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A Rising Tide Lifts All Boats

By Ms. Ananya Mitra & Ms. Shradhanjali Panda
United School of Business Management

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Design/Methodology: To study the linear relationship, the paper uses simple correlation coefficient and coefficient of determination. Along with it, for further prediction regression analysis is used. For an overview, measures of central tendency, standard deviation and graphical representations are used. Significance level between the variables is tested using t-test.

Findings: The variables are linearly related to one another. In other words, the variables are highly correlated and there is significant correlation coefficient among them.

Practical Implication: The findings may be used as an input for Economic and Budgetary decision making.

Research Limitation: Limited variables are used for the study. External noise may present because of exclusion of other variables.

Keywords : *FDI inflow, GDP rate, market rate and CPI inflation.*

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I. Introduction

FDI plays a major role in developing countries like India. It acts as a long term source of capital as well as a source of advanced and developed technologies. The investors also bring along best global practices of management. As large amount of capital comes in through these investments, more and more industries are also set up. This helps in increasing employment. FDI also helps in promoting international trade. This investment is a non-debt, non-volatile investment and returns received on these are generally spent on the host country itself thus helping in the development of the country. Some of the sectors that attract high FDI inflows in India are the hotel and tourism industry, insurance sector, telecommunication, real estate, retail, power, drugs, financial services, infrastructure and pollution control etc. retail sector accounts for 13% of country's GDP. Indian government liberalized FDI in 2005 in this sector to 100%, thus enabling foreign investors to set up retail companies in India. Government has allowed 100% FDI in manufacturing sector except in defense industry and cigarette manufacturing, which will help in employment of semi-skilled labor by providing them with access to developed technology. Developing countries, which invite FDI, can gain access to a wider global and better platform in the world economy. A remarkable inflow of FDI in various industrial units in India has boosted the economic life of country. Having watched the importance of FDI, the present study aims at examining the trend of FDI in India for the last ten years time period and checking its impact on some major macro-economic variables. GDP, Inflation Rate and Market rates are taken as other macro-economic variables for the study.

Author α : Lecturer (Economics) USBM Bhubaneswar.
E-mail : ya.lubalu.dibya@gmail.com
Author σ : Asst. Professor (Finance) United School of Business Management Bhubaneswar. E-mail : shradha313@yahoo.co.in

II. Objectives

Keeping the above discussed macro-economic factors, the objectives of the study are as follows.

- To study the trend of FDI inflow, GDP rate, Inflation rate and Market rate for the last decade in India.
- To study the extent of linear relationship between FDI and all other variables.
- To check the significance level of the linear relationship.

III. Research Methodology

a) Database & Time Period

All data used in the study are secondary in nature. It has used major macro economic variables like GDP at factor cost, GDP at market price, FDI inflow, CPI inflation rates and Market rate (CNX S & P Nifty). The official website of RBI has been used to get all above rates and official website of NSE is used to calculate the market rate. The data regarding the major macro economic variables like GDP, FDI and Inflation is collected from various websites. The time period considered here is from 2000 to 2012.

b) Research Methods and Statistical tools used

The present paper intends to use basic statistical tools like measures of central tendency, measures of dispersion, correlation analysis, coefficient of determination, regression coefficient. Along with it students "t" test is used to test the significance of the calculated correlation coefficient. Central tendency relates to the way in which quantitative data tend to cluster around some value here that value is arithmetic mean. Since arithmetic mean can be used for further future calculation it is preferred even though it is not a robust statistic, meaning that it is greatly influenced by outliers. Correlation analysis "r" is used to determine the extent of relation between the concerned variables here they are GDP, FDI, Inflation and Market rate. The coefficient of determination i.e. r^2 is used because it gives the proportion of the variance (fluctuation) of one

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variable that is predictable from the other variable. It is a measure that allows us to determine how certain one can be in making predictions from a certain model/graph. The coefficient of determination is the ratio of the explained variation to the total variation. Regression analysis is used to measure the strength of the relationship between one dependent variable and a series of other changing variables known as independent variables. To determine if the calculated correlation coefficient between the variables are significant or not, Students "t" test is being used. So, in brief the following methods and statistical tools are used for the study.

- Measures of Central Tendency
- Standard Deviation
- Regression Analysis by method of least square
- Correlation Coefficient
- Coefficient of Determination
- Student's t-test

The two regression coefficients are calculated by using the formula:-

$$(Y-\bar{Y}) = b_{yx}(X-\bar{X}) \quad (1)$$

$$(X-\bar{X}) = b_{xy}(Y-\bar{Y}) \quad (2)$$

Apart from it, Correlation Coefficient is calculated using the formula given below.

$$r = \sqrt{b_{yx} * b_{xy}}$$

Coefficient of Determination is calculated by deducting r^2 from 1.

For Student's t-test between the macro variables, the set null hypothesis is given below.

c) Null Hypothesis

$H0_{GDP}$:μ , GDP and FDI are uncorrelated.

$H0_{Inflation}$:μ , Inflation and FDI are uncorrelated.

$H0_{Marketrate}$:μ , Market rate and FDI are uncorrelated.

These hypotheses are tested at 10 degrees of freedom at 5% level of significance for two tailed analysis. The tabulated value is 2.228. If the calculated t-value is more than the table value then the test is significant and the null hypothesis is rejected.

IV. Analysis & Interpretation

a) FDI & Inflation

The two variables considered here are FDI and Inflation rate. The mean Inflation rate turns out to be 6.779 and the standard deviation is 8.13 (Table 2, annexure). Since the paper takes into consideration a phase where Indian Inflation rate was at a peak of 16%, the average mean value tends to be upward biased. The standard deviation too shows the same impact. The correlation coefficient being 0.896 (table1, annexure), it suggests that there exists a high degree of positive linear relationship between them and the coefficient of determination which is dependent on correlation coefficient accordingly becomes 0.803 (table1, annexure). Simply a high valued correlation is meaningless without the significance test, a t-test is conducted and the calculated t-value is 6.388 (table 3, annexure). This value is approximately 3 times greater than the tabulated one. Hence null hypothesis is rejected that shows there is a significant linear relationship between the variables.

b) FDI & GDP

The average GDP at factor price turns out to be 35503.039 (table 2, annexure) while the GDP at market price is 38302.21 and the Combined Mean (FDI, GDP) is 17958.475. The term factor cost or basic price is used in the national accounts to refer to the prices of products as received by producers. Market prices are the prices as paid by consumers. Thus, factor cost or basic prices are equal to market prices minus taxes on products plus subsidies on products. The standard deviation of FDI is 321.9040032, where as standard deviation of GDP at factor cost is 9363.51489 and Combined Standard deviation (FDI, GDP) is 18753.6904.The correlation coefficient between GDP at factor cost and FDI is 0.819933 that is the variables are having a very high positive relation. Both the variables are moving in the same direction with a high degree of linear relationship between them. The regression coefficient between FDI and GDP at factor cost is 0.028188 and between GDP at factor cost and FDI are 23.85014478. In t-test, the calculated value of "t" turns out 4.5293 (table 3, annexure).Calculated value is almost double of tabulated value meaning the null hypothesis is rejected and alternative hypothesis is accepted. To put it in simple language the correlation coefficient between GDP at factor cost and FDI is significant.

c) FDI & Market Rate

Stock market is the economic window of a country. It reflects the economic standard in it. For the present study, the major index of National Stock Exchange i.e. CNX S&P Nifty is taken. In this index, 50 "A" category blue chip companies from different sectors are present. As in the study the impact of FDI is tried to be tested, this index can be considered as a mirror image for it.

The calculated arithmetic average of the market rate is 3329.874 and the standard deviation is 1753.977(table 2, annexure). So, it can be interpreted that market is strongly reacting to the growth of FDI in the economy and upward direction of market movement proves it. Both the values make it clear that market is less volatile in this time period. Correlation coefficient and Coefficients determinants (0.885 and 0.784 respectively, table 1, annexure) support the above said logic. The relationship is significant in nature as the calculated t-value is 6.028 (table 3, annexure).

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V. Conclusion

The study tried to examine the linear relationship between FDI, GDP, Inflation and Market rate. Statistical tools like Arithmetic mean, standard deviation, Regression, correlation coefficient and coefficient of determinants are used to study the relationship between these macro variables. Student's t-test is conducted for examining the significance level between them. After analyzing the results, the study found that there exist high co linearity among these macro variables. The result of t-test supports the robustness of the result and interpretation. Thus the regression equations can be used for predicting the future dependent variables based on the independent ones. The only limitation of the study is ignoring the impact of other variables and the lagged impact factors. So, it can be safely concluded that FDI flow is positively affected by GDP rate, Inflation rate and Market rate which is a good sign for the economy of the country.

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Annexure

Table 1 : Correlation coefficient between FDI, GDP, Inflation rate and Market rate

Variables	Correlation Coefficient	Coefficient of Determination
GDP & FDI	0.819	0.672291
Inflation & FDI	0.896	0.803213
FDI & Market rate	0.885	0.784197

Table 2 : Calculation of Mean and Standard Deviation

Variables	Mean	Standard Deviation
FDI	413.85	321.904
GDP	35503.039	9363.514
Inflation	6.779	8.13
Market rate	3329.874	1753.977

Table 3 : T-test result

Variables	Calculated "t" Value
GDP & FDI	4.529
Inflation & FDI	6.388
Market rate & FDI	6.028

Tabulated t- value = 2.228

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