

IMPACT OF MACROECONOMIC VARIABLES ON GROSS DOMESTIC PRODUCT: AN EMPIRICAL STUDY

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ABSTRACT

This paper explores how the various macroeconomic determinants impact the Indian economy's GDP. The data has been collected from World Development Indicator (WDI) during the years 1982-2016. The variables included in the study are Gross Domestic Product (GDP), Rate of Interest (ROI), Inflation Rate (INF), Trade Openness (TO), Foreign Direct Investment (FDI) and Gross Capital Formation (GCF). The ordinary Least Square (OLS) method has been used to see the impact of macroeconomic variables on GDP. The regression results revealed a positive association between Foreign Direct Investment, Gross Capital Formation, Trade Openness and Gross Domestic Product, whereas there is a negative relationship between Inflation and Gross Domestic Product. The Granger causality test is also used here in the study to determine the causality between the variables in a model. The study reveals that Granger causality results indicate FDI does not Granger cause GDP, but GDP Granger causes FDI. Finally, the results show FDI Granger caused the interest rate as well as the trade openness of the Indian economy.

Keywords: Gross Domestic Product(GDP), Macroeconomic Variables, Ordinary Least Square (OLS) and Granger causality.

INTRODUCTION

Now Indian economy is a leading economy amongst the various emerging nations. The major role in the growth of our nation was the economic liberalization in the nineties. Macroeconomic variables determine the growth rate of economy. In macroeconomics, both theoretically and empirically, the relationship of various macroeconomic determinants and economic growth rate has been wider which can reflect the GDP of any country. Inflation, trade openness, interest rate, Gross Capital Formation and FDI are very much important for the growth of any nation. FDI plays crucial role in benefitting developing countries like India and also beneficial for the poor countries like Jordan. Globalization tends to offer various opportunities for the development of any country's economy to make them achieve high growth rate through trade openness and by doing investments. In the 1970s, it was examined that at an international level, trade grew much faster than the FDI and thus the openness in trade was much more crucial than the other macro-economic factors for the economy's growth rate (Harrison, 1996). In today's era where globalization have a crucial role which helps in enhancing the trade of the nation. Trade plays a crucial role in structuring the economic and social development of the

countries, especially amongst the emerging developing countries. In the context of foreign trade and its objectives, economic growth's promotion and its stability holds more weight. There are various researchers in their researches stated various advantages which can be obtained from the trade openness. (Kim et al, 2012). Policy makers also claim that FDI boost the economy's overall development as it creates employment, increases technical employment in host country and improves the economic condition in general. In various African countries, it has been observed by various economists that there are inadequate set of resources to finance the long term investments among the country which is massive problem for the economy and it's become difficult for them to achieve millennium development goals which has been set up by UN in 2015. Therefore FDI has been seen as big source of generating funds for the investments perspective and African countries also offers some incentives for encouraging FDI (Kriekhaus, 2002).

According to the findings of the research carried out by Jena et al. (2018), the connection between a nation's foreign direct investment and its rate of economic expansion is not entirely transparent. According to the results of their studies, several academics have arrived at distinct conclusions regarding the role that foreign direct investment (FDI) plays in the expansion of the economy. In their findings, some researchers indicated that foreign direct investment (FDI) is vital for fewer developing nations for their development and economic growth. However, some academics, on the other hand, believe claims that FDI's influence to economic growth is not as significant as the people believe it. Others contend that foreign direct investment does not contribute positively to the rate of economic growth. In a separate piece of research, conducted in 2011, Jena P. K. found a strong causal connection between foreign direct investment (FDI) and economic growth in India in the wake of globalisation. Using India's annual Time Series data from 1991 to 2006, the study investigated three potential causes and effects: foreign direct investment (FDI) leading to growth, growth leading to FDI, and a bidirectional or no causal link. According to the findings of the study, there is a correlation between FDI and the expansion of the economy. Trade openness, when seen over a longer period of time, has the ability to raise both the growth rate of the economy and the efficiency with which resources are allocated, both of which are advantageous to the economy. This is because trade openness gives access to commodities and services. The researchers also assert that nations with more open trade do better than countries with less trade openness or countries that have trade barriers in their economies. This is a claim that the researchers have made. When developing countries engage in trade with more developed nations, they stand to benefit more from increased market access. In addition, the unusual prosperity of East Asian countries can be attributed, at least in part, to their early openness in trading with other nations (Khan, 2001). In the 1970s, several developed nations implemented trade liberalisation by lowering import and export tariffs. Other researchers say in their findings that trade openness determined the economic growth rate by boosting the inflationary rate and sinking the exchange rate. Nevertheless, trade liberalisation was embraced by many developed nations. According to Pollin and Zhu (2006), economies that have become specialised in the manufacturing of goods of lesser quality may see a negative impact on their GDP as a result of increased market openness due to trade.

According to the findings of Lewis's research from 1954, high rates of saving and high rates of capital formation are necessary conditions for sustained economic expansion in any economy. There is a need of high savings for financing capital formation which tends to increase productivity and also long-term growth of the economy. Economy cannot fully dependent on foreign investments for financing capital formation (Lucas, 1988). Theoretically, the correlation

between FDI, trade openness, GCF and GDP seems to be positive. There are various reasons which agree to this assertion.

The neoclassical and endogenous theories of economic growth both say that foreign direct investment (FDI) boosts economic growth in economies with limited amounts of capital by elevating the level of physical investment in the nation in question. Additionally, it is possible to specify that FDI encourages long-term capital investments with new technology, producing employment and improving managerial skills (Alexander, 1994). According to Harrison (1996), FDI helps to encourage the technical spill over benefit, stimulates international rivalry among economies, and also expands the supply of goods and services in the host country, all of which contribute to increased economic growth. Trade openness, when viewed from the perspective of the risk-return relation, is another factor that influences international capital. In point of fact, no nation's economy is interested in making investments in a nation that places tariffs and other impediments on investment. When it comes to making investments, the degree of openness of trade also reflects the comparative advantage theory of economics. The expansion of the economy and foreign direct investment are both affected by capital formation. In its theory, the neoclassical model postulates that in an economy with a limited amount of capital, in the short run investment's marginal productivity will improve when in the long run an additional amount of capital will be introduced in the form of FDI, and that this increase in productivity will also impact the growth of the economy in the long run. (Barro, 1990). There is no depth study on the long run relationship among the macroeconomic variables. To study the association between gross domestic product, gross capital formation, foreign direct investment, interest rate, inflation and Trade openness of the Indian Economy during the years 1982-2016 an attempt has been undertaken.

MATERIALS AND METHODOLOGY

The data is carried out from the perspective of country India. Secondary data has been used. Secondary data is enumerated from the website of World Bank as shown. Table one shows variables, sources of data and measurement units.

Table 1	
VARIABLES DESCRIPTION	
Variables	Source and measuring unit
Interest rate	World Bank-world development indicator-WDI. Real interest rate (%)
Inflation	World Bank-world development indicator-WDI. Inflation, consumer prices (annual %)
Trade openness (TO)	World Bank-world development indicator-WDI. Trade(% of GDP)
Gross capital formation (GCF)	World Bank-world development indicator-WDI. (% of GDP)
Foreign Direct Investment (FDI)	World Bank-world development indicator-WDI. Net inflows (% of GDP)
Gross Domestic Product (GDP)	World Bank-world development indicator-WDI. GDP-Constant 2010 US\$

Econometrics Techniques

To identify the impact of macroeconomic factors on GDP, the obtained data is analysed through regression and the Granger Causality model and conclusions are drawn on the basis of its results.

Table 2 RESULTS OF OLS REGRESSION				
Variable: GDP (Dependent Variable)	Coefficient	Std. Error	t-Statistic	Prob.
FDI	0.131	0.043	3.046	0.000*
GCF	0.260	0.087	2.988	0.000*
INFLATION	-0.023	0.007	-3.285	0.000*
INTEREST RATE	0.072	0.352	0.305	0.204
TRADE_OPENESS	0.021	0.007	5.486	0.000*
C	2.736	0.252	3.000	0.000*
R-squared	0.882	Adjusted R-squared	0.864109	
F-statistic	48.05557			

Source: Authors Own Calculation.

The outcome of the OLS regression analysis can be found in table 2. The GDP variable will serve as the dependent variable for this analysis. In addition, the estimation method, which is referred to as the ordinary least squares method, is defined. There have been a total of 38 observations, which span the years 1982 to 2016. The foreign direct investment (FDI), global capital flows (GCF), inflation, interest rate, and trade openness are the independent variables, and C is the constant. The signs assigned to the coefficients provide information about the nature of the relationship. The findings indicate that there is a significant and positive correlation between FDI and GDP. The one hundred percent increase in FDI points to a 13 percentage point increase in India's growth rate. In addition, GCF and growth have a favourable correlation with one another. The findings demonstrate that a one hundred percent rise in GCF will point to a 26 percentage point increase in India's growth rate. On the other hand, there was shown to be a negative association between inflation and growth rate. According to this investigation, the relationship between growth and interest rates is insignificant. Finally, trade openness has a positive link with India's growth rate, which means that a 1% increase in trade openness will lead to a 0.02% rise in India's growth rate. The R^2 value, also known as the coefficient of determination, was found to be 0.882, which indicated that variations in India's GDP are due to independent variables 88 percent of the time.

The F-statistic illustrates how important it is for the model to be inclusive. The average significance of GDP in the statistics is 11.943, which is the same as the mean value of the dependent variable. The standard deviation of the dependent variable is 0.2887, and it represents the deviation from the mean value of GDP contained in the data. Akaike/ Schwartz/ Hannan-Quinn facts Criterion:. The model will be considered superior, provided that the value among them is lower. The findings indicate that the Akaike and the Hannan have values about the same and lower than others. As a result, it is preferable to accept both of these criteria. With the e-views software's assistance, the Granger causality analysis findings have been shown in Table 3.

Table 3
RESULTS OF PAIRWISE GRANGER CAUSALITY TEST

Null Hypothesis:	Observations	F-Statistic	Prob.
FDI does not Granger Cause GDP	35	0.31244	0.8162
GDP does not Granger Cause FDI		3.97896	0.0176
GCF does not Granger Cause GDP	35	1.19931	0.3281
GDP does not Granger Cause GCF		0.54649	0.6546
INFLATION does not Granger Cause GDP	35	0.59589	0.623
GDP does not Granger Cause INFLATION		1.31557	0.289
INTEREST_RATE does not Granger Cause GDP	35	1.12403	0.3562
GDP does not Granger Cause INTEREST_RATE		1.1235	0.3564
TRADE_OPENESS does not Granger Cause GDP	35	0.16714	0.9176
GDP does not Granger Cause TRADE_OPENESS		3.12154	0.0417
GCF does not Granger Cause FDI	35	5.75512	0.0034
FDI does not Granger Cause GCF		1.25858	0.3076
INFLATION does not Granger Cause FDI	35	0.66241	0.5821
FDI does not Granger Cause INFLATION		0.65328	0.5876
INTEREST_RATE does not Granger Cause FDI	35	0.82485	0.4913
FDI does not Granger Cause INTEREST_RATE		4.40289	0.0117
TRADE_OPENESS does not Granger Cause FDI	35	6.43373	0.0019
FDI does not Granger Cause TRADE_OPENESS		7.3046	0.0009
INFLATION does not Granger Cause GCF	35	2.57332	0.074
GCF does not Granger Cause INFLATION		1.39137	0.266
INTEREST_RATE does not Granger Cause GCF	35	2.60109	0.0718
GCF does not Granger Cause INTEREST_RATE		6.26733	0.0022
TRADE_OPENESS does not Granger Cause GCF	35	1.22094	0.3205
GCF does not Granger Cause TRADE_OPENESS		5.59768	0.0039
INTEREST_RATE does not Granger Cause INFLATION	35	0.75235	0.5303
INFLATION does not Granger Cause INTEREST_RATE		0.71365	0.5521
TRADE_OPENESS does not Granger Cause INFLATION	35	1.07051	0.3775
INFLATION does not Granger Cause TRADE_OPENESS		1.82597	0.1653
TRADE_OPENESS does not Granger Cause INTEREST_RATE	35	3.24156	0.0369
INTEREST_RATE does not Granger Cause TRADE_OPENESS		5.36814	0.0048

Source: Authors Own Calculation.

Granger causality results state that FDI does not Granger cause GDP, but GDP Granger causes FDI. Another null pair wise hypothesis regarding GCF and GDP states that the variables are not significantly impacting each other as both the p-values are greater than 0.05. Similarly, Inflation and GDP are not causing each other, which states that both are not impacting each other. The null hypothesis which statuses that trade openness does not granger cause GDP , here

p-value >0.05 therefore we won't be able to reject it and another one which states that GDP does not granger cause trade openness, here p-value <0.05 therefore here we will reject this fact, in other words it states that GDP is causing trade openness.

The pair wise null hypothesis of GCF and FDI states that FDI does not granger GCF. And we will reject the fact that GCF does not granger cause FDI. Therefore in other words GCF is able to determine FDI. The pair wise null hypothesis of FDI and Inflation states that both variables do not impact each other. The result of the pair wise granger causality test shows that FDI stimulates the interest rate as well as trade openness of the economy. So inflation is impacting the GCF and GCF is impacting the interest rate and trade openness. The results also show that Interest rate and trade openness determine each other.

CONCLUSION

The research was effectuated to examine the influence of macro-economic determinants on the GDP growth rate of Indian Economy. The variables involve in the work are GDP, GCF, interest rate, inflation, trade openness, FDI in which GDP is in use as dependent variable and rest of the variables are independent variable. The study castoff the data over the period of 1982-2016 which is together from the World Bank. After the collection of data the next step involve is to do the analysis part which the E-views Software does to do regression of the data which is done by OLS technique. The correlation matrix and Granger Causality methods are also applied to the analysis part. From the OLS regression it is interpreted that FDI, GCF and Trade openness shows substantial positive relationship with the GDP but inflationary rate shows a substantial adverse affiliation with the GDP. The next technique which was used to do the analysis part is the correlation matrix method which stated that FDI and Trade openness shows high correlation with the dependent variable. GCF and GDP have moderate correlation whereas interest rate and GDP have low correlation. The last technique used is the Granger Causality method, which stated that GDP can determine FDI and Trade Openness. GCF is able to predict GDP, FDI, interest rate and Trade openness. FDI does granger cause Interest rate and Trade openness. Trade openness causes Interest rate and FDI. Whereas interest rate does granger cause GCF only and Inflation can determine GCF. Therefore there is a prerequisite to take on tight monetary and fiscal policy by the government because inflation is having substantial negative impact on the GDP of an Indian Economy. Finally, the government also requisite to encourage constancy in the macro-economic factors and also need to employ policies that are growth oriented at the macro level for the economy of the state.

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