

## Nexus between Macro Economic Variables and Foreign Direct Investment (FDI) Inflows in India: Evidence from Time Series Analysis

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**Abstract:** *India's FDI situation is presently seeing a steady move with liberalized reforms over the recent couple of years and an alluring investment atmosphere having a beneficial outcome of the inflows. The main purpose of this study is to determine the nexus between macroeconomic variables and Foreign Direct Investment inflows in India from 1980 to 2016, applying the Autoregressive Distributed Lag (ARDL) testing approach to co-integration and the Toda Yamamoto Granger Causality test to draw inferences. The empirical results reveal a long-run association between Gross Domestic Product and Foreign Direct Investment Inflows. The findings also demonstrate that the causality test validates the causal relationship between foreign direct investment and all economic variables under study, except the Exchange rate and Consumer price index. However, the Toda Yamamoto test divulges bi-directional causality between Gross Domestic Product and Foreign Direct Investment Inflows. Policy makers are essential to pushing the reform agenda in the local market to pull more FDI into the Indian economy.*

**Keywords:** FDI Inflows; Macroeconomic factors; ARDL; Granger causality; India

**JEL Classification:** C22; F21; F41

### Introduction

Foreign direct investment (FDI) plays an essential role in international business due to expanding economic and financial reconciliation among developing and developed nations. It leads to several factors, such as technological up-gradation, access to global managerial skills and practices, innovation, and the spread of institutional speculators (Asiedu, 2002). In addition, favorable environmental conditions and Liberalized policies draw more FDI in emerging markets. In contrast, developed countries search

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for new markets where the availability of labour is very cheap and start new products, thereby making more profit. FDI fills numerous needs for the host nation. On the one hand, it supplements domestic investment and employment, which results in higher economic development. On the other hand, it also assists access to better technology, management skills and practices, and export competitiveness (Hamid & Jena, 2021).

Foreign investment in India increased significantly underneath the revamped policy framework, which began in 1991 and has played a far more significant role in speeding the country's economic progress in recent years. As one of the growing BRICS (Brazil, Russia, India, China, and South Africa) countries, India is becoming a major producer of commodities and services in the global economy. In addition, India has become a leading worldwide exporter of manufactured products and services (Wilson & Purushothaman, 2003). India has emerged as a prominent gateway for FDI inflows in recent years, owing to its vast consumer market, robust domestic demand growth, cheap labour costs, massive population (1.38 billion), and low rate of urbanization.

The Pattern of FDI changes and is allowed in various sectors due to the implementation of Liberalization, Privatization, and Globalization policy. In this way, multiple aspects have drawn FDI towards India. These aspects contain the expansion of the consumer market, promising approaches for foreign investors, a better and unchanging banking system, and the availability of low-cost, essential inputs (Asiedu, 2002). However, on the other side, FDI is considered a necessary vehicle for Multi-national companies in which they enlarge their business operations across borders. Still, not only for the movement of capital, but it has also provided knowledge transfer and technology up-gradation, which arouses economic upliftment in the host nation (Blomstrom et al., 1994). Consequently, various international organizations such as World Bank, Organization for Economic Co-operation and Development, International Monetary Fund, and others ponder that developing countries expand their market and make various reforms to attract more FDI with the anticipation that it adds to economic growth and development. In this way, FDI is considered a policy instrument for promoting growth and development in Asian countries (Yeboua, 2019).

Few studies which are relating to developing countries show that FDI plays a vital role in long term economic development by up-gradation of technology, upliftment of infrastructure, making new employment avenues, thereby improving the effectiveness of the domestic economy and increasing productivity (Dua & Rashid, 1998; Nair & Weinhold, 2001; Kumar & Pradhan, 2005; Chowdhury & Mavrotas 2005; Tripathi and Bhandari, 2015; Yeboua, 2019; Hamid & Jena, 2020). However, in the meantime, it pitches the risk of wrecking nearby abilities or potentially misusing host nations' assets or may act as an impartial one (Asiedu, 2002; Al Naseer, 2007; Dunning, 2009; Mishra, 2016). FDI has numerous effects on the economy of the host country. It provides employment, uplifts economic growth, income, financial development, and general government assistance to the recipient nation. Likewise, it is presumably one

of the essential components prompting the globalization of the worldwide economy. In this way, the massive increment in FDI streams across nations is one of the clear indications of the globalization of the world economy in recent years (United Nations Conference on Trade and Development, 2006). Subsequently, we can infer that FDI is a crucial element for fruitful financial development in creating nations because the very substance of monetary advancement is the quick and productive exchange and espousal of “top practice” across borders.

However, the ARDL cointegration approach is used for the following reasons. Firstly, the process is straightforward, allowing cointegration relationships to be evaluated using an ordinary least squares (OLS) test once the model’s lag order has been determined. Through a simple linear transformation, ARDL may be transformed into a dynamic error correction model (Banerjee et al. 1993). Second, because no unit root test is required, it may be utilized whether the model’s regressors are purely stationary I (0), purely non-stationary I (1), or reciprocally cointegrated. This method reveals the uncertainty shown by pre-testing the integration sequence. Finally, the test is more efficient for small samples or data sets with finite sample sizes. The ARDL technique is better than the commonly used Johansen (1988), Johansen and Juselius (1990), and Engel and Granger’s (1987) cointegration approach in terms of small size qualities. The ARDL procedure, on the other hand, will fail in the presence of the I (2) series (integrated of order 2).

Attempts have been made to explore the relationship between FDI and macroeconomic variables. However, these studies have shortcomings in that they concentrate on a single one-dimensional component of macroeconomic variables: GDP or the exchange rate. First, this study tested the cause-and-effect relationship between FDI inflows and macroeconomic indicators that reflected the economy as a whole. Second, this study is to re-evaluate the elements that stimulate FDI inflow to an economy in a regularly changing worldwide condition and to ponder the causal relationship, if any, between FDI inflows and Gross domestic product, the Exchange rate (ER), Balance of payment (BOPs), Consumer price index (CPI), Government final consumption expenditure (GFCE) and Gross capital formation (GCF) in an autoregressive vector structure and dissect the impact of such affiliation. Third, major economic events occurred during this period, including the global financial crisis, global political crises, great power conflicts, and the world’s entry into the twenty-first century, which is distinguished by the technological revolution. Despite significant differences in political stability, technical progress, geographic dimension, investment climate, and economic policies adopted across the countries studied, this study focused on the impact of macroeconomic determinants on FDI flows. With this perspective in mind, the study will use time series data from multiple secondary sources to investigate some of the macroeconomic variables that influence FDI flows into India. This research is anticipated to offer its empirical findings for India, as well as current economic literature on the subject.

The respite of the study is organized as follows: Section 2 provides an overview of the literature. Section 3 provides the details about the variables under study and a methodology for understanding the relationship between economic variables and FDI inflows. Section 4 provides empirical results. Section 5 is followed by a discussion and findings. Finally, section 6 entails the conclusion and future scope of research about the influence of the economic variables in the specific sectors.

## Literature Review

Only a few empirical studies have examined India's relationship between FDI inflows and macroeconomic variables. However, there is no similarity in this research when it comes to this topic. The lack of universal consensus might be due to the different time periods, countries, and econometric methodologies used in these studies. As a result, we investigate this empirical nexus between macroeconomic parameters and FDI inflows in India to address this gap in the current research.

A study was done by (Benacek et al., 2000) brought up that FDI inflows within the nineties have "increased the overall growth potential of the recipient economies, yet primarily through efficiency upgrades within the foreign affiliates themselves, as opposed to through expanded capital speculation or technology spillover to residential firms." Grima & Wakelin (2001) offer a few contentions on why FDI should have a provincial dimension. FDI-related spillover, including shock impacts, the obtaining of aptitudes, and technology exchange, are required to fundamentally benefit the regions where FDI is comprehensive. On the other hand, it might be suspected, in any case, that FDI-related spillover is weaker in less-propelled regions than in more developed areas. FDI could rather enlarge local aberrations if less propelled regions did not have the absorptive ability to gain profit from spillover.

Coskun, (2001) matched two periods in his study on turkey. The first period was the early 1980s, when the Turkish inflation rate was around 14%, and from 1992-to 2001, it was merely 2-3%. He clinched that the period in the 1990s (low inflation phase) contributed higher FDI inflows than the 1980s (high inflation). Likewise, apart from innovation and capital, FDI usually streams as a heap of assets, including hierarchical and administrative skills, marketing know-how, and market access through the advertising systems of multinational enterprises (MNEs). As an outcome, FDI plays a two-fold work by adding to capital amassing and expanding absolute factor efficiency (Kumar & Pradhan, 2002).

Few studies have presented aberrant evidence related to the issue, analysing the relationship between FDI and human capital. They reveal that technology-intensive FDI will stream vitally towards economies with high instructive levels, adding to the advancement of human capital in these economies. On-exchange hand, economies with a low level of early human capital will pull in less technology-intensive FDI, and

this sort of FDI will accept a more diminutive part, later on, change of these economies (additionally observe Blomstrom & Zejan, 1994; Aitken & Harrison, 1999; and Monge-Naranjo, 2002, Blomstrom & Mucchielli 2003).

For investigations of a gathering of countries, Makki & Somwaru (2004) found a positive effect of exports and FDI on GDP utilizing 66 developing nations information arrived at the midpoint of more than ten-years period, 1971-1980, 1981-1990, and 1991-2000 and the instrumental variable method; Wang & Wei (2004) utilize board information examination on 79 nations from 1970-1988, and find that “ FDI is generally more useful to high-wage countries, while the worldwide exchange is more imperative for low-wage nations.” But they didn’t inspect the stationary variables to maintain a strategic distance from the fake conclusion. Conversely, some studies show a positive connection between FDI and corruption in a sample of 73 developed and underdeveloped nations from 1995 through 1999 (Egger & Winner, 2005).

While the other such as (Agiomirgianakis et al., 2003) employed panel data from OECD countries and established that real GDP growth, Exchange rate, inflation, and level of human capital are statistically significant and positively related to FDI. In the recent past, much literature shows that two fundamental factors are a cane of soundness of economy influencing FDI, including: first, real exchange rate and, second, inflation rate (Naseer, 2007). Resende (2010) traced a positive relationship between money supply and inward FDI. And also Engle & Rangel (2008) found that financial Sector development is a significant element of FDI. A study done by (Das et al., 2009) applied a fixed effect panel data to look at the impacts of trade and FDI on the growth of per capita real GDP in 13 exchange economies of Central and Eastern Europe and the Baltic district from 1991 to 2005. He found a critical beneficial outcome of trade on growth, but FDI has no noteworthy effect on growth in these exchange economies. However, when controlling the impacts of local speculation and exchange on FDI, Das et al. (2009) communicated that it has all the earmarks of being a huge determinant of growth for the period after 1995.

Tolentino (2010) examined the effect of exchange rate on trade situated FDI inflows through the production cost impact and the wealth impact. He asserted that the production cost in an economy with deteriorating money is ideal as it builds the benefits generously because of less expensive factor costs. Also, the foreign firms wind up wealthier than their household partners as they esteem their profit as far as remote cash. Alshamsi & Azam (2015) uses a set of panel data that comprises seven nations, including Pakistan, Bangladesh, India, Afghanistan, Srilanka, Maldives, and Bhutan, for the period 1996 to 2007, which materialized that GDP per capita has a positive and noteworthy effect on FDI inflows, showing that substantial market estimate makes interest for merchandise and ventures which encourages multinational corporation to achieve economies of scale in having a nation. Similarly, Babajidide & Lawal (2016) examined the association between foreign direct investment and macroeconomic indicators in Nigeria from 1990 to 2003. The findings demonstrate that

policies aimed at increasing trade, increasing government spending, manipulating the exchange rate system, and lowering inflation and interest rates effectively lure FDI inflows. Finally, Hassan & Nassar (2017) investigated the relationship between FDI inflows and macroeconomic variables in Mexico using an Auto-Regressive Distributive Lag Model. There was no convincing evidence that foreign direct investment had a significant association with the other economic factors.

Dondashe & Phiri (2018) used an auto-regressive distributive lag model to investigate the influence of macroeconomic variables on FDI in South Africa from 1994 to 2016. The study's findings reveal that FDI is positive and significantly associated with GDP per capita, government size, and terms of trade. Lawson et al. (2019) used regression analysis to determine macroeconomic factors' effect on Ghana's FDI inflows over 30 years. The results demonstrate that FDI inflows vary within the structural break studied, with only a small number of bilateral investment treaties reflecting FDI as a significant factor. Furthermore, Maryam and Mittal (2020) used a pooled mean group and an auto-regressive distributive lag model to look at the relationship between FDI and macroeconomic factors in the BRICS from 1994 to 2018. In the long term, macroeconomic variables are beneficial and substantial, according to the findings. Adebayo et al., on the other hand, used an Auto-Regressive Distributive lag Model to investigate the links between FDI inflows and vital macroeconomic indicators from 1981 to 2018. According to the results, exports and trade openness have a beneficial influence on FDI inflows.

## Research Methodology

The empirical study is also required to fully comprehend India's link between FDI inflows and macroeconomic parameters. The study uses annual data for all variables from 1980 to 2016 and comprises 36 observations. The period considered for this study encompasses the whole economic cycle. The information for the variables was obtained from Reserve Bank of India publications and the World Bank database.

A Multiple regression model is applied in this study to test and verify the impact of macro-economic factors on the FDI inflows in India. The model as per the following:

$$FDI_t = \alpha + \beta_1 GDP_t + \beta_2 CPI_t + \beta_3 GCF_t + \beta_4 BOP_t + \beta_5 ER_t + \beta_6 GFCE_t + \mu_t \quad (1)$$

Where:

FDI = FDI inflows of country at time  $t$

GDP = Real GDP of country at time  $t$

CPI = Consumer price index at time  $t$

GCF = Gross capital formation at time  $t$

BOP = Balance of payment at time  $t$

ER = Exchange rate at time  $t$

GFCE = General final consumption expenditure at time  $t$

$\alpha$  = Intercept

$\beta_1$  to  $\beta_6$  = Estimated coefficient of the dependent variables.

$\mu_1$  = Disturbance term of country at time  $t$

Table 1: Data Description and Source

Variables	Definition of Variable	Source
FDI	Net inflows of foreign investment(as a % of FDP)	World Bank
GDP	Is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products?	World Bank
CPI	A comprehensive measure used for estimation of price changes in a basket of goods and services representative of consumption expenditure in an economy is called consumer price index.	Reserve Bank of India
GCF	Gross capital formation (formerly gross domestic investment) consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories.	World Bank
BOP	Is a statement that records all the monetary transactions made between residents of a country and the rest of the world during any given period?	Reserve Bank of India
ER	In finance, an exchange rate (also known as a foreign-exchange rate, forex rate, FX rate or Agio) between two currencies is the rate at which one currency will be exchanged for another.	Reserve Bank of India
GFCE	General government final consumption expenditure (formerly general government consumption) includes all government current expenditures for purchases of goods and services (including compensation of employees).	World Bank

## Stationary Test

The stationary of the data is the necessary step for sketch gist full interferences in a time series analysis. A given time series is stationary when mean and variance is constant or independent of time. Macro-Economic variables such as gross domestic product, exchange rate, and inflation evolve over time. Before any econometric estimation, it is essential to check whether these variables are stationary or non-stationary, because non-stationary variables may generate a spurious relationship. The present study uses Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests to examine the stationary of the data series. ADF test regresses the first difference of a series with its lagged values first and then electively with a constant and then with a time trend. This can be articulated as follows:

$$\Delta Y_t = \alpha_0 + \alpha_1 t + \alpha_2 Y_{t-1} + \sum_{j=1}^p a_j \Delta y_{t-j} + \varepsilon_t \quad (2)$$



The null hypothesis is rejected when the absolute ADF test value is higher than the absolute Mackinnon's critical value. It indicates that the coefficient is significantly other than zero and thus  $Y_t$  is stationary or does not contain a unit root. The Phillips-Perron (PP) test differs from the ADF test mainly in dealing with serial correlation and Heteroscedasticity in the errors. One advantage of the PP test over the ADF test is that the PP tests are robust to general forms of Heteroscedasticity in the error term  $\mu_t$ .

The model for PP test is:

$$Y_t + \mu + \alpha Y_{t-1} + \varepsilon_t \quad (3)$$

### ARDL Cointegration Test

Pesaran & Shin (1995) and Pesaran et al., (2001) proposed the Autoregressive Distributed Lag (ARDL) approach to cointegration or bound procedure for a long-run relationship, irrespective of whether the underlying variables are 1(0), 1(1), or combination of both in such situation the application of ARDL approach to cointegration gives more realistic and efficient estimates. A bound test within the ARDL approach for cointegration is used in this study. Cointegration testing procedure specifically helps us to know whether the underlying variables in the model are cointegrated or not, given the endogenous variables. The elementary form of the ARDL regression equation is:

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + \dots + \beta_p Y_{t-p} + \alpha_0 + \alpha_1 X_{t-1} + \dots + \alpha_q X_{t-q} + \varepsilon_t \quad (4)$$

$Y_{t-1}$  to  $Y_{t-p}$  are lags of the dependent variables, whereas  $X_{t-1}$  to  $X_{t-q}$  are lags of the independent variable and  $\varepsilon_t$  is a random disturbance term.

The ARDL model is reparameterized into the Error correction model when there is one cointegrating vector among the underlying variables. The reparameterized result gives the underlying variables' short-run dynamics and long-run relationships. Then the ARDL approach includes estimating the following Error correction model:

$$\begin{aligned} \Delta FDI_t = & \beta_0 + \sum_{i=1}^n b_{iy} \Delta \ln FDI_{t-i} + \sum_{i=0}^r c_{iy} \Delta \ln GDP_{t-i} + \sum_{i=0}^r d_{iy} \Delta \ln GCF_{t-i} \\ & + \sum_{i=0}^r e_{iy} \Delta \ln BOP_{t-i} + \sum_{i=0}^r f_{iy} \Delta \ln CPI_{t-i} + \sum_{i=0}^r g_{iy} \Delta \ln ER_{t-i} \\ & + \sum_{i=0}^r h_{iy} \Delta \ln GFCE_{t-i} + \sigma_1 \ln FDI_{t-1} + \sigma b_{iy} \ln GDP_{t-1} \\ & + \sigma c_{iy} \ln GCF_{t-1} + \sigma d_{iy} \ln BOP_{t-1} + \sigma e_{iy} \ln CPI_{t-1} + \sigma f_{iy} \ln ER_{t-1} \\ & + \sigma g_{iy} \ln GFCE_{t-1} + \varepsilon_{1t} \end{aligned} \quad (5)$$



$$\begin{aligned}
\Delta \ln FDI_t = & C_0 + \sum_{i=1}^n \beta_2 \Delta \ln FDI_{t-i} + \sum_{i=1}^m \beta_2 \Delta \ln GDP_{t-i} + \sum_{i=1}^o \beta_2 \Delta \ln GCF_{t-i} \\
& + \sum_{i=1}^p \beta_2 \Delta \ln BOP_{t-i} + \sum_{i=1}^q \beta_2 \Delta \ln CPI_{t-i} + \sum_{i=1}^r \beta_2 \Delta \ln ER_{t-i} \\
& + \sum_{i=1}^s \beta_2 \Delta \ln GFCE_{t-i} + \phi ECM_{t-1} + \varepsilon 1_t
\end{aligned} \tag{6}$$

Where  $n$  is the ARDL model maximum lag order?

$\varepsilon 1_t$  And  $\varepsilon 2_t$  are serially independent random errors with mean zero and finite covariance matrix.

The F-statistics is used to find the long-run relationship between the dependent and independent variable (Pesaran et al., 2001). They give two sets of the critical value; one set assuming that all the variables are  $I(0)$ , i.e., a lower critical bond that embraces all the variables is  $I(0)$ , meaning that there is no cointegration among the underlying variables. Another assumes that all the ARDL model variables are  $I(1)$ , meaning there is cointegration among the underlying variables. Suppose the computed F-statistics fall within (between the lower and upper bond) the critical value band. In that case, the inference result is inconclusive and depends on whether the underlying variables are  $I(0)$  or  $I(1)$ .

### Granger Causality Test

Granger Causality or precedence is a circumstance in which a one-time series variable consistently and predictably changes before another variable. Granger Causality is essential because it allows us to analyze which variable precedes or “leads” the other, and such leading variables are extremely useful for forecasting purposes, Engle & Granger (1987) and Johansen & Juselius (1990). Despite the value of Granger Causality, we shouldn’t let ourselves be lured into thinking that it allows us to prove economic causality in any rigorous way. But their outcome underwent the following limitation: The first direction of causality depends analytically on the number of lagged terms involved. If the selected lag period is lesser than the actual lag length, the Omission of lags causes prejudice in the direction of causality. If we ponder, extraneous lags estimate would be ineffective. Furthermore, these tests assume that the variables are stationary or, even if non-stationary, must have the same order of integration. Thus these tests do not make accurate inferences from empirical evidence; instead are fragile.

Two steps are intertwined while applying this method. The first step comprises the determination of the lag length ( $m$ ), and the second is selecting the maximum

order of integration (dmax) for the variables in the system. Clichéd from the ADF results that the maximum order of integration (dmax) is 1 and from AIC/SIC number of lags (k) to be 1. Therefore, we develop a VAR as in equation (9) with a total of (k+dmax) to be two lags.

$$\begin{bmatrix} FDI_t \\ GDP_t \\ ER_t \\ CPI_t \\ BOP_t \\ GCF_t \\ GFCE_t \end{bmatrix} = A_0 + A_1 \begin{bmatrix} FDI_{t-1} \\ GDP_{t-1} \\ ER_{t-1} \\ CPI_{t-1} \\ BOP_{t-1} \\ GCF_{t-1} \\ GFCE_{t-1} \end{bmatrix} + A_2 \begin{bmatrix} FDI_{t-2} \\ GDP_{t-2} \\ ER_{t-2} \\ CPI_{t-2} \\ BOP_{t-2} \\ GCF_{t-2} \\ GFCE_{t-2} \end{bmatrix} \varepsilon_t \quad (7)$$

Where,

$A_0$  = Indicate intercept vector.

$\varepsilon_t$  = denotes vector of error term.

### Toda and Yamamoto Technique

But in the outlook to clarify these limitations, Toda & Yamamota's (1995) technique was applied. According to him, economic series could be either integrated of the different orders or non-cointegrated. In these cases, the Error correction mechanism can't be applied for Granger causality tests. Hence, they developed an alternative test, irrespective of whether  $Y_t$  and  $X_t$  are 1(0), 1(1), and 1(2), non-cointegrated or cointegrated of arbitrary order. This procedure provides the possibility of testing for causality between integrated variables based on asymptotic theory. This model is applied in a two-step procedure: First, it includes an ADF unit root test to define the maximal order of integration of the series involved in the model. Secondly, a  $K^{th}$  optimal lag VAR model based on series at level is constructed with  $(k + d_{max})$  lags. The optimal lag length is selected on the basis of following criterion like AIC, SIC and HIC.

From the point of time following the Toda and Yamamoto causality test is applied for the bivariate model can be discussed as:

$$X_t = 1 + \sum_{i=1}^{h+d} \beta 1_i X_{t-i} + \sum_{j=1}^{l+d} Y 1_j Y_{t-j} + \varepsilon 1_t \quad (8)$$

$$Y_t = \alpha_2 + \sum_{i=1}^{h+d} \beta 2_i Y_{t-i} + \sum_{j=1}^{l+d} Y 2_j X_{t-j} + \varepsilon 2_t \quad (9)$$

Where  $d$  is the maximal order of integration of the variables in the model,  $h$  and  $l$  is the optimal lag length of  $Y_t$  and  $X_t$ , and  $\varepsilon_{1t}$  and  $\varepsilon_{2t}$  are error terms with zero mean, constant variance and no auto-correlation.

The above model is verified for a set of hypothesis:

Hypothesis for equation (7)

$$H_0: Y_t \text{ does not Granger cause } X_t \text{ if } \sum_{j=1}^i Y_{1j} = 0$$

$$H_1: Y_t \text{ does not Granger cause } X_t \text{ if } \sum_{j=1}^i Y_{1j} \neq 0$$

Hypothesis for equation (8)

$$H_0: X_t \text{ does not Granger cause } Y_t \text{ if } \sum_{j=1}^i Y_{2j} = 0$$

$$H_1: X_t \text{ does not Granger cause } Y_t \text{ if } \sum_{j=1}^i Y_{2j} \neq 0$$

## Findings and Discussion

Table 2 shows the results of the descriptive statistics. The study's dependent variable (FDI) displays considerable dissimilarity from 1980 to 2016. The independent variables also have a more significant dispersion level. All the variables in the study were asymmetrical. It means the bulk of them are skewed to the right side except for the balance of payment, which is negatively skewed. The consumer price index is said to have the highest mean, while the balance of payment has the lowest. The consumer price index for India shows the true worth of salaries, earnings, and pensions, as well as the buying power of a nation's currency and market prices. Except for the payment balance, all the variables have a normal distribution. The mean and median reveal that the normal distribution of the data for each variable in India was relatively close. The minimum and maximum values demonstrated that the variables' overall trend was upward. The standard deviation, meanwhile, showed that the normal or average distance scores deviated from the mean. The FDI value differed or spread from the mean in India by about 1.537293, whether it is 1.537293 above or below 1.119843. The calculated Jarque-Bera statistics and corresponding p-values are applied to test for the normality assumption. Based on the Jarque-Bera statistics and p-values, this assumption is rejected at a 10% significance level for all variables, apart from the inflation figures. However, for FDI and the related explanatory variables, the Jarque-Bera statistic, which suggests the null hypothesis that all the series are obtained from a normally distributed random process, cannot be rejected?

Table 2: Descriptive Statistics

	FDI	BOP	CPI	ER	GDP	GFCE	GCF
Mean	1.119843	-12810.23	56.73982	34.70685	7.460564	8.149534	2.51862
Median	2.635643	-5171.170	49.74981	41.25937	4.161367	5.073852	1.17674
Maximum	4.457632	8772.510	154.9751	67.19531	2.274749	2.647286	7.22390
Minimum	560000	-91471.30	10.06374	7.862945	1.842363	1.823782	3.93750
Standard.dev	1.537293	20719.41	41.97659	17.56417	6.561843	7.058716	2.48480
Skewness	1.120883	-2.227340	0.912329	-0.101563	1.100722	1.148304	0.929201
Kurtosis	2.653802	7.737149	2.804648	1.855129	2.732416	2.935947	2.174618
Jarque-bera	7.932437	65.18901	5.191624	2.084317	7.718222	8.137699	6.374657
Probability	0.018495	0.00000	0.074585	0.052693	0.021087	0.017097	0.041282
Observation	37	37	37	37	37	37	37

Source: Author's own Calculation.

## Unit Root Results

Table 3 shows the unit root test result that conceals the entire variable incorporated into the model is stationary at the level expected the balance of payment (BOP) was detected as non-stationary but became stationary after the first difference. Hence the idea of co-integration is applicable, and the pre-essential of a co-integration test is that the variables must be coordinated in the same arrangement, i.e., all variables must be either I (0) or I (1). However, our examination has a blend of I (0) and I (1) variables; thus, traditional co-integration tests are not conceivable. Consequently, considering the ARDL model, we can direct the co-integration by having a blend of I (0) and I (1) variables without dropping any variable from the examination.

Table 3: Unit root results

Series	At	ADF test stat	PP test stat	Series
BOP	Level	-1.843294	-1.841224	
	First difference	-3.216751***	-5.558228***	Series: 1(1)
CPI	Level	1.629904	6.748920	
	First difference	-1.285051	-1.382028**	Series: 1(1)
ER	Level	0.046821	0.242072	
	First difference	-3.480580***	-4.564358***	Series: 1(1)
GDP	Level	2.535697	3.395844	
	First difference	-2.853084	-3.858635***	Series: 1(1)
FDI	Level	0.227003	0.140548	
	First difference	-3.871705***	-6.32667***	Series: 1(1)
GFCE	Level	2.752763	3.33882	
	First difference	-1.690494	-2.960985**	Series: 1(1)
GCF	Level	0.519242	0.644885	
	First difference	-3.510192**	-5.385294***	Series: 1(1)

Source: Author's own Calculation.

Notes: \*\*\* 5% level of significance, \*\* 1% level of significance.

### Bound test for Cointegration: Wald Test (F) statistics

Equations are estimated using the ordinary least squares method (OLS) in the following step of the ARDL bounds testing approach to test whether there is a long-run relationship between the variables by performing an F-test for the joint significance of the coefficients of the lagged levels of the variables involved. The null hypotheses for the absence of cointegration are:

$$H_{01} : \lambda FDI = \lambda BOP = \lambda CPI = \lambda ER = \lambda GDP = \lambda GFCE = \lambda GCF = 0$$

$$H_{a1} : \lambda FDI \neq 0, \lambda BOP \neq 0, \lambda CPI \neq 0, \lambda ER \neq 0, \lambda GDP \neq 0, \lambda GFCE \neq 0, \lambda GCF \neq 0$$

Table 4 summarizes the findings of the estimated F- statistics when using the normalized FDI as the dependent variable under the ARDL-OLS regression while taking into account the Narayan and Pesaran F-test critical values (2005). The Wald test result of F-Stats is (17.00801) shown in Table 4, and it exceeds the upper bound critical value that Pesaran et al. (2001) and Narayan (2005) established at a 5 percent level of significance. The null hypothesis that there is no cointegration is thereby disproved. Therefore, taking into account both test critical value boundaries, we draw the conclusion that long-term relationships exist among the variables, with FDI inflows acting as the dependent variable.

Table 4: Wald test

Wald test:			
Test Statistics	Valve	df	Probability
F-statistics	17.00801	(6,20)	0.0005
Chi-Square	22.69872	6	0.0000
Null hypothesis: C(10)= C(11)= C(12)= C(13)= C(14)=C(15)=0			
Null hypothesis summary:			
Normalized restriction(=0)	Valve	Std.error	
C(10)	0.387484	0.132924	
C(11)	-0.809659	0.128319	
C(12)	-0.067903	0.021616	
C(13)	0.107597	0.022482	
C(14)	-2.264029	1.904319	
C(15)	0.143989	0.034914	

Source: Author's own Calculation.

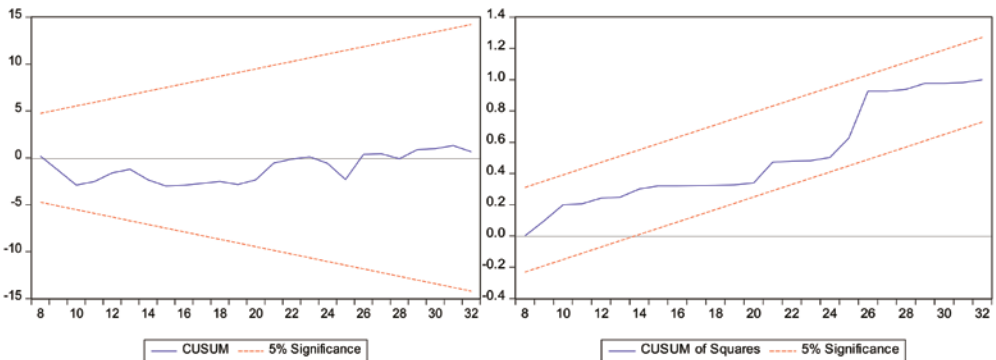
Note: Restrictions are linear in coefficients

Bounds for asymptotic critical values taken from Pesaran et al., (2001) Table C I (ii) case II (restricted intercept, no trend, and K = 3) with three regressors. At a 5% significance level, the lower limit I (0) = 2.79 and the upper bound I (1) = 3.67. Results from case II by Narayan (2005) differ somewhat from those by Pesaran et al (2001). Values for the lower limit and upper bound are 3.164 and 4.194, respectively, with a constrained intercept and no trend for 35 observations and three regressors as K 14=3 at the 5% level of significance.

## Stability test

Brown et al. (1975) suggested tests for parameter reliability. This test is based on recursive residuals and is known as the cumulative sum of recursive residuals (CUSUM) and cumulative sum of the square of recursive residuals (CUSUMSQ). Figure plots of both recursive residuals give an accurate picture for analyzing parameter variations and assessment making. The CUSUM and CUSUMSQ test a null hypothesis of parameter constancy over the sample. The 5 percent critical lines and the cumulative sum are plotted in a figure plot of the CUSUM and CUSUMSQ test. If the collective sum crosses the 5 percent critical lines, the parameters are not stable. The plots of both graphs did not cross the critical value line, which indicates the stability of the estimated parameters, and this model is beneficial for policy and decision-making.

Figure 1: CUSUM (left) and CUSUMSQ (right) for India.



## Toda Yamamoto causality test

Table 5, shows that there is a bi-directional causality between balance of payment and FDI also bi- directional causality exist between gross domestic product and FDI. Exchange rate and consumer price index does not causes FDI which flags that FDI venture are long haul in nature and with the outlandish financial instrument accessible for supporting, the multinational organizations deals with their forex risk when they choose to put resources into outside land. There appear to exist a unidirectional causality among Inflation and FDI spilling out of FDI to Inflation, (i.e., FDI in retail, and so forth. are controlled) however we should not overlook the financial hypothesis proposing “direct expansion is positive for developing economies”. Subsequently legitimate supervision in regards to the utilization of FDI inflows must be controlled by the government on time to time basis. The GFCE and GCF significantly causes FDI.

These results are in confirmation of previous studies (Dutt & Ghosh, 1994; Khalafalla & Webb, 2001). The findings show that while increased FDI inflows enhance GDP, they have a negative impact on export growth over the long term. This may be due mostly to the fact that India draws a sizable portion of the market seeking FDI. As a result, the government must focus on creating policies that encourage FDI that is export-oriented.

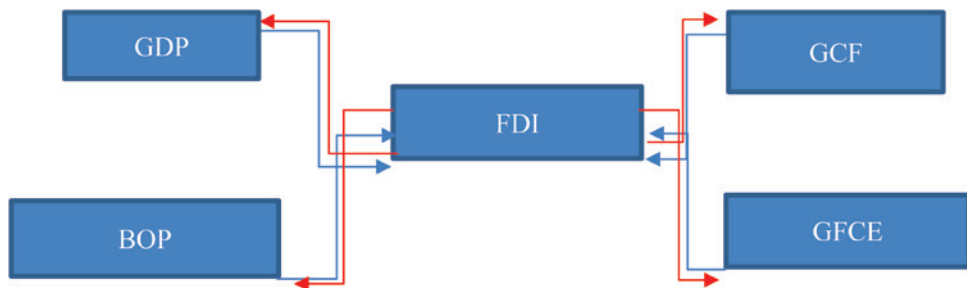
Table 6: Results of Toda Yamamoto causality test

Null hypothesis	MWALD Statistics	P-value
<b>GDP versus FDI</b>		
GDP does not Granger cause FDI	22.38696*	0.0000
FDI does not Granger cause GDP	8.543475**	0.0140
<b>BOP versus FDI</b>		
BOP does not Granger cause FDI	1.38696***	0.0602
FDI does not Granger cause BOP	10.82182*	0.0000
<b>ER versus FDI</b>		
ER does not Granger cause FDI	6.970749	0.6994
FDI does not Granger cause ER	1.827315	0.4011
<b>CPI versus FDI</b>		
CPI does not Granger cause FDI	4.59486	0.1005
FDI does not Granger cause FDI	1.23596	0.5390
<b>GCF versus FDI</b>		
GCF does not Granger cause FDI	21.42612*	0.0000
FDI does not Granger cause GCF	4.001193**	0.0353
<b>GFCE versus FDI</b>		
GFCE does not Granger cause FDI	0.771873*	0.0000
FDI does not Granger cause GFCE	6.915065**	0.0315

Source: Author's own Calculation.

Note : (\*), (\*\*), and (\*\*\*) denotes significance at 1%, 5% and 10% levels respectively.

Figure 2: Pair wise Granger Causality test



Note: The red and blue lines refer to bidirectional causality among the variables.



The results of pairwise granger causality between FDI and different macro-economic variables are presented in Figure 2. We have found that causality between FDI and balance of payment, FDI and gross domestic product are bidirectional, no causality exist between FDI and exchange rate, FDI and consumer price index.

## Discussion

An ARDL (bound testing) approach to cointegration proposed by Pesaran et al. (2001) was used in this study, showing substantial evidence of a long-run relationship between gross domestic product, FDI inflows, and gross capital formation in the case of India. Furthermore, it validates by Toda Yamamoto Causality Test findings which signify a cause and effect connection between FDI and other explanatory variables. The bidirectional causality between the FDI and Gross domestic product recommends that FDI pulled toward India for its immense market potential. The causal connection between FDI and balance of payment infers that internal inflows of FDI might have been utilized as a short-term financing device. A solid financial framework in India makes the above suspicion decline. The outcome identified that exchange rate and FDI are intentional to comprehend because exchange rates in India were see-sawing amid the period; however, FDI inflows have not decreased due to this. It shows the potential; India has in contrast with other Asian countries. The outcomes likewise affirmed that FDI is a factor causing inflation within the period. It might be on the back of useless utilization of FDI inflows significantly due to the patterned financial vulnerabilities causing damping business movement in the distinctive periods of the examination time frame. In light of the aforementioned facts, it can be concluded that solid macroeconomic foundations together with a productive capital market boost investor confidence in companies and favorably influence FDI inflows.

The Findings of this paper provides vital ramifications for policy makers and outside financial specialists. Policy makers are essential to push reform agenda in local market in order to pull more FDI in the Indian economy. The policy makers should make steady and straightforward strategies to give shield to the outside financial specialists and gain their self-assurance. The unbalanced policies owing to its repeatedly changing characteristics weaken the confidence of the investors in the rules and regulations governing the respective sectors of the country. Accordingly it includes wait and watch behavior amongst the foreign investors either because they are not sure about the future or because of anticipation of better policy in succeeding period. Government of India needs more attention towards macro-economic policies to reduce the production and transaction cost of MNE's. Nowadays India is on the eye of foreign investors due to huge market potential, transparent tax system with goods and service tax, and political stability. Due to proper financial system in place, chances of more FDI will come. However, lack of transparency leads to unnecessary

delays in the approval and the execution of the projects. In view of this, India should take continuous steps to ensure an enabling business environment to improve India's attractiveness as an investment destination and a global manufacturing hub. Improving governance and overall accountability in public office will not only help attract more FDI but also increase domestic investment.

## **Implications**

The result of this empirical study thrives new insights between FDI and macro-economic variables, particularly in the Indian Context. First FDI plays an important role for accessing international markets, innovation change, an increase in productivity level, and an upsurge in financial output and macroeconomic level fluctuations occur to given prosperity. Second Indian markets spinning into a collective worldwide platform to fortify the investment sector and also increase the flow of foreign investment with the course of time. Third India should have to come up with a liberal and transparent policy framework of FDI alongside reinforcing human and institutional capabilities to execute them, so as to accomplish the anticipated effects on the FDI inflows. The fourth point is that FDI boom will be more in India if the environmental conditions are friendly. Favorable and supportive environment conditions give upsurge for economic growth, which in turn entices foreign inflow of capital. In today's scenario, the important issue in front of the government is how to handle the association between FDI and other political, social, and cultural factors. In this way, our view is that the vital signs of FDI for India may not be the FDI itself, but the level of openness the government obliges to in order to pull foreign capital, with a free level of international trade and capital, free market, and deregulation of businesses, the nation will become the leading economic powers it aims to be.

## **Future Directions**

Subsequently India should more focus on the program of economic reforms, as a sound and better economic system plays major role for the attraction of foreign capital. Though any political change need to guarantee that insecurity does not arise. Market access obstructions ought to be taken out and it ought to support market-oriented FDI as this is desirable over export orientated FDI since it prompts innovation move and spillover impacts. Such a way will assist Indian firms with moving up the innovation stepping stool. Besides, India should accelerate the privatization of state-owned organizations, including banks; to build up a future market for currency exchanging and to set up an independent credit-rating agency. Foreign Capital plays a vital role in Economies of Asia, because it uplifts the liquidity of Asian economy and also

helped other investments such as provide more business opportunities for local entrepreneurs as well as support businesses for construction, hospitality and transportation etc. Also, it creates more avenues for employment opportunities, and tax revenues and such revenue have been fed back into the economy to boost the living standards of all Asian people, further boosting the economy, facilitating a virtuous-cycle of prosperity for over two decades.

## **Limitations**

It is crucial to remember that this study has several limitations: First, trade strikes are a significant element that has a long-term impact on FDI. Trade strikes will provide a picture of the industrial environment and the level of volatility, enabling them to assess the security and potential for better investment returns. Second, this study uses data for a single nation from 1985 to 2016. A more reliable result outcome through cross-sectional analysis on bigger sample size, and the researcher use data from sources that are openly accessible. To assess the effects of FDI influx to other rising countries, large data sets of additional explanatory variables would be helpful. However, these restrictions would be valuable to our on-going study agenda.

## **Declarations**

### *Funding*

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### *Conflicts of interest/Competing interests*

There is no conflict of interest.

### *Availability of data and material*

The data that support the findings of this study are openly available in the website of World Bank ([www.worldbank.org](http://www.worldbank.org)) and Reserve Bank of India ([www.rbi.org.in](http://www.rbi.org.in)).

### *Code Availability*

EvIEWS 12 results are presented through the tables in the manuscript.

*Authors' Contributions*

**Ishfaq Hamid:** Writing original draft.

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