

# Does all Macro-economic factors contributes equally for Foreign Direct Investment (FDI) Inflows in India?

## An Empirical study on Macrovariables

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*Abstract- Numerous research has taken place on FDI (Foreign Direct Investment) in various pattern on their own views. This study is to develop a model to analyse whether all the macro-economic factors have an impact on Foreign Direct Investment inflows in India. The study was tested by analysing the 10 macro variables including foreign direct investment inflows from the period 1986-2016. By analysing various research reviews conducted by past researchers the study has come up with a model which says all the factors are not contributing for inflows of foreign funds to India. The results of the study suggests that India should concentrate more on some of the macro-economic factors and policies in order to have an inflows of good foreign funds*

**Keywords:** Foreign Direct Investment inflows, Macro-economic variables

## I. Introduction

India was the favored areas for FDI, which pulls in moderately greater amount of FDI in the 2<sup>nd</sup> decade of liberalization. Comparing with other countries in Asia the inflow of FDI into India was very low. Thus degree of flexibility in India's strategies on Foreign Direct Investment is very greater if weighed with the challenging Asian countries. In despite of all that Foreign Direct Investment is a non-debt financial source for the Indian economic development. Foreign investors started to participate in India for the benefit of little wages and other benefits like tax exemptions etc. it is also said that the country which is getting more inflow of FDI those nations will also find improvements in its technology and the unemployment rate of that country will be reduced by providing employments. In recent past GOI (Government of India) has permitted FDI in multi-brand retailing also, extended the sectorial top of FDI in dissimilar territories, viz., power, exchanging trades, single brand retailing, transports and Mobile, TV. Apart from having a free approach, FDI inflows by way of a rate offer of Gross Domestic Product have not expanded considerably and were just nearly 3.5% GDP. It also gathers that the investors from other countries are not just seeking attention by the free trade of the host nations additionally pulled in on their performance also. Henceforth, it is fundamental for any host countries to recognize the important elements that pull in FDI inflows.

There is a large collection of learning with respect to the inflow of FDI (Grosse and Trevino, 1996; Tallman, 1988). By examination, very less knowledge is grasped about what drives FDI in provisional economies (Bart, 1997; Child and Tso, 2001). FDI plays a significant part as a key factor in exchanging new innovation and advancing monetary

development. Theoretically, FDI can impact a beneficiary nation at both micro and macro levels. At the micro level, FDI for MNCs can influence the administration and specialized technical efficiency of domestic companies by transfer of technologies, deliver positive overflow effectiveness and labor training. At the macro level, FDI may impact on the two major factors, like economic growth, employment, domestic investments, imports and exports (Dunning, 1988, 1995; Hold, 1995; Levine, 1997; Bornstein and Lee, 1998) and money related factors like exchange rates, Balance of Payments and interest rates etc. (Ligand and Pang, 1991).

Hence this study gives a detailed information on the macro-economic factors effect on FDI inflows by considering 10 macro-economic variables including FDI inflows and a panel data from 1986-2016. The analysis is divided into various sections where in first the analysis of the factors has been done, secondly model selection, thirdly testing of that model with different Diagnosis tests and finally analyzing whether the factor which effect truly on FDI has an impact on long run or short run. In study it has also been proved that all macro variables doesn't effect FDI inflows only some variables effect truly on inflows of FDI and analysis of amendments of policies in 2013 and in 2016 and their impact has been conducted and found that recent amendments are boosting up the inflows of foreign funds.

The rest of the paper is planned as follows: Section 2 is a review of literature on determinants effecting FDI and policy recommendations. Section 3 defines the methodology and models, Section 4 presents the empirical analysis and results and Section 6 is a findings and conclusion.

## II. Literature review:

An extensive collection of thorough research studied the real determinants of FDI inflows in developing and developed nations. The greater part of the studies happening Foreign Direct Investment concentrates on the relation between the macro variables and Foreign Direct Investment inflows. Between the macroeconomic variables, one of the facts is the model demonstration, which determined relationship among economies as principally an element of the market size or GDP of every economy. (Shapiro A. , (1998)) Had talked about market measure (Gross Domestic Product) of the host nation straightforwardly influences the normal income of investments. (MacDermott, (2007)) Uncovered that Foreign Direct Investment would rise with host nation's Gross Domestic Product. Numerous researchers has utilized Gross Domestic Product as an intermediary for market measure. The over-all suspicion is that Foreign Investment

inflows seem to be pulled in by the bigger market portion of a place.

One of the study (Kravis, I., and Lipsey, R., 1982) that foreign inflow had been predominantly affected by the area of the market. Correspondingly, research work of (Hsiao, (2004)) has additionally disclosed that Foreign Direct Investment has been decidedly influenced by market portion and wage. It was clear that, the entrepreneurs from the Japan and US were impacted by market measure and for those from Taiwan, Korea and Hong Kong wage difference was the utmost imperative variable in choosing interest. Along with the previously stated researches, (Makki, (2004)) broke down the variables of FDI by United States food business in developing and developed nations. It has been identified that market estimate, openness and per-capita salary altogether influenced United States food manufacturing firm's choices to contribute abroad, yet their impact varied amongst developing and developed nations. In addition, Egger, P., (2008) has accepted that FDI likely raises with host market measure and two-sided parent. It is clear by an observational research of United States outward Foreign Direct Investment stocks at firm level. Correspondingly, (Ang, (2008)) has likewise discovered that genuine Gross Domestic Product has altogether affected Foreign Direct Investment inflows to Malaysia utilizing yearly arrangement information. Examination likewise discovered that rise in exchange rate will lead to depreciate Foreign inflows. Unusually, the outcomes likewise seemed to propose that advanced macroeconomic weakness encouraged more foreign inflows. But it is not applicable for all the economic variables.

Besides, a few researches have started to highlight the more unpredictable examples of Foreign Direct Investment especially vertical Foreign Direct Investment. (Hood, 1979) Concentrated on area wise advantages. They simplified that since real wage cost changed among nations, firms moved to low wage nations. (London, (1995)) Said cost and control on work are the critical determinants of FDI. Moreover, while analyzing about the critical determinants of FDI inflows into North America, (Luger, (1985)) have distinguished that higher wage rates weakened FDI in North America. Keeping in mind the end goal to analyze the previously mentioned theory (Gao, T., 2005) had looked at FDI from advanced OECD nations with that of Southeast- Asian and East developing nations. The outcome of the study discovered that Asian direct financial investors proposed to put resources into low-wage nations and now nations adjacent when contrasted with advanced OECD financial stockholders. (Coughlin, 1991) had additionally discovered that higher pay on work weakened FDI inflows, though more unemployment rates pulled in FDI inflows in US.

### III. Objectives and Methodology

The basic objective of this study is to develop a model to know which are the macro economic variables affecting FDI inflows by analysing the panel data from 1986-2016. The methodology for the current study has been carried down as mentioned below. The data for the research work have been gathered from handbook of Reserve bank of India, Department of Industrial Policy and Promotion, World Bank India Report, OECD and statistics of Indian Survey.

- The variables considered for analysis includes macrovariables viz., Interest rate, Inflation rate, Exchange rate, GDP growth, current and account balance, Total Reserves, Debt, Imports and Exports of India. In this study samples were considered to be 30 years (1987-2016).
- With the assistance of this variables the Least squares model has been developed for all the macro economic variables considering FDI inflows as a dependent factor and all other variables as an independent factor.
- Variables whose probability was more than 5% was filtered to know which the factors are impacting truly on FDI inflows.
- Three different models of least squares were formed with different supporting variables to evaluate the better model.
- On the selected macro-economic variables VAR (Vector Auto Regression Model) was conducted to test the long run effect.
- Least Squares (Gauss-Newton / Marquardt steps) was conducted to analyses the long run effect of selected variables.
- Wald Test was implemented to cross verify the results of long run effect on FDI inflows.
- The test like Histogram, Heteroscedasticity Test: ARCH, Breach-Godfrey Serial Correlation LM Test: were conducted on the selected model to analyses the results are valid.

**Table 1: List of the variables considered for the research work:**

Dependent	Independent
Foreign Direct Investment (FDI) inflows	Gross Domestic Product (GDP)
	Bill of Payment (BOP)
	Exchange Rate (ER)
	Interest Rate (IR)
	Inflation rate (INFR)
	Current Account Balance (CAB)
	Total Reserves (TR)
	Imports (IM)
	Exports (EX)
	Total Debts (TD)

$$\text{Equation: } FDI = \beta_0 + \beta_1GDP + \beta_2ER + \beta_3IR + \beta_4INF + \beta_5BOP + \beta_6TR + \mu \dots \dots \dots \text{---(1)}$$

In the above model, FDI is foreign direct investment inflow into India (the parameter to be estimated),  $\beta_0$  is the constant,  $\beta_1$  to  $\beta_6$  are the slope coefficients, GDP is Gross Domestic Product, ER is exchange rate, IR is Interest rate, INF is inflation, BOP is Balance of Payment and TR is Total Reserves. Foreign Direct Investment (FDI) – In the current study, data for direct investment to India from 1986-2016 was used. After gathering of data we will obtain a model by filtering variables and we select which model is the best

model effecting FDI inflows. The hypothesis for Independent variables is:

H<sub>1</sub>: All Independent variables doesn't impact on Dependent variable (FDI inflows)

H<sub>2</sub>: All Independent variables do have impact on Dependent variable (FDI inflows)

### Hypothesis:

The above-mentioned studies provide evidence of the important impact of GDP, inflation rate, interest rate, exchange rate, total reserves, imports, exports, balance of payments and total debts on FDI inflow. The hypotheses of the present study examine these relationships in the Indian context. Hypotheses anticipated are based on existing literature.

H<sub>1</sub>: All the macro economic variables do not effect on inflows of foreign investment.

H<sub>2</sub>: Residual Diagnosis tests have a positive results on the model.

## IV. Analysis and Interpretation

By having knowledge of this the study intends to see whether there is any relation between FDI inflows

(Dependent variable) and other macro-economic factors, the statistical tool unit root test have been done on the selected data and Johnsen integration method says there is no integration of the variables hence we select a unrestricted VAR model for the analysis. Hence in order to measure the relationship between these factors. Hence least squares method have been used to know the impact or effect of variable son FDI inflows, the results are shown below.

In order to know the results clearly the hypothesis is formed as above:

H<sub>0</sub>: All the macro-economic variables are not impacting of inflows of FDI.

H<sub>1</sub>: All the macro-economic variables are impacting of inflows of FDI.

When the variables like FDI inflows, Gross Domestic Product, Current account balance, Imports, Exports, Interest rate, Exchange rate, Inflation rate, Total debts and Total reserves are given as an input for software, when we convert this data into equation the results will be as shown in table 2: as shown below:

**Table 2: Probability values of the selected Macro-economic variables:**

Variable	Coefficient	Std. Error (SE)	T-Statistic	Probability.
C	-44472.88	25791.13	-1.724348	0.1001
Bill OF Payment (BOP)	-0.01521	0.066725	-0.227957	0.822
EXCHANGE_RATE (ER)	-150.4591	393.7096	-0.382157	0.7064
EXPORTS(EX)	2047.882	3351.578	0.61102	0.5481
GDP	251.0462	1181.185	0.212538	0.8338
IMPORTS (IM)	1252.145	2466.333	0.507695	0.6172
INFLATION (IFR)	820.4625	831.2886	0.986977	0.3354
INTEREST_RATE (IR)	1732.799	1316.226	1.31649	0.2029
TOTAL_DEBT (TB)	139.8256	529.1157	0.264263	0.7943
TOTAL_RESERVES (TR)	-120.2679	112.112	-1.072748	0.2962
R-squared	0.799318		Akaike info criterion	21.38998
Probe(F-statistic)	0.000029		Schwarz criterion	21.85704

Before going to analysis we should check these variables are significant, the variables will be significant only if the probability values is less than 5%, but in this table we can see that not even single variable is significant because all the probability values are more than 5% but if we see the R-square it is more than 60% and F-statistics is less than 5% so overall it is a good output from the variables but single variables should be analysed so from here the data needs to be modified. The modification of data is based on the correlation analysis, the values which are highly correlated should be filtered because to see the Correlation value of other variable. Here the variables whose correlation values are highly significant like Imports, Total debt, Total reserves, GDP, Exchange rate and BOP are eliminated. After the elimination the results can be obtained in three different models each model have their own equation, they are:

The equations for model are as follows:

$$\text{Equation of Model1: } Y = \beta_1(\text{ER}) + \beta_2(\text{INF}) + \beta_3(\text{IR})$$

$$\text{Equation of Model2: } Y = \beta_1(\text{EX}) + \beta_2(\text{INF}) + \beta_3(\text{ER})$$

$$\text{Equation of Model3: } Y = \beta_1(\text{ER}) + \beta_2(\text{INF}) + \beta_3(\text{GDP})$$

#### Variables:

Y (C) = FDI inflows

$\beta$  = Probability

EX = Exports

INF = Inflation rate

ER = Exchange Rate

GDP = Gross Domestic Product

Variables	Co-efficient	Std.Error	T-statistics	Prob	R-Squared	Prob (F-statistic)	Akaike info criterion (AIC)	Schwarz criterion (SC)
C	-39100.63	13214.28	-2.958968	0.0065	0.761546	0	21.16243	21.34925
Exports	2505.5	317.2449	7.897683	0				
Inflation	1248.793	572.0417	2.183045	0.0383				
Interest Rate	1413.337	1060.716	1.332437	0.1943				

The rule for accepting the model is that probability value of all the variables should be less than 5% (except the supporting variable). When we add interest rate a supporting variables we get Exports and inflation value less than 5%, but if we replace interest rate with Exchange rate and GDP the values of exports and inflation go beyond 5% hence this says Model 1 is a better but another criteria for model consideration is analysing the Akaike info criterion and Schwarz criterion values, it is said that if the value of Akaike info criterion value and Schwarz criterion is less the model is better. If we see the value of Akaike info criterion and Schwarz criterion values model 1 has a least values hence this criteria also says that model 1 is better. The R-squared also 76% it means this model proves 76% of the solution. Hence  $H_0$  is proved, which says all the macro variables doesn't impact on FDI inflows.

Research find that exports and inflation plays a major role in Foreign Direct Investment inflows to the nation, in order to see whether these variables support FDI with a short term or long term. Here unrestricted Vector Auto Regression is used as a model because as previously stated Johansen cointegration test showed that there is no cointegration of the variables hence the results for future analysis is obtained through VAR (Vector Auto Regression) model. After obtaining the result through VAR model by considering lag variables as 2 years (can be considered more than 2 years on the basis of study), from this model we will get to know only the coefficient, standard error and t-statistics of the 3 variables. In order to see whether these variables affect In long run or short run we have to see the probability value, but the probability value is absent here hence the table should be converted to an equation which is as follows and should estimate to see the probability value of exports and inflation rate.

**Equation 1:**  $FDI = C(1)*FDI(-1) + C(2)*FDI(-2) + C(3)*EXPORTS(-1) + C(4)*EXPORTS(-2) + C(5)*INFLATION(-1) + C(6)*INFLATION(-2) + C(7)$

**Equation 2:**  $EXPORTS = C(8)*FDI(-1) + C(9)*FDI(-2) + C(10)*EXPORTS(-1) + C(11)*EXPORTS(-2) + C(12)*INFLATION(-1) + C(13)*INFLATION(-2) + C(14)$

**Equation 3:**  $INFLATION = C(15)*FDI(-1) + C(16)*FDI(-2) + C(17)*EXPORTS(-1) + C(18)*EXPORTS(-2) + C(19)*INFLATION(-1) + C(20)*INFLATION(-2) + C(21)$

**Table 3: Probability of the lag Variables for the selected equation**

Variables	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.821787	0.211298	3.889227	0.0008
C(2)	-0.140476	0.245349	-0.572555	0.5728
C(3)	-281.9939	819.1179	-0.344265	0.7339
C(4)	1220.471	964.639	1.26521	0.219
C(5)	-96.42062	362.7827	-0.265781	0.7929
C(6)	172.6386	357.8749	0.482399	0.6343
C(7)	-7004.725	6870.321	-1.019563	0.319

From the table above it is observed that which and all the probability values is less than 5%, here it has been found C1 is having 0.003 which is lesser than 5% now should compare this constraint with the equation (FDI) because in this research focuses on whether FDI is having any impact from other variables so it only concentrates on equation 1 ( $FDI = C(1)*FDI(-1) + C(2)*FDI(-2) + C(3)*EXPORTS(-1) + C(4)*EXPORTS(-2) + C(5)*INFLATION(-1) + C(6)*INFLATION(-2) + C(7)$ ). As per analyse equation for the consideration we can see that FDI is supported by exports and inflation in long run. In the current study 2 lags are considered, hence 1,-1, 2,-2 are the lag variables.

In order to cross verify the analysis whether there is any effect of these variables in short run we assume C3 and C4 present in equation 1 which symbolises the current year exports and previous year exports will be assumed as 0 (0 signifies "if exports are absent in equation will it make any difference in the solution) and hypothesis will be formed to run through "Wald test" method, the results of the test are as follows:

**Table 4: Results of Wald Test on selected variables**

Null Hypothesis	Value	df	Probability
$C(3)=C(4)=0$	5.7495	2	0.0564
$C(5)=C(6)=0$	0.7229	2	0.6966

The results show that probability of inflation rate are more than 5%, hence it signifies that there is no effect of inflation rate on short term but in the long run there is an effect on FDI. Now the study got a clear picture about the 2 variables namely exports and inflation rate which has greater impact on FDI inflows and it is also found that whether those variables have the impact long run but not in short run. It is finally found that FDI inflows have influenced only by the



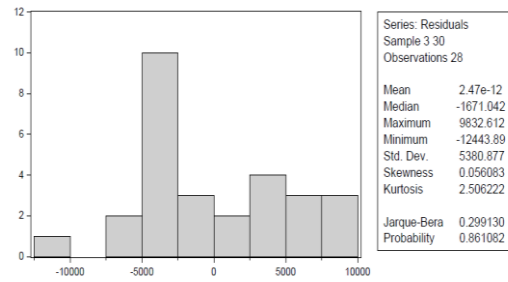
previous year's FDI inflows not from the factors like exports and inflation rate etc.

**Residual Diagnostics:**

Residual Diagnostics tests are done in order to see whether the above models and test conducted are significant and to check whether it is acceptable. Hence 3 types of Residual Diagnostics testing i.e., Histogram, Heteroskedasticity Test (ARCH effect), Breusch-Godfrey Serial Correlation LM Test have been carried out, this tests have their own guidelines to prove the above model is best those are explained with the test.

**a) Histogram:**

**Figure 1: Results of Histogram**



In this test we have to analyse whether the residuals or normally distributed. The results of these test have been enclosed in Appendices. The results shows that probability value is 0.8610 which is more than 5%, which explains the residuals are normally distributed.

**a) Analysis of Heteroskedasticity test/ARCH:**

Table 5: Results of Heteroskedasticity test/ARCH				
F-statistic	0.61811	Prob. F(1,27)		0.4391
Obs*R-squared	0.651452	Prob. Chi-Square(1)		0.4196
Variable	Coefficient	Std. Error	t-Statistic	Prob
C	21475627	8063241	2.663399	0.0133
RESID^2(-1)	0.145308	0.184823	0.7862	0.4391
R-squared	0.024128		Akaike info criterion	37.53576
Prob(F-statistic)	0.43914		Schwarz criterion	37.63174

Heteroskedasticity Test or ARCH model says that in order to consider model as the valid or significant model then the probability value of Heteroskedasticity Test or ARCH test should be more than 5%. The results table is enclosed in the

appendices. From the above results it has been identified that the probability value is 43.91% which is more than 5% which says there is no Heteroskedasticity present in time series.

**a) Analysis of Breusch-Godfrey Serial Correlation LM Test:**

Table 6: Results of Breusch-Godfrey Serial Correlation LM Test				
F-statistic	1.711998	Prob. F(1,27)		0.2072
Obs*R-squared	4.275415	Prob. Chi-Square(1)		0.1179
Variable	Coefficient	Std. Error	t-Statistic	Prob
C(1)	1.419149	0.798828	1.776538	0.0917
C(2)	-1.04003	0.628585	-1.654557	0.1144
C(3)	-433.5455	920.8341	-0.470818	0.6431
C(4)	-681.3084	1025.676	-0.664253	0.5145
C(5)	159.3973	384.1078	0.414981	0.6828
C(6)	-98.99455	385.1332	-0.25704	0.7999
C(7)	7757.498	9480.309	0.818275	0.4233
RESID(-1)	-1.491967	0.80631	-1.850365	0.0799
RESID(-2)	-0.029741	0.278644	-0.106733	0.9161
R-squared	0.152693		Akaike info criterion	20.45989
Prob(F-statistic)	0.889725		Schwarz criterion	20.8881

This is the test which is very much essential to check when the study is based on time series. The meaning of this test says that there should not be a Serial Correlation in time series which are considered. From the results it has been cleared that the probability value of the test is 11.79% which is more than 5%, which says there is no serial correlation exists in the time series. From all the test we got positive results hence we accept alternative hypothesis.

## V. Findings and Conclusion

This section contains the summary of findings. The findings is based on the analysis carried on the above sections, the facts and figures are taken into consideration and stated the above points. By comparing the study with existing literatures it can be identified that majority of the results of the current research work is like cyclical because the concept Foreign Direct Investment will arrive at same decisions, but in this study there are some unique analysis of data and unique objectives which have been not focused in previous research works on the basis of that key findings are stated.

- The study found that all the variables (GDP, Interest rate, Inflation rate, exchange rate, BOP, Total Debt, Total reserves, exports and imports) which are earlier considered by research scholars doesn't impact FDI consecutively.
- It has been identified that the factors like Exports and Inflation rate are the two variables attracting higher FDI inflows and interest rate is impacting minor on FDI inflows.

- In fact majorly exports are highly influencing on FDI inflows, which should be given greater importance by government.
- With the analysis of the variables it has been seen that Exports and inflation rate are the variables having an impact on FDI inflows on the long term basis but in short term they are not highly contributing.
- The tests like Histogram-Normality distribution, Heteroskedasticity Test: ARCH, Breusch-Godfrey Serial Correlation LM Test have also proved there is positive results (P-value is greater than 5%) from the analysis which have been carried out.

From the above research work the study concludes, on comparison with existing literature we can see that most of the results of the present study are giving the results which support some literatures. On the other hand, a few findings of the current study also contradict some of the Contentions of previous studies. It can be summed up by saying that to attract FDI, India should use its advantages such as large domestic market, abundant supply of trained and low-wage labour, vast pool of technical professional, second largest nation, etc.

FDI is a panacea for the economic ills of any country. Economic development strongly depends on FDI. But we cannot blindly believe that all the factors effect FDI inflows equally, with the help of some research we can come to some opinion where limited factors which have impact on FDI inflows strongly. Many research work came up with many results to show the variables effecting FDI inflows as the same this study also proved exports and inflation are the two main factors effecting FDI inflows and the government should strengthen the exports and should maintain less inflation rate to attract more FDI funds in India.

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