Pradhan (2002) employs a production function framework to examine the effects of inward FDI on India's economic growth. His findings indicate that FDI does not have a significant positive impact on growth. Agrawal (2005) corroborates Pradhan's conclusions, suggesting that FDI has contributed little to India's economic expansion. These findings challenge the widely held view that FDI unequivocally drives growth, at least in the Indian context. The mixed conclusions from these studies highlight the complexity of the FDI-growth nexus and suggest that the benefits of FDI may depend on various factors, such as the sectoral allocation of FDI, the absorptive capacity of the domestic economy, and complementary policies.

II. REVIEW OF LITERATURE

Foreign direct investment (FDI) inflows are widely recognized as a critical factor influencing a nation's development and economic progress. Numerous studies have empirically analyzed the impact of FDI and exports on economic growth. Research across various countries and time periods has examined the effects of variables such as FDI, exports, and imports on economic development using diverse econometric models, methodologies, and approaches. The emergence of neoclassical growth theory further solidified the idea that FDI contributes to economic growth. Harrod (2015), Domar (1946), and Solow's (1956) neoclassical growth theory argue that FDI supports economic development in a manner similar to domestic investments, particularly in the short term.The endogenous growth theory, proposed by Lucas (1988), Romer (1986, 1993), and Rebelo (1991), suggests that FDI fosters economic growth by introducing advanced technologies and promoting knowledge spillovers. Studies by Borensztein and Lee (1998) and Lim and Maisom (2000) highlight that FDI, when accompanied by management expertise, human capital development, exports, and technology transfer, helps create sustained growth momentum. Lipsey and Weiss (1981, 1984) emphasize a positive correlation between trade flows and FDI at the

industry level.Several country-specific studies have explored the relationship between FDI and economic growth. Alexiou and Tsaliki (2007) examined the connection between FDI and GDP in Greece from 1945 to 2003, demonstrating long-term FDI-driven growth. Miankhel et al. (2009) analyzed the relationship between FDI and GDP in six emerging economies—Chile, India, Mexico, Malaysia, Pakistan, and Thailand—revealing long-term causation from GDP to the other factors studied. Katircioglu (2009) investigated the short- and long-term linkages between FDI inflows and economic growth in Turkey from 1970 to 2005 using the ARDL-Bounds test, which confirmed a connection between FDI and real GDP. Similarly, Belloumi (2014) explored the interplay between FDI, trade openness, and economic growth in Tunisia from 1970 to 2008, also employing the ARDL-Bounds test. The findings indicated that these factors interact in the long run.Further, Sunde (2017) utilized the VECM Granger causality test to analyze South Africa, finding unidirectional causality from FDI to economic growth, thereby supporting the FDI-led growth hypothesis.Against this backdrop, this article aims to investigate the dynamic relationships between FDI inflows, exports, imports, and GDP in India during the period 1991–2018 using the Autoregressive Distributed Lag (ARDL-Bounds) technique. The document is organized as follows: Section 2 outlines the econometric approach and data sources. Section 3 presents the empirical findings and discussion, while Section 4 summarizes the key conclusions and policy implications.

III. RESEARCH METHODOLOGY:

Research methodology refers to the systematic process of identifying, selecting variables, and gathering data related to a study's subject. It involves evaluating the overall effectiveness and precision of the research. The methodology encompasses various steps, including topic selection, data collection, conducting interviews, administering questionnaires, and other related procedures. This study adopts a quantitative approach, utilizing secondary data to examine the relationship between agricultural production and economic growth in India.

Data sources and data types:

This investigation utilized secondary data obtained from various reputable sources, including the International Monetary Fund's International Financial Statistics and Balance of Payments databases, the World Bank's International Debt Statistics, and GDP estimates from both the World Bank and the OECD. Additional data was gathered from the World Development

Indicators, the Indian Economic Survey, and the Handbook of Statistics. The study covers a sampling period of 30 years, spanning from 1991 to 2020.

Variables identified and their meanings:

GDP (Gross Domestic Product) _____Dependent variable

INF (Inflation Rate) _____Independent variable

FDI (Foreign Direct Investment) _____Independent variable

EXP (Export) _____Independent variable

IMP (Import) _____ __Independent variable

Gross Domestic Product (GDP); GDP represents the total value of all goods and services produced within a country in a given year. As an indicator of economic growth, GDP was used as the dependent variable in this study. An increase in GDP indicates a rise in economic growth.

FDI, Net Inflows (% of GDP); FDI net inflows refer to the value of inward direct investments made by non-resident investors in the reporting economy. This includes reinvested earnings, intra-company loans, and is net of capital repatriation and loan repayments.

Inflation, Consumer Prices (Annual %); Inflation measures the rate at which the general price level of goods and services increases over time, reducing the purchasing power of a country's currency. It plays a crucial role in influencing the economy and the population's financial well-being. Inflation is often assessed using the consumer price index.

Export of Goods and Services (% of GDP); This represents the transportation or transfer of commodities and services from one country to another, contributing to a nation’s economic activities.

Import of Goods and Services (% of GDP); This refers to the process of bringing goods and services from foreign countries into the domestic economy for use or sale.

Formulation of Hypotheses

- **H0**: Agricultural productivity in India has no positive relationship with economic growth.
- **H1**: Agricultural productivity in India has a positive relationship with economic growth.

Econometric Model:

This study's econometric model is as follows:

$GDP = \beta 0 + \beta 1\ (INF) + \beta 2\ (EXP) + \beta 3\ (IMP) + \mu$ …… 1

Where

GDP stands for Gross Domestic Product.

INF stands for Inflation.

EXP stand for Export

IMP stand for Import

$\beta 0$ = Interception

Slope Coeficient = $\beta 1, \beta 2, \beta 2, \beta 3,$

Error Term = μ

Autoregressive Distributed Lag (ARDL) Model: The ARDL method is employed to analyze the relationship between Foreign Direct Investment (FDI), Exports, Imports, Inflation, and economic growth in India. This technique, developed by Pesaran et al. (1996), Pesaran and Shin (1999), and Pesaran et al. (2001), is highly flexible as it allows variables in the model to be integrated at order 0 or 1, denoted as I(0)I(0) or I(1)I(1). This method is particularly effective even with small sample sizes.The ARDL approach permits variables to have different lag lengths within the model specification. The general ARDL equation used in this analysis is presented as follows:

$Yt=\beta 0+\beta 1\ Yt\text{-}1+\ldots\beta q\ Yt\text{-}p + \alpha 0\ Xt+\alpha_1 Xt\text{-}_1+\alpha_2 Xt\text{-}_2+\ldots\alpha k Xt\text{-}k+\varepsilon t$ ……2

The unconstrained vector error model, on the other hand, is shown below

$$\Delta GDP_t = \gamma_0 + \sum_{I=1}^{P} \gamma_1\ GDP_{t-1} + \sum_{I=1}^{P} \gamma_2\ FDI_{t-1} + \sum_{I=1}^{P} \gamma_3\ EXP_{t-1} + \sum_{I=1}^{P} \gamma_4\ IMP_{t-1} + \sum_{I=1}^{P} \gamma_5\ INFL_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots 3$$

The ARDL model, shown in Equation (3), demonstrates the long-run and short run connection between the dependent and independent variables. The intercept term is 0. The short-run coefficients of variables are $\gamma 0, \gamma 1\ \gamma 2, \gamma 3, \gamma 4$, explanatory variables, whereas the long run co-efficients of variables , and t is the stochastic error, which includes all missing variables in the equation.

IV. Result and Discussion:

Table 1:Descriptive Statistics

	GDP	FDI	EXP01	IMP	INF
Mean	5.81	1.29	16.83	19.22	7.23
Median	6.59	1.18	18.54	20.28	6.49
Maximum	8.84	3.62	25.43	31.25	13.87
Minimum	-7.25	0.02	8.49	8.49	3.32
Std. Dev.	3.11	0.84	5.43	7.04	3.23
Skewness	-2.59	0.61	-0.07	0.08	0.50
Kurtosis	11.36	3.08	1.61	1.71	1.96
Jarque-Bera	121.1	1.87	2.43	2.09	2.63
Probability	0.00	0.39	0.29	0.35	0.26

Auther's Calculation Eview-10

The descriptive statistics provide details on measures such as the median, mean, minimum, maximum, skewness, standard deviation, kurtosis, Jarque-Bera statistic, and probability. This analysis utilizes time-series data covering 30 years of annual observations from 1991 to 2020. Table 1 highlights the following findings: the average GDP growth rate is 5.81%, with a standard deviation of 3.11%. The mean inflation rate (INF) is 7.23%, with a standard deviation of 3.23%. The average value of foreign direct investment (FDI) is 1.29%, with a standard deviation of 0.84%. Exports have an average value of 16.83% and a standard deviation of 5.43%, while imports average 19.22%, with a standard deviation of 7.04%.

Most variables, including Inflation, FDI, and Imports, are positively skewed, whereas GDP and Exports exhibit negative skewness. The kurtosis statistics indicate that Exports, Imports, and Inflation are platykurtic (flat-topped or short-tailed) with values less than 3. Conversely, GDP and FDI are leptokurtic (sharp-peaked or long-tailed), as their values exceed 3.

The Jarque-Bera test results show that the P-value for GDP is 0.00, which is less than the 10% significance level. This leads to the rejection of the null hypothesis, indicating that the GDP data is not normally distributed. For Inflation, the Jarque-Bera P-value is 0.26, which is greater than the 10% threshold, leading to acceptance of the null hypothesis and confirming the normal distribution of the data. Similarly, for all other variables, the Jarque-Bera P-values exceed 10%, supporting the null hypothesis and confirming that their data are normally distributed.

Table 2: Results of Correlation Matrix

	GDP	FDI	EXP	IMP	INF
GDP	1	-0.12	0.1	0.14	-0.07
FDI	-0.12	1	0.79	0.78	-0.131
EXP	0.1	0.79	1	0.98	-0.133
IMP	0.14	0.78	0.98	1	-0.07

INF	-0.07	-0.13	-0.133	-0.07	1

Auther's Calculation Eview-10

Table 2, All variables show significant correlation with GDP, except for FDI and Inflation (INF). The variable Gross Domestic Product (GDP) is negatively correlated with FDI and Inflation, while Exports (EXP) and Imports (IMP) exhibit positive correlation with GDP. Additionally, pairs of the same variables, such as FDI with itself, EXP with itself, IMP with itself, and INF with itself, are entirely dependent on each other.

The correlation between GDP and Inflation is -0.07, indicating a weak negative association since $r > |0.30|$. The degree of association between FDI, EXP, and IMP is 0.79, 0.78, and their correlations are moderate, as they fall within the range $|0.30| < r < |o.70|$. Conversely, the degree of association between GDP and Inflation is -0.07, signifying a weak correlation.

Table 3, ADF and PP Unit root test

	ADF Unit root Tests		**PP**	
Variables	**Level**	**First Difference**	**Level**	**First Difference**
LGDP	-2.10(0.24)	-4.37**(0.00)	**-2.10 (0.24)**	**-4.37**(0.00)**
LFDI	-1.823(0.36)	-5.82** (0.00)	**1.75 (0.39)**	**-6.20** (0.00)**
LEXP	-1.53 (.50)	-5.477**(0.00)	**-1.53(0.50)**	**-5.48**(0.00)**
LIMP	-1.56 (0.48)	-4.073**(0.00)	**-1.57(0.00)**	**-4.07**(0.00)**
LINF	0	-6.78**(0.00)	**-3.10**(0.03)**	**-6.86**(0.00)**

Table 3 shows the stationary and non-stationary characteristics of the various variables. Time series data must be stationary to avoid erroneous regression analysis since it is impossible to obtain excellent findings and forecasts with a non-stationary series. The augmented Dickey-Fuller test revealed that certain variables are stationary at the level, and others are stationary at the first difference. This means that GDP is integrated at the first difference, and the t-statistic value is -4.37 with a probability value of 0.002. Inflation is likewise stationary at the level with a t-statistic of -5.99 and a probability of 0.00. The Foreign Direct Investment (FDI) is integrated at the first difference with the t-statistic value of -5.82, with a probability value of 0.00. The EXP is stagnant at level with a t-statistic of -1.53 and a probability of 0.50. The IMP is stationary at the first difference, with a t-statistic of -4.07 and a probability of 0.00. Time series analysis reveals

that all variables are integrated in distinct orders, implying that there is no co-integration among variables, and therefore the ARDL model may be used. Or in the other words the above table 3 we can see that When the ADF and PP tests are used to determine whether variables are stationary, we find that logarithms of gross domestic product (LnGDP) and logarithms of Foreign Direct Investment (LnFDI) are both stationary at the 1 percent level of significance, whereas logarithms of exports (LnEXP), logarithms of imports (LnIMP) and logarithms of inflation (LnINF) are both stationary at the 5 percent level of significance. The right lag order is also one of the ARDL method's requirements. The information criterion for picking the lag-lengths is Akaike's information criterion (AIC), and the findings show that the best lag length of the variables is 4.The bound test for co-integration demonstrates the long-run relationship between the variables. Table 4 displays the results

Table 4. F-Bounds Test

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	4.011	10%	2.2	3.09
k	4	5%	2.56	3.49

Table 4 indicates that the F-statistic value (4.01) exceeds the lower and upper critical bounds at the 5% significance level. This confirms the existence of a long-run relationship between lnGDP, ln GDP, lnFDI, lnFDI, lnEXP, ln EXP, lnIMP, ln IMP, and lnINF, ln INF. The model satisfies key assumptions, including normality, autoregressive conditional heteroscedasticity (ARCH), functional form validity, and absence of serial correlation. Since co-integration is established, the process for estimating the Autoregressive Distributed Lag (ARDL) model proceeds to identify both long-run and short-run relationships. Once co-integration is verified, the long-run model can be derived using equation 2.

Table;5 Long Run ARDL Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDI	17.92	22.62	0.79	0.47
EXP01	13.69	13.36	1.03	0.36
IMP	-12.15	12.37	-0.98	0.38
INF	2.05	2.03	1.01	0.37
C	-28.02	29.83	-0.94	0.40

Table 5 presents the results of the ARDL model, showing that the coefficient of FDI in the long run is significant, indicating a positive relationship with GDP growth. This suggests that for each 1% increase in GDP growth, FDI growth is likely to rise by 17%. On the other hand, the coefficient of Imports (EXP) is statistically insignificant and negatively related to GDP growth in the long run. The negative and insignificant relationship is attributed to a lack of investment, particularly due to electricity shortages, which adversely affects imports and, in turn, GDP growth. Additionally, the coefficient for Inflation in the long run is positive but statistically insignificant. The lack of significance is linked to the insufficient contribution of agriculture, which hinders economic growth (Alam, 2015).

Table 6, Error Correction Model: Short Run Relationship:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FDI)	-4.02	0.406	-9.90	0
D(EXP01)	-3.68	0.532	-6.93	0.00
D(IMP)	2.11	0.347	6.07	0.00
D(INF)	0.76	0.109	6.98	0.00
CointEq(-1)*	0.78	0.106	7.36	0.00
R-squared	0.977	Mean dependent var		-0.535
Adjusted R-squared	0.936	S.D. dependent var		3.188
S.E. of regression	0.808	Akaike info criterion		2.659
Sum squared resid	5.877	Schwarz criterion		3.481
Log likelihood	-17.56	Hannan-Quinn criter.		2.895
Durbin-Watson stat	1.662			

Table 6 shows that economic growth is the most significant variable both in the long run and the short run. The ECM (Error Correction Model) coefficient is 0.77, which is positive and statistically significant. This indicates the presence of a long-run causal relationship. The positive coefficient of the ECM reflects the speed at which the system adjusts from disequilibrium to equilibrium. The adjusted R^2 value of 0.97 suggests that 97% of the variation in GDP (the dependent variable) is explained by changes in the independent variables. Additionally, the F-statistic's probability is statistically significant at the 5% level, confirming that the model is a good fit.

Stability of the Model: The Cumulative Sum of Recursive Residuals (CUSUM) test is used to assess the model's stability in terms of the short-run and long-run relationships between the variables. The graph of the cumulative sum of recursive residuals is shown below.

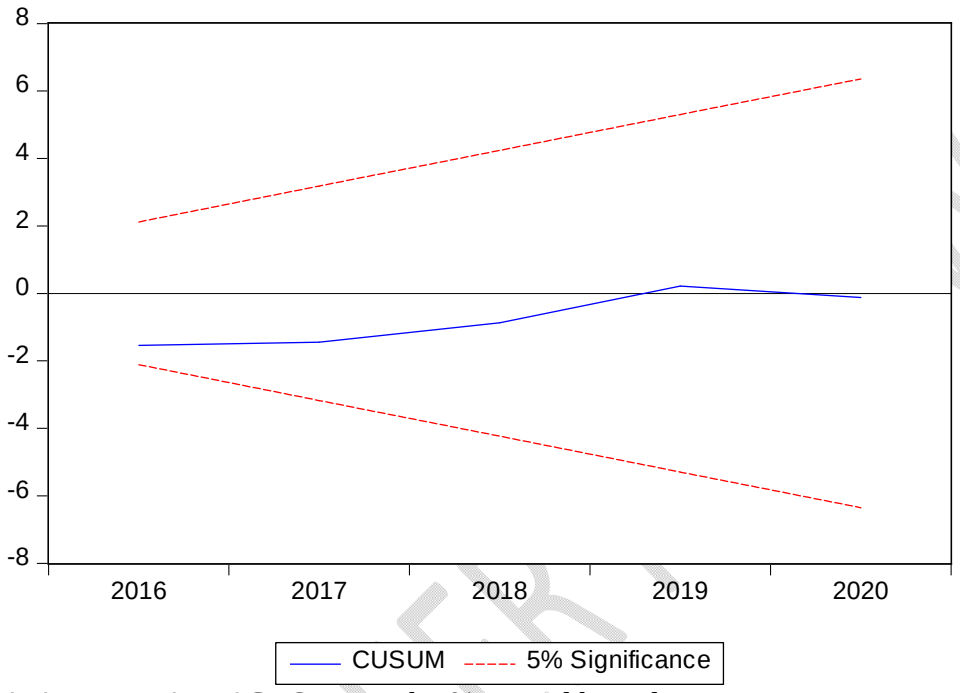

Fig 1-Graphical presentation of CUSUM with 5% critical boundaries

The CUSUM test plots the time series on the horizontal axis and the residuals on the vertical axis to assess the stability of the model. Figure 1 illustrates that the CUSUM remains within the 5% critical boundaries, as the graph does not cross these limits. This indicates that the model is stable and there are no significant discrepancies. Therefore, we can conclude that the model is correctly specified, and the null hypothesis is accepted at the 5% significance level.

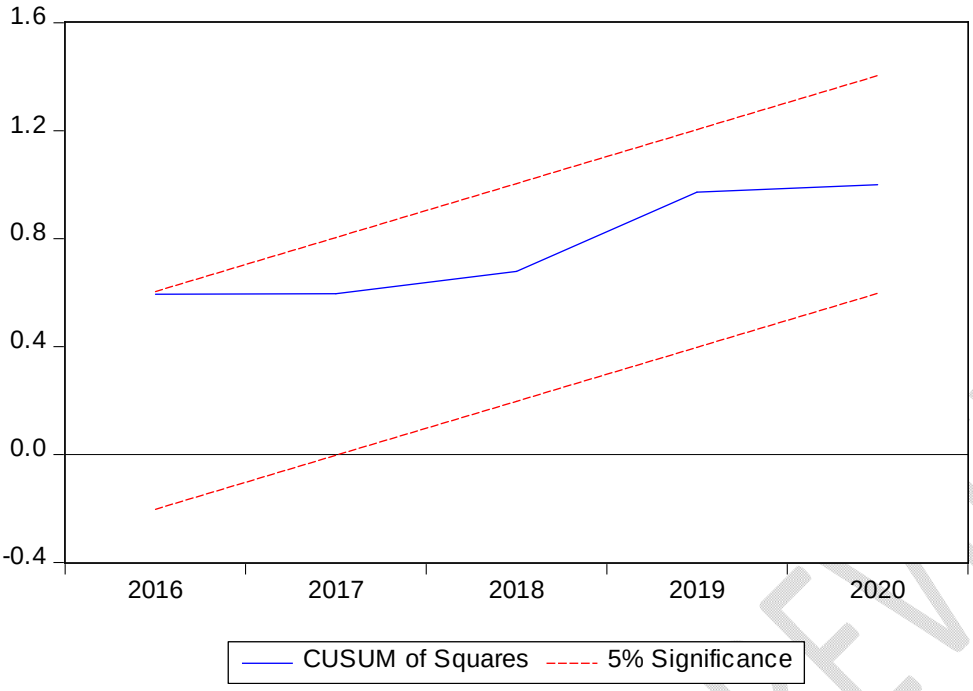

Fig 2-Graphical presentation of CUSUM of squares with 5% critical boundaries

The results indicate that the coefficients are stable, as evidenced by the CUSUM plot. The CUSUM statistic remains within the critical bands of the 5% confidence interval, confirming parameter stability.

Findings of the Study:

The key findings of the study are as follows:

First, the influence of explanatory variables on economic growth, measured as GDP, was explored. The ARDL model results show that while all independent variables, including FDI, Exports (EXP), Imports (IMP), and Inflation (INF), are insignificant in the long run, they are significant in the short run.Second, the study highlights that imports have a negative impact on economic growth in the long run, which is a key factor affecting India's economic progress. The R-squared value suggests that the independent variables have a substantial effect on the dependent variable, indicating that the model fits well.This study examined the impact of foreign direct investment (FDI) inflows, exports, imports, and inflation on India’s economic growth from 1991 to 2020. The ARDL bounds testing technique was used to analyze the long-run and short-run relationships among the variables, specifically GDP, FDI, exports, imports, and inflation.The results of the co-integration analysis indicate a positive but minimal relationship between GDP, FDI, and exports, while a negative relationship was observed between GDP and imports.

V. Conclusion &Policy Recommendations:

The findings of this study have important implications for Indian policymakers, suggesting a focus on FDI and export-led growth strategies. It also recommends the implementation of additional structural policies aimed at achieving specific goals. While foreign FDI into India has recently increased, empirical research on its spillover effects remains limited and presents mixed results. The study's conclusion underscores the fact that FDI has proven to be a key driver of economic growth in India. Thus, adopting a more proactive and open approach to encouraging FDI in targeted sectors could enhance knowledge transfer, productivity growth, and exports.

Government policies that focus on advancing industrial structure, such as promoting high-tech industries in India, can have a positive impact on both FDI and exports, thereby supporting economic growth. Lastly, although the study suggests that more detailed data, such as sectoral and industry-specific data, might yield more comprehensive findings, this paper does not address industrial or sectoral heterogeneity. Future research should explore this aspect.

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