



Does industrialization influence FDI inflows in liberalized Indian economic landscape

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Abstract

The article is an attempt to investigate the causal affiliation among Foreign Direct Investment (FDI), industrialization and trade openness in India and tries to analyze and empirically estimate the effect of industrialization and trade openness on FDI in India, using the co integration approach for the period, 2004-2024. The empirical findings of suggests that trade openness has noteworthy positive impact on FDI whereas industrialization has insignificant negative impact. The cointegration test confirmed an existence of long run equilibrium relationship among Foreign Direct Investment (FDI), industrialization and trade openness in India as confirmed by the Johansen cointegration test results. The Granger causality test finally confirmed the presence of one uni-directional causality which runs from trade openness to industrialization.

Keywords: FDI, industrialization, openness, India, co integration, granger causality

Introduction

The character of FDI in the stages of economic progress of a country has been a blazing subject of debate in several countries including India during last couple of decades. FDI is a non-debt, long-term capital source that boosts industrial production, competence, and productivity. It has been instrumental in the advancement of technological knowledge and managerial skills in Indian firms. FDI is a crucial constituent of the globalization efforts of the world economy. The growth of intercontinental production is driven by economic and technological forces. It is also motivated by the ongoing liberalization of Foreign Direct Investment (FDI) and trade policies. FDI inflows have augmented in all parts of the world since 1980 extremely (Wang *et al.* 2022 ^[17]). After reopening of the global economy immediately after the COVID pandemic, global FDI flows rushed forward to USD 1815 billion in 2021, marking a notable increase of nearly 37 percent above the pre-pandemic levels (OECD 2022). Although FDI efficiently inspires international investments, there are definite factors which excite and affect FDI flow of a country. These factors embrace political solidity and economic stability, towering institutional quality, a glut of natural resources, and a well-built commitment to trade liberalization and regional integration.

A few recent studies on FDI flow and its likely determinants will enlighten us behind undertaking our study. Imran and Rashid (2023) and Aziz and Mishra (2016) have identified certain constructive influence of institutional quality on enlarged FDI inflows. Correspondingly, Dua and Garg (2015) confirmed that the downgrading of currency is crucial in attracting FDI inflows, while Ullah and Khan(2016) showed that economic size of the host economy plays a lot for attracting FDI inflows. Other studies have depicted that trade openness may also impact the inflows of FDI [Ho and Rashid 2011 ^[7]; Rathnayaka Mudiyansele *et al.* 2021 ^[9]; Aziz and Mishra 2016 ^[2]. Erdogan and Unver (2015)] demonstrate that their findings on the effect of openness are mixed based on the model specifications. Petrović-Randelović *et al.* (2017) concluded an optimistic

affiliation between market size and FDI inflows by focusing on Balkans' economies. In the context of ASEAN economies, the findings of Ullah and Khan (2017) designated that economic size has negatively impacted FDI inflows, which is astonishing. These amazing regional results cast doubt on the worldwide role of market size in attracting FDI inflows. Pasupathi & Sakthi (2019)^[13] aimed to analyze the trend of FDI in India, and also analyzed the impact of the Make in India policy on FDI. This study found that India succeeded in attracting foreign investors after the launching of the Make in India policy and various other government reforms. Ayomitunde *et al.* (2020) provided substantiation based on Nigerian data that economic size positively contributes to FDI inflows. Oluwaseyi *et al.*, (2020)^[11] established a long-term relationship between carbon emissions, income, trade integration, FDI inflows, GDP, and capital. Furthermore, the Granger causality result revealed two-way impacts between CO2 emissions and FDI inflows, whereas there is one-way causality from capital to CO2 emissions. Rathnayaka Mudiyansele *et al.* (2021) examine this question and show that a higher level of trade openness reliefs has a negative impact on FDI inflows, and it is less likely to attract FDI in the long run. Chandra & Ridwan, (2023) ^[3], using the Auto Regressive Distributed Lag (ARDL) approach, found a co-integration relationship between CO2 emissions, population, industrialization, and education in Argentina.

Despite a careful literature review, the crucial question of what basically determines the inflows of FDI still be deficient of a credible answer. Above prior work has identified a variety of factors accountable for FDI inflows. But there is no doubt that industrialization has been a crucial driver of Foreign Direct Investment (FDI) in India post-1991, by fostering technology transfer, infrastructure development, and competitiveness in key sectors. Initiatives like "Make in India" and liberalized policies have been initiated to magnetize foreign investment. Theoretically, it is possible that openness to trade and industrialization may influence the FDI inflows both positively as well as negatively. The determinants of FDI have been researched

widely globally. However, there are still divergence among the researchers about the common determinants of FDI inflows. Very small is known about the possible influence of trade openness and industrialization on FDI inflows. Distinctively, in the Indian economic scenario, the available research literature is not very affluent as far as the relationship between trade openness, industrialization and FDI inflows are concerned. Equally, the available literature is also unvoiced on the issue of Granger causality between trade openness, industrialization and FDI inflows. Therefore, the present research endeavour is a novel attempt to fill the gaps in the literature by assessing the consequence of trade openness, industrialization on FDI for Indian economy.

This paper is an attempt to analyze the causal relationship between Foreign Direct Investment (FDI) and economic growth in India and tries to analyze and empirically estimate the effect of trade openness and industrialization on FDI for Indian economy, using the cointegration approach for the period, 2004-2024.

Methodology

1. Data and Variables

The objective of this paper is to explore the impact of industrialization and openness on foreign direct investment inflow in India and also to judge causal nexus among FDI (Foreign Direct Investment), trade openness and industrialization in India using the annual data for the period, 2004-05 to 2024-25 which includes the 21 annual observations. All necessary data for the sample period are obtained World Bank data base. All the variables are taken in their natural logarithms to reduce the problems of heteroscedasticity to maximum possible extent.

The entire estimation procedure consists of three steps: first, unit root test; second, OLS regression to judge impact of industrialization and openness on FDI and cointegration test for long run association; third, ganger causality estimation to assess short run causality.

2. Definition of variables

Table 1: List and definition of variables

Variables in the regression	Names	Definition
Foreign Direct Investment	FDI	Natural log value of Foreign Direct Investment inflows
Industrialization	INDS	Industry value added(% of GDP)
Trade Openness	OPENS	Combined import&export as a % of GDP

Data Source: www.worldbank database[compiled]

3. Hypothesis

The paper is based on the following hypotheses for testing the causality and co-integration among FDI, trade openness and industrialization in India: (i) whether there is bi-directional causality among FDI, trade openness and industrialization, (ii) whether there is unidirectional causality among FDI, trade openness and industrialization, (iii) whether there is no causality among FDI, trade openness and industrialization in India (iv) whether there exists a long run relationship among FDI, trade openness and industrialization in India.

4. Model Specification

Step –I

The choice of the existing model is based on the fact that it allows for generation and estimation of all the parameters without resulting into unnecessary data mining.

The growth model for the study takes the form: $FDI_t = f(OPENNESS_t, INDS_t)$ -----(1)

Where FDI, OPENNESS and INDS are the foreign direct investment, trade openness and industrialization respectively.

Equation (1) is treated as a Cobb-Douglas function with trade openness(OPENNESS) and industrialization(INDS), as the two explanatory variables.

The relation among foreign direct investment, trade openness and industrialization in India can be described using the following model in linear form:

$$\ln FDI_t = \alpha + \beta_1 \ln INDS_t + \beta_2 \ln OPENS_t + \varepsilon_t$$

$$(1.1) \quad \alpha \text{ and } \beta_i > 0$$

Step –II: The Stationarity Test (Unit Root Test)

When dealing with time series data, a number of econometric issues can influence the estimation of parameters using OLS. Regressing a time series variable on

another time series variable using the Ordinary Least Squares (OLS) estimation can obtain a very high R^2 , although there is no meaningful relationship between the variables. This situation reflects the problem of spurious regression between totally unrelated variables generated by a non-stationary process. Therefore, prior to testing Cointegration and implementing the Granger Causality test, econometric methodology needs to examine the stationarity; for each individual time series, most macro economic data are non stationary, i.e. they tend to exhibit a deterministic and/or stochastic trend. Therefore, it is recommended that a stationarity (unit root) test be carried out to test for the order of integration. A series is said to be stationary if the mean and variance are time-invariant. A non-stationary time series will have a time dependent mean or make sure that the variables are stationary, because if they are not, the standard assumptions for asymptotic analysis in the Granger test will not be valid. Therefore, a stochastic process that is said to be stationary simply implies that the mean $[E(Y_t)]$ and the variance $[Var(Y_t)]$ of Y remain constant over time for all t, and the covariance $[covar(Y_t, Y_s)]$ and hence the correlation between any two values of Y taken from different time periods depends on the difference apart in time between the two values for all $t \neq s$. Since standard regression analysis requires that data series be stationary, it is obviously important that we first test for this requirement to determine whether the series used in the regression process is a difference stationary or a trend stationary. The Augmented Dickey-Fuller (ADF) test is used. To test the stationary of variables, we use the Augmented Dickey Fuller (ADF) test which is mostly used to test for unit root. Following equation checks the stationarity of time series data used in the study:

$$\Delta y_t = \beta_1 + \beta_2 t + \alpha y_{t-1} + \gamma \sum \Delta y_{t-1} + \varepsilon_t$$

Where ε_t is white noise error term in the model of unit root test, with a null hypothesis that variable has unit root. The

ADF regression test for the existence of unit root of y_t that represents all variables (in the natural logarithmic form) at time t . The test for a unit root is conducted on the coefficient of y_{t-1} in the regression. If the coefficient is significantly different from zero (less than zero) then the hypothesis that y contains a unit root is rejected. The null and alternative hypothesis for the existence of unit root in variable y_t is $H_0: \alpha = 0$ versus $H_1: \alpha < 0$. Rejection of the null hypothesis denotes stationarity in the series.

If the ADF test-statistic (t-statistic) is less (in the absolute value) than the Mackinnon critical t-values, the null hypothesis of a unit root can not be rejected for the time series and hence, one can conclude that the series is non-stationary at their levels. The unit root test tests for the existence of a unit root in two cases: with intercept only and with intercept and trend to take into the account the impact of the trend on the series.

Step-III: Testing for Cointegration Test(Johansen Approach)

Cointegration, an econometric property of time series variable, is a precondition for the existence of a long run or equilibrium economic relationship between two or more variables having unit roots (i.e. Integrated of order one). The Johansen approach can determine the number of co-integrated vectors for any given number of non-stationary variables of the same order. Two or more random variables are said to be cointegrated if each of the series are themselves non – stationary. This test may be regarded as a long run equilibrium relationship among the variables. The purpose of the Cointegration tests is to determine whether a group of non – stationary series is cointegrated or not.

Having concluded from the ADF results that each time series is non-stationary, i.e it is integrated of order one $I(1)$, we proceed to the second step, which requires that the two time series be co-integrated. In other words, we have to examine whether or not there exists a long run relationship between variables (stable and non-spurious co-integrated relationship). In our case, the mission is to determine whether or not foreign direct investment (FDI), trade openness(OPENS)and industrialization(INDS) variables have a long-run relationship in a bivariate framework. Engle and Granger (1987) introduced the concept of cointegration, where economic variables might reach a long-run equilibrium that reflects a stable relationship among them.

For the variables to be co-integrated, they must be integrated of order one (non-stationary) and the linear combination of them is stationary $I(0)$.

The crucial approach which is used in this study to test r cointegration is called the Johansen cointegration approach. The Johansen approach can determine the number of cointegrated vectors for any given number of non-stationary variables of the same order.

Step-IV: The Granger Causality test

Causality is a kind of statistical feedback concept which is widely used in the building of forecasting models. Historically, Granger (1969) and Sim (1972) were the ones who formalized the application of causality in economics. Granger causality test is a technique for determining whether one time series is significant in forecasting another (Granger. 1969). The standard Granger causality test (Granger, 1986) seeks to determine whether past values of a variable help to predict changes in another variable.

The definition states that in the conditional distribution, lagged values of Y_t add no information to explanation of movements of X_t beyond that provided by lagged values of X_t itself (Greene, 2003) [6]. We should take note of the fact that the Granger causality technique measures the information given by one variable in explaining the latest value of another variable. In addition, it also says that variable Y is Granger caused by variable X if variable X assists in predicting the value of variable Y . If this is the case, it means that the lagged values of variable X are statistically significant in explaining variable Y . The null hypothesis (H_0) that we test in this case is that the X variable does not Granger cause variable Y and variable Y does not Granger cause variable X . In summary, one variable (X_t) is said to granger cause another variable (Y_t) if the lagged values of X_t can predict Y_t and vice-versa.

Analysis of results

Table 1 present the results of the unit root test. The results show that all variables in our study attain stationarity at level, $I(0)$, using ADF test. The results indicate that the null hypothesis of a unit root can be rejected for the all given variables as all the ADF statistic value are smaller than the critical t-value at 1%,5% and 10%level of significance for all variables and, hence, one can conclude that the variables under consideration attained stationary at their levels in ADF test.

Table 1: Unit Root test(ADF)

Variables	Level(t statistic)	Prob,	Conclusions
LnFDI	-4.120808	0.0068	I(0)
Ln OPEN	-7.288089	0.0001	I(0)
Ln INDS	-6.439031	0.0001	I(0)
Critical value	1% level		-3.920350
	5% level		-3.065585
	10% level		-2.673459

Source: Authors' own estimate from collected data

Note: *MacKinnon critical values for rejection of hypothesis of a unit root.

H₀: series has unit root;

H₁: series is trend stationary

According to the table-2, trade openness (OPENS) has significant positive impact on FDI flow in India. This major finding of the study suggests that trade openness matters

significantly, while attracting FDI inflows. This means that the liberalized policies of India have not only helped them in achieving higher growth rates but have also helped them in achieving higher FDI inflows.

Table 2: Regression result by OLS Technique

Independent variables	Dependent variable is LnFDI Method: Least Squares Sample:2004-2024 Included observations: 21			
	Coefficient	SE	t ratio	Prob.
C	10.77912	11.81035	0.912685	0.3735
Ln INDS	-4.563428	4.165637	-1.095494	0.2877
LnOPEN	4.309348	0.938593	4.591284	0.0002
R-squared	0.623048	Log likelihood	-22.41540	
Akaike info criterion	2.420514	F-statistic	14.87571	
Schwarz criterion	2.569732	Prob(F-statistic)	0.000154	
Hannan-Quinn criter.	2.452898	Durbin-Watson stat	0.525537	

Source: Authors' own estimate

On the other hand, industrialization has insignificant negative impact on FDI flow. This might be because of the fact that industrialization not only brings about changes in pace of country's administrative set up to attract more

foreign capital in form of FDI. Many studies suggest that increased flow of FDI depends on institutional quality in case of developing economy like India which to some extent is lacking in India.

Table 3: Johansen Cointegration Tests

Hypothesized N0. Of CE (s)	Eigen value	Likelihood Ratio	5% critical value	1% critical value
Unrestricted Cointegration Rank Test (Trace)				
None *	0.931479	66.99710	42.91525	0.0000
At most 1	0.400718	16.06543	25.87211	0.4873
At most 2	0.283606	6.336984	12.51798	0.4187
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
None *	0.931479	50.93167	25.82321	0.0000
At most 1	0.400718	9.728447	19.38704	0.6479
At most 2	0.283606	6.336984	12.51798	0.4187
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: Author's own estimate

H₀: has no co-integration; H₁: has co-integration

Having established the time series properties of the data, the test for presence of long-run relationship between the variables using the Johansen and Juselius (1992) [8] LR statistic for cointegration was conducted. The crucial approach which is used in this study to test cointegration is called the Johansen cointegration approach. The Johansen approach can determine the number of cointegrated vectors for any given number of non-stationary variables of the same order. The results of Trace value and Maximum Eigen value statistic reported in table (3) suggest that the null hypothesis of no cointegrating vectors can be rejected at the 1% level of significance. It can be seen from the Likelihood Ratio (L.R.) that we have one co-integration equations. In other words, there exists one linear combination of the

variables indicating long run co integrating relations among observed variables.

Estimating the long-run relationship, the results are contained in table-4 which shows positive relationship between foreign direct investment and trade openness. Precisely, 1% increase in OPENNESS raises the level of FDI by 1.61%. Therefore, the normalized cointegration equation reveals that there is a positive relationship between foreign direct investment (FDI) and OPENNESS and negative relations between industrialization and FDI flow. Looking at the results, the normalized cointegrating equation reveals that in the long-run, OPENNESS affects FDI positively and industrialization affects FDI negatively in India.

Table 4: Normalized cointegrating coefficients (standard error in parentheses)

Table 5: Normalized cointegrating coefficients (standard error in parentheses)			
LnFDI	LnINDS	LnOPEN	@TREND(00)
1.000000	-5.497434	1.610024	-0.223992
	(1.17535)	(0.35856)*	(0.01200)

Source: Authors' own computation; *Figure in the parenthesis indicates S.E.

Given that a long-run relationship exists between the studied variables based on the cointegration test results, a further test was carried out using the Granger

causality test. The Granger causality test focuses on examining and assessing if any causal relationship exists among the study variables as shown in Table 5.

Table 5: Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.	Decision	Results	Direction of Causality
INDS does not Granger Cause FDI	19	0.53561	0.5968	Did not reject		No causality
FDI does not Granger Cause INDS		0.31326	0.7361	Did not reject		
OPENS does not Granger Cause FDI	19	0.64445	0.5398	Did not reject		No causality
FDI does not Granger Cause OPENS		0.53572	0.5968	Did not reject		
OPENS does not Granger Cause INDS	19	5.99140	0.0132	Reject null at 5% level		Unidirectional causality
INDS does not Granger Cause OPENS		2.43899	0.1234	Did not reject		

H_0 : X does not Granger cause Y; H_1 : X Granger causes Y
 It has been observed that for the H_0 of “OPENS does not Granger Cause INDS”, we reject the H_0 since most of the probability values are less than 0.1 at the lag length of 2. Therefore, as per our expectation, unidirectional causality is found between trade openness(OPENS) and industrialization (INDS) which runs from openness to industrialization. This signifies that trade openness positively persuades economic growth via industrialization by enabling efficient resource allocation, providing easier access to goods and services, and facilitating total factor productivity. Trade openness contributes to higher growth rates by improving productivity, competition, and technological diffusion which in turn brings industrializations of India as reflected in our result. We have found that for the H_0 of “INDS does not Granger Cause FDI”, we cannot reject the H_0 since most of the probability values are even greater than 0.1 at the lag length of 2. Therefore, we accept the H_0 and conclude that INDS does not Granger Cause FDI. Similarly, no causality is found between industrialization and FDI ; openness and FDI in any direction in both cases. Although it is expected that FDI alone brings foreign capital, technology, expertise, and market access. It can stimulate economic growth by improving productivity, creating jobs, and fostering innovation and it is critical for creating new production facilities and modernizing existing industries in domestic countries like India, due to opening up of access to the latest technologies and management practices, it contributes to the competitiveness of national economies in the global market. However, the effectiveness of FDI often depends on local conditions, such as infrastructure and workforce skills. A majority of empirical evidences demonstrate a weak short-run bidirectional causation between FDI inflows and trade openness or no causality which our study also suggests. Not only openness of economy is crucial for inviting more FDI, but country’s rule of law, regulatory quality, control of corruption, political stability and absence of violence and voice and accountability conforming governance of country’s government also is assumed to greater role in augmenting FDI inflows.

Conclusion

The article tries to examine the causal affiliation among Foreign Direct Investment (FDI), industrialization and trade openness in India and tries to analyze and empirically estimate the effect of industrialization and trade openness on FDI in India, using the cointegration approach for the period, 2004-2024. The main findings have been depicted as follows: The ordinary least square regression suggests that trade openness has significant positive impact on FDI flow in India and industrialization has insignificant negative impact on FDI inflow in India. The unit root test elucidated that

industrialization, trade openness and foreign direct investment are stationary at level $I(0)$ by applying Augmented Dickey Fuller test(ADF). The cointegration test confirmed that industrialization, trade openness and foreign direct investment are cointegrated, indicating an existence of long run equilibrium relationship among these three variables under consideration as confirmed by the Johansen cointegration test results. The Granger causality test finally confirmed the presence of single uni-directional causality which runs from trade openness to industrialization indicating that trade openness positively persuades economic growth via industrialization. The study suggests that India should spotlight more on long-term policies for augmenting GDP growth to draw more FDI inflows into the economy. The study also suggests that the policy-makers of India should strive towards liberalizing international trade considerably to boost the contributions of industrial sector toward gross domestic product (GDP) and to achieve the dreamed goal of sustainable long-run growth of Indian economy.

References

1. Ayomitunde AT, Adeniran BG, Gbenro MS, Bako YA. The determinants of foreign direct investment inflows in Nigeria: An empirical investigation. *Acta Universitatis Danubius. O Economica*,2020;16:131–42.
2. Aziz OG, Mishra AV. Determinants of FDI inflows to Arab economies. *The Journal of International Trade & Economic Development*,2016;25:325–56.
3. Chandra L, Ridwan M. Impact of FDI, industrialization, and education on the environment in Argentina: ARDL approach. *Heliyon*,2023;9(1):e12872. <https://doi.org/10.1016/j.heliyon.2023.e12872>.
4. Dua P, Garg R. Macroeconomic determinants of foreign direct investment: Evidence from India. *The Journal of Developing Areas*,2015;49:133–55.
5. Erdogan M, Unver M. Determinants of foreign direct investments: Dynamic panel data evidence. *International Journal of Economics and Finance*,2015;7:82.
6. Greene WH. *Econometric Analysis*. Pearson Education,5th Edition, 2003, 382.
7. Ho CS, Rashid AHM. Macroeconomic and country specific determinants of FDI. *The Business Review*,2011;18:219–26.
8. Johansen S, Juselius K. Structural hypotheses in a multivariate cointegration analysis of the PPP and UIP for UK. *J. Economics*,1992;53:211–44.
9. Rathnayaka MM, Epuran G, Tescas B. Causal links between trade openness and foreign direct investment in Romania. *Journal of Risk and Financial Management*,2021;14:90.

10. Imran M, Rashid A. The empirical determinants of foreign direct investment episodes. *Global Journal of Emerging Market Economies*,2023:15:409–35.
11. Oluwaseyi A, Samad AA, Madina A. Does gross domestic income, trade integration, FDI inflows, GDP, and capital reduces CO2 emissions? An empirical evidence from Nigeria. *Current Research in Environmental Sustainability*,2020:2:100009. <https://doi.org/10.1016/j.crsust.2020.100009>.
12. OECD. *FDI in Figures*. Paris: Organisation for European Economic Cooperation, 2022.
13. Pasupathi S, Sakthi V. Recent Trends of Foreign Direct Investment in India and its Impact on Economic Growth. *IOSR Journal of Business and Management (IOSR-JBM)*,2019:8–11.
14. Petrovic-Randelovic M, Jankovic-Milic V, Kostadinovic I. Market Size as a Determinant of the Foreign Direct Investment Inflows in the Western Balkans Countries. *Facta Universitatis, Series: Economics and Organization*, 2017, 93–104.
15. Ullah I, Khan MA. Institutional quality and foreign direct investment inflows: Evidence from Asian countries. *Journal of Economic Studies*,2017:44:1030–50.
16. Sim C. Money, Income and Causality. *American Economic Review*,1992:62:251–266.
17. Wang X, Xu Z, Qin Y, Skare M. Foreign direct investment and economic growth: A dynamic study of measurement approaches and results. *Economic Research-Ekonomska Istraživanja*,2022:35:1011–34.