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Do the macroeconomic indicators influence foreign direct investment inflow? Evidence from India

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Abstract. *This study significantly contributes to the growing literature on the dynamic link between FDI inflow and macroeconomic factors like inflation, trade openness, market size, and exchange rate in the case of India. An Autoregressive Distributed Lag bound testing approach with annual time-series data from 1975 to 2017 employed for modelling the short-run and long-run dynamics. Using Wald coefficients, the study found integration between the variables. It further discovered that variables are correcting the shock-induced disequilibrium at a speed of 86%. In the long-run trade openness and real gross domestic product positively affect the FDI inflow, whereas the exchange rate and inflation are negatively associated with FDI inflow. However, the study failed to detect any short-run association among the variables. Based on the findings, the research suggests better management of inflation and exchange rate volatility through specific policy action for attracting more global capital to the economy.*

Keywords: FDI; ARDL; inflation; GDP; exchange rate; trade openness.

JEL Classification: F21, F63, E22.

1. Introduction

The past few decades have witnessed a remarkable increase of foreign direct investment (FDI) that has surpassed both world output and trade (UNCTAD, 2017). The motive for the better effort to attract more FDI begin from the prevalent belief on the multi-dimensional benefits such as technology transfer and advancement, growth in production and productivity along with labour empowerment and international production network (Sader, 1999). In addition to that, it is a significant source of non-volatile, non-debt financial resource for the economic development of developing countries (Rădulescu and Druica, 2014). Economic liberalisation boosted the flow of capital which gave a win-win strategy for both host and home country, which resulted in the development of institutional and market level. The change in the scale and nature of the FDI inflow to Emerging Market Economies (EMEs) have long been further influenced by continuous waves in the economic, social, political and financial changes.

Identifying the dynamic relationship between macroeconomic variables and FDI inflow into the country is complicated because of its interconnection with social, economic and political conditions of the host countries. But the academic community mentioned specific factors which determine the FDI inflow. For instance, Dunning's (1977, 2013) Eclectic Theory based on the comprehensive framework of Ownership, Location, and Internationalization (OLI) continues the dominant framework for analysing the determinants of FDI and other international operations of Multi-National Enterprises (MNEs). FDI usually fly to the economies where it is easy to converge the ownership advantage with location advantage through the internationalisation of the overseas investment (UNCTAD, 1998). Similarly, other factors like strategic advantage, potential market growth, resources (including natural resources and human resources), technological and infrastructural development also decide the FDI Inflow. In addition, stages in economic cycle, political and economic stability, development of financial markets and institutions, law and order, trade openness and restrictions on capital mobility also determine the capital flow (Blonigen, 2005; Boateng et al., 2015; Petri, 2012; Sethi et al., 2003).

1.1. FDI in Indian scenario

In recent years, FDI is measured to be the yardstick of economic growth, development, and openness, as it promotes the collaboration of different economies for economic development (OECD, 2002). India has been prominent among the world nations as a potential destination for FDI, because of its possible market size, human resources, natural resources, and growth. Despite a 13% drop in global FDI inflow in 2016 (UNCTAD, 2017), Department of Industrial Policy and Promotion (DIPP), Government of India (GoI) showed an 18% jump in FDI inflow to the country. In the second stage of the policy reform in India, foreign investors are authorised to invest in most of the sectors. As a result, some infrastructural projects were initiated with the help of Japan, Germany, and the United States of America (USA) in the last few decades. These projects are designed to surmount the infrastructure bottleneck, which is considered as the major obstacle in attracting further FDI to the economy. Similarly, there are lots of investment-summits which are meant to attract more investors in the manufacturing and service sectors as part of ‘Make in India’ programme. These activities aim to exploit the global trend of investing in EMEs.

The oil price crisis decline in export and the consequential Balance of Payment (BoP) deterioration in the 1980s lead Indian government to liberalise the economy partially. The failure of the previous policy action leads to a significant BoP crisis in1991, which made a drastic shift from the protective system during the 80s to Liberalisation, Privatisation & Globalisation (LPG) promoting foreign trade and investment during 90s. This radical shift boosted the capital flow from -0.01% in 1975 to 3.65% of GDP in 2008. For achieving such a far-reaching goal, the Government of India implemented the Structural Adjustment Program (SAP) and macroeconomic stabilisation schemes with the help of the World Bank and International Monetary Fund (IMF) (Ahluwalia, 1996). Changes in the institutional, infrastructural and administrative level including removal of the equity ceiling of 40% under Foreign Exchange Regulation Act, 1973 (FEMA act, 1973), lifting the sectorial restriction on entry and expansion of foreign companies, lifting restriction on international brands, liberalizing the rules and regulations on technological transfer and royalty payment contributed to the growth of FDI Inflow. Establishment of Foreign Investment Promotion Board (FIPB) and membership in specialised agencies like Multilateral Investment Guarantee Agency (MIGA) for the protection of the investors also helped to boost the capital flow. Also, opening-up of retail, insurance, and banking sectors along with Small Scale Enterprises (SSEs) contributed to explosive growth in FDI. In recent years, FDI is permitted in most of the industries (fully or partially) with delegated authority to Reserve Bank of India (RBI) under an Automatic Route framework except in case of a few industries where government approval is necessary. Recently, the Government of India abolished FIPB as part of 'Maximum Governance and Minimum Government' principle. Now, processing and approval of the FDI application are delegated to the concerned Ministries and Departments in consultation with DIPP under the Ministry of Commerce, which guide the procedures for handling and consent of the application (Chandran, 2017).

In this backdrop, this paper investigates the macroeconomic factors which drive FDI inflow into India. It also examines the long-term and short-run dynamic relationship between the FDI inflow and these factors. As part of developing the context for the present inquiry, the next section of the paper discusses scholarly literature about determining factors of FDI inflow in different economies. The third and fourth sections of the paper deal with the econometric model and analysis respectively, concluding its findings in the last section.

2. Literature review

Over the past few decades, policymakers and researchers have been trying to identify and explore different aspects of FDI inflow. Numerous empirical studies across the world examine the impact of the FDI inflow on the host and home country. The research on FDI starts from the question of why firms are going abroad for their investment activities. Blonigen (2005) argues that some intangible assets within the firm (like managerial skill, technology) can be used in a larger area generating more wealth without extensive effort. The urge to optimally use such resources to tap potential market motivate firms to invest in a foreign country. Dunning and Lundan (2008) described three kinds of FDI investments. The first form of FDI is called market-seeking FDI in which investors reach out to host countries to tap their potential markets. Secondly, resource seeking FDI aims to acquire

resources which are unavailable in the origin country. Thirdly, efficiency-seeking FDI aspires to explore the foreign market to utilise economies of scale. Mutual existence of these factors makes to identify the specific one.

From the side of the host country, UNCTAD (1998) classified the driving factors of FDI inflow into three: economic factors, political factors, and business facilitation. These theoretical arguments are not easily measurable because of the presence of multiple elements in each category. For econometric analysis, researchers considered exchange rate, GDP growth, size of the potential market, inflation, and trade openness as significant factors of the FDI inflow (Artige and Nicolini, 2006; Koojarroenprasit, 2013; Piteli, 2010; Ramasamy and Yeung, 2010; Singhania and Gupta, 2011). Despite examining the individual influence of these factors on FDI inflow, many empirical studies examined several combinations of these different variables to get a better understanding of the dynamic relationship during different periods in different economies.

According to the majority of studies, potential market size is the most influential determinants of FDI inflow in developed or developing economies (Artige and Nicolini, 2006). Such studies consider GDP or GDP per capita as a variable for measuring market size. Jordaan (2004), argue that economies with the larger potential market and sufficient purchasing power tend to attract FDI as they provide the opportunity to sustain in the market with a higher return for an extended period. Chakrabarti (2001) argued that large market is essential for optimum utilisation of capacity to take advantage of the economies of scale. Studies from countries across the world including Japan, China, and European countries establish that there is a positive relationship between GDP growth and FDI inflow (Ali and Guo, 2005; Hara and Razafimahefa, 2005; Parletun, 2008; Ramasamy and Yeung, 2010). Similarly, Asiedu (2002) and Demirhan and Masca (2008) found a strong binding between GDP growth and FDI inflow in developing countries. They argued that extension of the market size magnetises FDI inflow.

The impact of macroeconomic variables like exchange rate, interest rate, and inflation on FDI also has been examined by many empirical studies. Froot and Stein (1991) first brought out empirical results which challenged the general wisdom was that variation in the exchange rate would not revise the investment decision of the foreign firms. But they found that appreciation of the host countries currency makes the assets costly, so the companies delay or divert their investments. Blonigen (1997) Klein and Rosengren (1994) also supported the argument that depreciation of home currency makes the assets cheaper and boosts the FDI inflow. However, the relationship between exchange rate appreciation and its volatility hurt FDI (Ang, 2008; Koojarroenprasit, 2013). Several researchers have empirically established that higher inflation in the destination country increases the price of investment, reduces the profit and thus reduces FDI inflow (Boateng et al., 2015; Cevis and Camurdan, 2007; Demirhan and Masca, 2008). The interest rate is another macroeconomic variable which determines investment decisions. It has a supportive relationship with FDI (Anna et al., 2012; Cevis and Camurdan, 2007; Singhania and Gupta, 2011). But Koojarroenprasit (2013) and Ramasamy and Yeung (2010) found a negative relationship between these variables.

There is a shortage of studies which used Autoregressive Distributed Lag (ARDL) model for estimating the long-run and short-run relationship among FDI and other macroeconomic variables like exchange rate, inflation, and GDP for minimising the potential information loss. Several studies from emerging Asian and African economies and trade associations like BRICS found that GDP growth rate has a significant long-run affiliation with FDI inflow. Similarly exchange rate, inflation, foreign exchange reserve, and manufacturing growth also contributed to the growth of FDI in different economies (Almsafir et al., 2011; Bekhet and Mugableh, 2012; Chandran and Krishnan, 2008; Goh et al., 2017; Lodhi et al., 2013; Pondicherry and Tan, 2017; Ravinthirakumaran et al., 2015; Vijayakumar et al., 2010).

On a general note, it can be seen that the developing economies around the world have attracted numerous academic interest in terms of understanding the determinants of FDI inflow. However, despite being the 9th largest FDI destination in the world, there are only a few studies which examine the determinants of FDI in India exclusively (UNCTAD, 2017). Studies which analysed the FDI determinants in BRICS countries (Duan, 2010; Jadhav, 2012; Vijayakumar et al., 2010) established that market size, GDP growth, labour cost, exchange rate, and infrastructure are critical factors of increased FDI inflow. Similarly, (Sahoo, 2006) with the help of panel regression method, and (Bhavan et al., 2011) with Generalized Method of Moments (GMM) model found similar results. In addition, both these studies also established a significant positive relationship between trade openness and FDI.

The US trade commission report on Indian FDI highlighted that infrastructure, labour cost, high growth rate and development of capital and financial market enhances FDI inflow (Bloodgood, 2007). However, they concluded that bureaucracy and corruption as hindering forces. Singhania and Gupta (2011) used ARIMA model and found that GDP, inflation and advancement in scientific research influence FDI inflow. Regression analysis by Kaur and Sharma (2013) found that trade openness, GDP, reserve and long-term debt have a positive effect while the exchange rate and inflation has a pessimistic impact on FDI. Parvathi (2015) used multiple regression analysis, to discover that export, wholesale price index, exchange rate changes, and foreign exchange reserve are the significant determinants of Indian FDI.

Table 1. *Summary of major Indian studies*

Authors	Maniam and Chatterjee (1998)	Venkatara many (2002)	Azam and Lukman (2010)	Vijayakumar et al. (2010)	Singhania and Gupta (2011)	Jadhav (2012)	Kaur and Sharma (2013)	Kishor and Singh (2015)	Gupta and Singh (2016)	Baby and Sharma (2017)
Country	India	India	India, Indonesia and Pakistan	BRICS	India	BRICS	India	BRICS	BRICS	India
Sample Period	1962-1994	1991-2000	1970-2005	1975-2007	1991-2008	2000-2009	1990-2011	1994-2014	1983–2013	1994-2015
Market Size (GDP)	Insignificant	(+)	(+)	(+)	(-)	(+)	(+)	(+)	Insignificant	Insignificant
Infrastructure			(+)	(+)				(+)		
Labour Cost				(-)					(-)	
Exchange Rate (Real/ Nominal/REER)	(-)			(-)			(-)	Insignificant	(-)	(+)
Inflation		(-)	(+)	Insignificant	(-)	(+)	(-)		(-)	(+)
Interest Rate		(+)			(+)					(-)
Foreign Exchange Reserve			(+)				(+)			Insignificant
Trade Openness			(-)	Insignificant	(+)	(+)	(+)		(+)	
Gross Capital Formation				(-)					Insignificant	
R&D Expenditure					(+)					
Natural Resource Availability						Insignificant				
Money Growth					(-)					
Long-term Debt							(+)			
Changes in Export		(+)								
Changes in Import		(+)								
External Indebtedness			(-)							Insignificant
Government Incentives			(+)							
Industrial Production Index				Insignificant				Insignificant	(+)	
Trade Balance	Insignificant									
Stock Market Turnover								Insignificant		

Notes: (+) sign shows the positive relation with FDI inflow, (-) sign shows the negative association with FDI inflow.

Existing literature points out different economic factors that influence the growth of FDI inflow. Table 1 shows the significant factors identified by various researchers in the Indian context. Practically it is impossible to include all these potential variables in a single model because of the multicollinearity and stationarity issues. However, for the sake of succinctness, this study incorporated only those variables which have strong proximity to the purpose of the study and current economic scenario. Moreover, trying to examine the influence of all possible factors simultaneously in the present model may not yield a viable outcome due to specific methodological contexts. For this reason, the study, after a rigorous review of significant studies, employed a combination of only those variables which are more sensitive to FDI behaviour in the Indian context. The present study attempts to explore this lacuna by applying an ARDL model on data for 43 years (1975-2017) to understand the long-term and short-term dynamics between the FDI inflow and its determinants.

3. Data and model specification

3.1. Data and variable construction

The used annual time-series data on FDI inflow, real exchange rate (INR/USD), real GDP, trade openness and the inflation rate for macroeconomic stability from 1975 to 2017. All data is sourced from World Development Indicator (WDI) and Federal Reserve Bank of St. Louis (Fred). The explained variable in the study is Net. All the explanatory variables are cautiously chosen, after reviewing studies from similar economies. All the variables were changed into the natural log for minimising the problem of heteroscedasticity (Bekhet and Mugableh, 2012; Chen et al., 1986). Keeping in mind the prime objective, the basic econometric model of the described as follows:

$$LFDI_t = \alpha + \beta_1 LEXC_t + \beta_2 LCPI_t + \beta_3 LGDP_t + \beta_4 LT_t + \mu_t \quad \ldots \quad (1)$$

Where LFDI describe net FDI inflow measured in millions of USD, LEXC symbolises real exchange rate (INR/USD), LCPI stands for annual variations in consumer price index measured in terms of constant of 2010=100 index. LGDP is the natural log of real Gross Domestic Product used as a proxy for market size (million USD), LT is trade openness measured as trade ratio to GDP, and μ_t is the white noise error term.

3.2. Econometric methodology

The Study employed robust ARDL approach introduced by Pesaran and Shin (1999) and further extended by Pesaran, Shin, and Smith (2001) to investigate the possible interaction among the underlined variables. This methodology has several virtues over other similar techniques such as:

(a) This test is based on the single ARDL equation, rather than on a VAR as in Johansen's model. Thus, it reduces the number of parameters to be estimated.
(b) This test is comparably more efficient in small and finite sample data sizes, as is the case in our study.
(c) This test is not restrictive and can apply regardless of whether the regressors in the model are purely I(0), purely I(1) or mutual cointegrated (Pesaran, 1997).

(d) ARDL representation does not call for symmetry of lag length. Each length can have a different number of lag lengths (Laurenceson and Chai, 2003).

The Unrestricted Error Correction Model (UECM) of ARDL approach can be written as:

$$\Delta LFDI_t = a_1 + \sum_{i=1}^{\rho} a_2 \Delta LFDI_{t-i} + \sum_{i=0}^{q_1} a_3 \Delta LEXC_{t-i} + \sum_{i=0}^{q_2} a_4 \Delta LCPI_{t-i} + \sum_{i=0}^{q_3} a_5 \Delta LGDP_{t-i} + \sum_{i=0}^{q_4} a_6 \Delta LT_{t-i} + \lambda_1 LFDI_{t-1} + \lambda_2 LEXC_{t-1} + \lambda_3 LCPI_{t-1} + \lambda_4 LGDP_{t-1} + \lambda_5 LT_{t-1} + \mu_t \quad (2)$$

The model in equation (2) is a "conditional ECM", estimates unrestricted coefficients (Pesaran et al., 2001). a_1 is the drift component, parameters $\alpha_2 - \alpha_6$ estimates short-run coefficients $\lambda_1 - \lambda_5$ represent the long-run coefficients. Δ denotes the first difference operator and μ_t is the white noise error. Optimum lag lengths of the variables are determined through information criteria such as AIC, BIC, HQ, and FPE. The null hypothesis described below is tested by considering the Unrestricted ECM:

$H_0 : \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = 0$

$H_1 : \lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq \lambda_5 \neq 0$

The F-statistics is based on the Wald statistics to test the cointegration hypothesis. Critical values (upper and lower critical values, i.e. I(0) and I(1)) describe by Pesaran et al. (2001) for the cointegration test. If the upper bound value lower than calculated F-statistics, confirm the cointegrating relationship among the variables. On the other hand, a critical value higher than calculated F-statistics makes to accept the null hypothesis. Computed F-statistics in the middle of I (0) and I(1) gives an inconclusive result.

Further, short-run parameters are estimated using the ECM as illustrated in equation (3) mentioned below:

$$\Delta LFDI_t = c_1 + \sum_{i=1}^{\rho} c_2 \Delta LFDI_{t-i} + \sum_{i=0}^{q_1} c_3 \Delta LEXC_{t-i} + \sum_{i=0}^{q_2} c_4 \Delta LCPI_{t-i} + \sum_{i=0}^{q_3} c_5 \Delta LGDP_{t-i} + \sum_{i=0}^{q_4} c_6 \Delta LT_{t-i} + \gamma EC_{t-1} + \mu_t \quad (3)$$

The parameter of the error correction term γ describes how the system adjusts to disequilibrium. It gives details on the speed at which explained variable rush back to the long-run equilibrium diverted due to shocks in independent variables. Likewise, in (Hendry, 1995) the general-to-specific linear modelling approach is pursued by eliminating the insignificant lags in the fitted model.

4. Empirical results and findings

4.1. Testing of the unit root hypothesis

Identifying the Data Generating Process (DGP) of a series is always crucial as deriving a regression model with non-stationary time series data direct to the spurious results (Gujarati and Porter, 2009). Theoretically, the absence of unit root (presence of constant mean and variance) in a time series make series stationery (Hendry, 1995). Therefore, it is essential to know the possible number of unit roots in a series for developing a non-spurious regression model. For checking the unit root, this study applied the conventional Augmented Dickey-Fuller (ADF) test suggested by Dickey and Fuller (1979) and Phillips and Perron's test developed by Phillips and Perron (1988). Summary of the unit root test result is presented below.

Table 2. *Unit root rest*

			ADF			PP	
Variables		Intercept	Intercept & Trend	None	Intercept	Intercept & Trend	None
LFDI	Level	-1.335	-3.355	1.213	-0.952	-3.364	2.305
	Δ	-5.358***	-5.537***	-6.113***	-9.023***	-8.800***	-6.235***
LEXC	Level	-1.921	-0.654	0.693	-1.818	-0.793	-0.736
	Δ	-4.422***	-4.844***	-4.365***	-4.442***	-4.844***	-4.394***
LCPI	Level	-5.884***	-5.821***	-1.407	-5.124***	-5.054***	-2.524**
LGDP	Level	2.475	-2.057	13.55	3.684	-2.035	13.55
	Δ	-5.382***	-6.383***	-1.011	-5.384***	-6.946***	-1.756*
LT	Level	-0.111	-1.840	2.855	-0.162	-1.840	2.828
	Δ	-5.551***	-5.460***	-2.640***	-5.551***	-5.460***	-2.640***

Notes: ***, ** and * denotes significance at 1%, 5% and 10%, respectively. Δ denotes first difference.
Source: Authors calculation.

The results of the unit root test point out that none of the variables except CPI integrated at level, but they are integrated at first difference, i.e. I (1). The necessary condition on the stationarity that none of the variables are stationary at I (2), otherwise the underlying assumptions of the ARDL model would have violated.

4.2. Lag selection of ARDL (p,q) model

Optimum lag length for the ARDL bound testing is identified through equation (2) in the OLS framework to confirm the existence of a long-run association among the variables. The issue of overfitting and underfitting makes choice of optimum lag length arduous and ponderous because overfitting of the lag length unreasonably enhances the mean squared forecast error whereas underfitting of the lag length frequently generates the issue of autocorrelation in the VAR model (Lütkepohl, 1993). Using information criteria like Akaike information criterion, Schwarz information criterion (SIC) and Hannan-Quinn information criterion (HQ).

Table 3. ARDL *lag selection criteria*

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-27.87415	NA*	0.553173	2.227891	2.676821*	2.380989
1	-26.77103	1.492461	0.553252	2.221825	2.715648	2.390233
2	-25.98581	1.016166	0.564564	2.234459	2.773175	2.418177
3	-23.53296	3.029996	0.523112*	2.148997*	2.732606	2.348025*
4	-23.52195	0.012951	0.560591	2.207173	2.835675	2.421510

Notes: * indicates lag order selected by the criterion (each test at 5% level); LR: sequential modified LR test statistic; FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn information criterion.
Source: Author calculation.

The optimum lags were selected on the basis of the lag at which absolute values of information criterion were minimised. Following the arguments of (Gutierrez et al., 2009; Liew, 2004) Gutierrez et al. (2009) and Liew (2004), this study used AIC to incorporate the optimal lag length of three (p = 3) for better and reliable results in contrast to other criteria.

4.3. ARDL bound test

F-statistic developed by (Pesaran et al., 2001) were used for confirmation of the cointegration relationship among the variables. The estimated F-statistics is 16.334 which is larger than the upper bound value I (1) as presented in Table 4. Thus, we reject the null hypothesis of absence cointegration at the 5% level of significance and conclude that they all move together in the long-run.

Table 4. *Cointegration estimation.*

	Bound test F- Statistics computed Value	Bound test F critical Value at 1% level		Decision
		I (0)	I (1)	
$LFDI_t = f(LCPI_t, LEXC_t, LT_t, LGDP_t)$	16.334***	3.81	4.92	Cointegrated

Source: Authors calculation.

4.4. Long-run and short-run estimation

4.4.1. Long-run relationship

All the variables in the long-run are statistically significant with a theoretically expected sign. The results are illustrated in Table 5. The estimated coefficients of trade openness and GDP have positive sign confirm that 1% increase in trade openness and GDP increased FDI inflow by 0.15% and 11.4%, respectively, whereas 1% hike in inflation rate and exchange rate reduced the share of FDI inflow by 4.1% and 0.26% respectively. The R^2 of the model confirm the high power of the coefficient of determination, implying that the explanatory variables explain almost 85.3% variation in the explained variable. The Durbin-Watson value is higher than two which signify the serially uncorrelated errors with their lagged values.

The positive coefficient of GDP and trade openness indicates that India follows a more flexible trade regime and therefore can attract more FDI. The findings on potential market size match with results of Kaur and Sharma (2013) and Jadhav (2012), whereas the positive coefficient on trade openness contradicts the results of Azam and Lukman (2010).

The negative coefficient of the exchange rate and inflation rate is in consensus with the theoretical argument of an inverse association between FDI and these variables. It reveals that depreciation of domestic currency (Indian Rupee) attract more FDI inflow whereas, appreciation dampens the investment inflow. Similar results were found by Ali and Guo (2005) and Dees (1998) that depreciation of Yuan attracts more FDI into China. The present study substantiates the standard theoretical argument that exchange rate is a crucial element to attract more FDI in developing nations. Moreover, our result on inflation rate verifies the findings of Venkataramany (2002).

Long-run estimation results can be concluded that macroeconomic factors like inflation rate, exchange rate, trade openness, and GDP are the key determinants of FDI inflow in India.

Table 5. *Estimated long run coefficients*

Explained variable LFDI

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-347.20	209.3614	-5.458433	0.0001***
LEXC	-0.2646	3.554956	6.142954	0.0000***
LCPI	-4.1023	2.997831	-2.412532	0.0282**
LGDP	11.4088	15.23934	5.414485	0.0001***
LT	0.1507	1.244838	-2.643989	0.0177**
Long-Run Diagnostic Results				
Serial correlation (LM Test) = 0.90(0.63)		R-Square = 0.853		
Heteroscedasticity Test = 15.224(0.70)		Adjusted R-Squared = 0.680		
Normality (J-B Test) = 0.531(0.76)		Durbin-Watson Stat = 2.148		
F-statistic = 4.916		Prob (F-statistic) = 0.000		

Notes: ***' ** and * denotes significant at 1%, 5% and 10% alpha level.
Source: Authors' calculation.

4.4.2. Short-run estimation (lag order: 2, 2, 3, 3, 0 and 1).

Further, this study employed the error correction framework of the ARDL model with lag order of (2, 2, 3, 3, 0 and 1). The results are mentioned in Table 6. Statistically significant negative coefficients of error correction term (ECT_{t-1}) signify the mean reversion speed of the model. It indicates the rate of adjusting the system towards long-run equilibrium, which is 86% in the present model. A highly significant ECT is supplement evidence for the existence of a stable long-run bond among the variables (Banerjee et al., 1998). Diagnostic tests for auto-correlation, normality, heteroscedasticity was conducted as shown in Table 6. This test shows that there is no indication of multicollinearity and heteroscedasticity in the model. In the short-run, trade openness, consumer price index, GDP, and exchange rate do not significantly affect the FDI inflow in India. FDI does not contribute much in the short-run because of its spillover effect as it is a time-consuming process and moreover, no company will invest its permanent capital for short-run. These findings are consensus with the result of (Fosu and Magnus, 2006) except for the trade openness results are contradicting the findings of Saleem, Jiandong, Khan, and Khilji (2018) from China and Hakro and Ghumro (2011) from Pakistan.

Table 6. *Error correction model*

Variables	Coefficients	Std. Error	t-Statistic	Prob.	Results
Constant	1.105059	0.903181	1.223519	0.2347	Insignificant
$\Delta LFDI_{t-1}$	0.517132	0.238974	2.163962	0.0421	Significant
$\Delta LFDI_{t-2}$	0.259214	0.191484	1.353708	0.1902	Insignificant
$\Delta LCPI$	-0.792344	3.626785	-0.218470	0.8292	Insignificant
$\Delta LCPI_{t-2}$	-2.031105	5.324455	-0.381467	0.7067	Insignificant
$\Delta LGDP$	-3.938177	5.095456	-0.772880	0.4482	Insignificant
$\Delta LGDP_{t-1}$	1.951666	8.028756	0.243084	0.8103	Insignificant
$\Delta LGDP_{t-2}$	-6.144761	4.086834	-1.503550	0.1476	Insignificant
$\Delta LGDP_{t-3}$	-6.336821	4.454555	-1.422548	0.1696	Insignificant
$\Delta LEXC$	0.262428	2.492876	0.105271	0.9172	Insignificant
$\Delta LEXC_{t-1}$	-1.351951	2.122194	-0.637053	0.5310	Insignificant
$\Delta LEXC_{t-2}$	-4.315031	3.705998	-1.164337	0.2573	Insignificant
$\Delta LEXC_{t-3}$	-0.392177	1.570168	-0.249768	0.8052	Insignificant

Variables	Coefficients	Std. Error	t-Statistic	Prob.	Results
ΔLT	1.597565	1.362573	1.172462	0.2541	Insignificant
ECT_{t-1}	-0.862566	0.325989	-3.566277	0.0018	Significant
Short-Run Diagnostic Results					
Serial correlation (LM Test) = 1.781 (0.41)			R-Square = 0.597		
Heteroscedasticity Test = 9.675 (0.78)			Adjusted R-Squared = 0.328		
Normality (J-B Test) = 4.877 (0.08)			Durbin-Watson Stat = 1.816		
F-statistic = 2.223			Prob (F-statistic) = 0.002		

Notes: ***' ** and * denotes significant at 1%, 5% and 10% alpha level.
Source: Authors' calculation.

4.5. Stability test

Further, the cumulative sum of recursive residuals (CUSUM) mean plot (Figure 1) and the cumulative sum of square (CUSUMQ) was exercised to discover the structural break in the model (plotted in Figure 2) and to ensure the stability of the model with the ECT_{t-1}term (Brown, Durbin, and Evans, 1975). The mean plot of CUSUM and CUSUMQ statistic fall inside the critical boundary imply nonexistence of any instability of the coefficients in the model.

Figure 1. *CUSUM test*

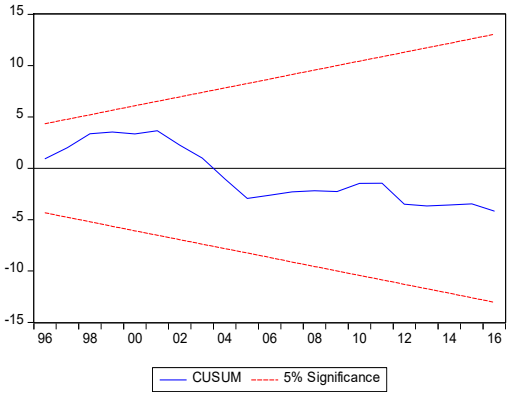
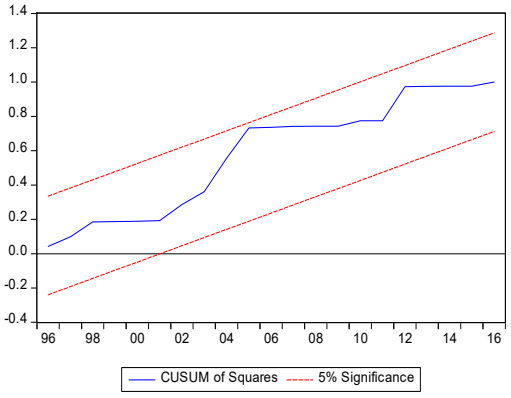


Figure 2. *CUSUMQ test*



Source: Authors calculation.

The investor's choice may always be connected to the relative cost of production between India and its competitors like China. Indian market is so vast that it could exploit economies of scale and reduce the cost competitiveness. However, the Rupee appreciation and hyperinflation negatively influence cost competitiveness and FDI inflow. These factors are the biggest challenge for ensuring sustainability and improving the efficiency of FDI inflow in the current scenario. Steps taken for upgrading technology and improving labour productivity were crucial in China's industrial revolution (Dees, 1998). Similar measures are needed in the Indian Scenario also. Opening more sectors along with infrastructural development as part of economic openness will also boost the FDI inflow.

5. Conclusion and discussion

In the present paper, we try to estimate the impact of different variables on FDI in India using Pesaran et al. (2001)approach to cointegration. The result of the ADF and PP unit root test shows that the variables are stationary at I (1), which justified the use of ARDL bound testing approach to test the cointegration between the variables. The finding of bound testing based on F-statistics states that variables are cointegrated when FDI inflow is used as a dependent variable. The associated equilibrium correction speed is also highly significant further confirming the existence of the long-run relationship. The equilibrium correction speed is breakneck and approximately 86% of the disequilibrium of the previous period's shock converge to the long-run equilibrium in the current period. Further, by applying CUSUM and CUSUMQ tests to the model, the study shows that the model is stable and there are no structural breaks in the data.

The results suggested that the decreasing inflation rate in India increases the volume of FDI inflow in the long-run. It indicates that inflation is negatively influencing the investment decision of foreign MNCs as inflation de-stabilise the macroeconomic and financial environment. However, the inflation rate is not significant in the short-run. Growth in GDP expands the market, improves macroeconomic environment which in turn, attracts more capital. Additionally, the negative sign of the exchange rate increased FDI inflow as the depreciation of the currency cause domestic assets and the cost of production cheaper. Trade openness also contributes positively to FDI, and it could be the reason why the FDI inflow of India registers an increase as it follows more liberal trade policies. Finally, our results indicate that all the explanatory variables have a statistically significant effect on FDI inflow in case of India, although the sign and degree of their effectiveness vary across cases. From a policy perspective, keeping tight control over the macroeconomic variables, especially inflation, is vital for the country to attract more FDI inflow. Similarly, the findings suggest that Reserve Bank of India (RBI) should control excessive appreciation and volatility of rupee through intervention measures to enhance confidence among investors, thus facilitating more FDI inflow into the Indian economy.

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