

FACTORS AFFECTING THE ECONOMIC GROWTH IN INDIA

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DECLARATION

We hereby declare the term paper 'FACTORS AFFECTING THE ECONOMIC GROWTH IN INDIA' submitted by us to the Department of Business Economics, Gargi College is our own work. This research project is submitted as an internal assessment of B.A. (hons.) Business Economics. We further declare that the work reported in this project has not been submitted and will not be submitted, either in part or full for any other degree or diploma of this university or any other university.

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ABSTRACT

The *gross domestic product (GDP)* is one of the key parameters used for measuring the condition of a nation's economy. The *GDP Per Capita* is obtained by dividing the GDP of a country by its population. Due to the latter fact, the GDP per capita accurately mirrors the average income per individual in the economy. As GDP booms, it is accepted that everybody in the chain will profit and the development will have a trickle-down impact on the people, improving their standard of living, thus leading to the Economic growth of the country. This paper aims at identifying the factors affecting the economic growth in India by keeping the GDP per Capita as the dependent variable. It uses *Time Series data* for India from 1999-2019. A positive *Trade Balance (Trade Surplus)*, higher *FDI growth* and surging *Inflation* were found to have a positive impact on the growth of Per Capita GDP of India while the *Employment Rate* showed a negative impact on the same. This paper provides an overview of the changes in Indian Economy amidst its opening up in 1991,

Keywords: GDP Per Capita, Trade Surplus, Trade Balance, FDI, Inflation, Employment Rate.

INTRODUCTION

After a long and rigorous struggle for independence by the Indians, which continued for more than a 100 years, against the British, freedom paved its way to the Indian soil in 1947. After gaining the freedom and a constitution of its own, the new budding India strived to place itself amongst the most stable and developed nations on the globe through various developmental tools. Economy of India laid the foundation for this dream. It not just depicts the synchronization between various sectors such as the private companies, MSMEs, agriculture, railways, tax, public sector undertakings, etc. but has also been the pillar of various remarkable economic policies till date. After 1990, when India opened up itself for liberalization and globalization, it entered a new era of economic reforms. Since then, the economy of India has been complex but inclusive. Various other factors such as research and development, science and technology, Foreign Direct Investment, Trade Balance, Foreign Exchange Rate, etc. have been an important determinant of economic growth apart from the traditional factors such as agriculture, employment, poverty, education, etc.

With the concept of economy being so dynamic, in this research paper, we try to investigate and analyse some important factors viz. Trade Balance, Foreign Direct Investment, Inflation and Employment and their effects on the economic growth rate of India. Through the use of various economic theories related to it, literature review of some eminent research papers and the important statistical and research analysis tools, we try to make our endeavour more interesting and wholesome.

THEORETICAL CONCEPT

India, a developing country, a country that attracts huge capital due to its large population and workforce. Economic growth in India has been one of the many positives that have existed since its independence.

India witnessed an economic revolution in the late 1980's and early 90's. Since then the economy has only grown and India is currently among the fastest growing GDP nations in the world.

Economic development infers an improvement in economic welfare through higher real incomes and other welfare indices such as improved quality of education, employment, better infrastructure, reduced poverty and better medical care. This paper analyzes the impact of foreign investments inflows on the economic growth of India.

All around let us view a portion of the components that influence the Indian economy.

1. Trade Balance

The trade balance is the net amount of a nation's exports and imports of merchandise without considering every monetary exchange, investments and other monetary segments. A nation's trade balance is positive (implying that it enlists an excess) if the worth of exports surpasses the worth of imports.

A Trade Surplus can create more employment due to a rise in the government spending, inturn leading to a better infrastructure, education and thus promoting the country's economic growth, A country's trade balance can also influence the value of its currency in the global markets, as it allows a country to have control of the majority of its currency through trade. A strong trade surplus doesn't necessarily mean strong economic growth. Japan, for example, has run a significant trade surplus for most of the past several decades, yet its economy has been stuck in low gear most of that time. Germany, too, generally runs a strong trade surplus but registers mediocre economic growth.

In the U.S., some periods of strong economic growth have come at times of a high trade deficit, as consumers and businesses buy more products and services from abroad, and foreign investors seek to put their money to work in the U.S.

2. Foreign Direct Investment(FDI)

Foreign Direct Investment refers to an investment made by businesses or individuals of one country in the business of another country. FDI has a positive impact on the development of the Indian Economy. Inflows of FDI strengthen the trade network of a country at global level and also provide financial assistance to that country. FDI helps in reducing the balance of payment (BOP) account deficit.

Through SPSS, by applying the regression technique and with the regression model it is found that FDI has a significant impact on the growth of an economy.

3. Inflation

When inflation increases, the purchasing power of a currency falls, resulting in rising prices for all goods and services. Fluctuating inflation rates affect all stakeholders in an economy including the consumers, investors, corporations, and government. If inflation becomes too high, the economy will suffer; conversely, if inflation is controlled and at reasonable levels, the economy will prosper. With controlled, lower inflation, employment increases due to rise in consumer spending. Consumers have more money to buy goods and services, and the economy benefits and grows. However, the impact of inflation on economic development cannot be assessed with complete accuracy.

4. Employment Rate

Economic Growth and Employment are interlinked concepts in an Economy. Employment contributes to economic growth and development of a Nation. Workers producing valuable goods or services, in turn receive a wage, which they can spend on buying the good produced. Employment is also significant for economic development because it improves the quality of living standards of an employed person and this helps to improve the business of their employer or improve the profitability of any company resulting in overall increase in economic growth and development of the country as a whole.

RESEARCH AND METHODOLOGY

- Secondary data has been used for the analysis.
- The time period under consideration is 1999 to 2019.
- Data has been collected from the World Bank and RBI Bulletins.
- Per Capita GDP has been taken as the dependent variable.
- The independent variables are Trade Balance, Inflation, FDI and Employment rate.
- The software used is SPSS.
- Per Capita GDP and Employment are taken in percentage of population.
- Trade Balance and FDI are in billion dollars.
- Inflation is expressed in rate %.
- Descriptive statistics methods are used to analyse the data.
- A multiple regression analysis will be carried out to examine the impact of the independent variables on GDP.
- A correlation analysis will also be carried out.
- Differential functional forms like Double Log, Semi Log will also be used for the data.

LITERATURE REVIEW

1. Choi, Smith and Boyd (1996) argued that inflation, in the presence of information asymmetry can harm growth by highlighting financial markets frictions and thereby negatively affecting the provision and allocation of investment. The rational expectations revolution, criticised the non-neutrality proposition of Keynesians by arguing that, under flexible markets, 8 repeated monetary shocks meant to facilitate growth can only lead to ever increasing levels of inflation in the long run.
2. Feenstra & Markusen (1994) stated that the new input, the growth of output, affects the usage of a wide variety of goods which are improvised in the FDI related manufacturing sector. Coming up to the technologies, FDI is the main source of productivity and innovation. Also, the further expansion in FDI by multinational enterprises (MNE's) especially from the eighties have actually contributed towards the upliftment of growth and changes in technologies, liberalization and privatisation of economies of developing countries like India.
3. Ch. Hymavathi, Dr. K. Kalpana (2017) in their paper titled "A Study on Analysis of BOP Trends with Reference to India" stated that in the capital account, exports declined in 2011 - 2016 and imports increased first and then decreased in 2011 - 2016. In the current account, foreign investment (including portfolio investment and direct investment) also declined in 2011 - 2016. Population growth, demonstration effects, cyclical fluctuations, natural factors, globalization, liberalization and inflation are factors that cause imbalances in the balance of payments.
4. Kothare (1999) pointed out that India is one of the world's fastest growing economies, initially due to the rise in population growth creating a positive effect on its long term economic growth. India is now ranked as one of the top producers of agricultural products and is one of a leading nation in terms of GDP among developing countries. He stated that a variety of factors have contributed to the growth of India's economy. Due to the increase in population a large labor force was created. In keeping with its fiscal policies, India spent

money on education to provide a pathway for youth and adults, which helped them to play a productive role and contribute to India's economy. Due to the quality education provided to the job-seekers, India was able to generate better trained employment forces. The resulting high rates of fruitful employment meant that India's economic sectors, mainly agriculture and industry, began increasing their productivity.

Examination of Individual Impact of the Variables on GDP per capita

1. Impact of Trade Balance on GDP per capita

We take Trade Balance as an indicator of economic growth, which affects GDP per capita. In a fast growing economy, generally there is a positive impact of Trade Balance on GDP per capita. But there is a negative impact also when there is a lower Tariffs / Trade Barriers.

According to the data collected by us, it shows a positive impact of Trade Balance on GDP per capita.

The impact can be studied using regression analysis. Carrying out regression of Trade Balance on GDP per capita, we get:

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.783 ^a	.613	.592	358.400210

a. Predictors: (Constant), Trade Balance (in Billion \$)

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3857760.028	1	3857760.028	30.033	<.001 ^b
	Residual	2440563.505	19	128450.711		
	Total	6298323.533	20			

a. Dependent Variable: GDP per capita (in thousands)

b. Predictors: (Constant), Trade Balance (in Billion \$)

Coefficients ^a								
		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
Model		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	572.563	132.558		4.319	<.001	295.115	850.010
	Trade Balance (in Billion \$)	11.605	2.118	.783	5.480	<.001	7.173	16.037

a. Dependent Variable: GDP per capita (in thousands)

As can be seen, the R Square comes out to be 0.613, implying that 61.3% of the variation in GDP per capita can be explained using Trade Balance. The model is significant at 5% level of significance, using Anova table. Using the table of “Coefficients”, too, see that Trade Balance is a significant independent variable at 5% level of significance. The regression equation is:

$$\text{GDP per capita} = 572.563 + 11.605 \times \text{Trade Balance}$$

This implying that 1 unit change in Trade Balance will lead to 11.605 unit change in GDP per capita.

In this case, the impact of Trade Balance on GDP per capita turns out to be positive, as we discussed earlier.

2. Impact of Foreign Direct Investment on GDP per capita:

Foreign Direct Investment in an economy shows that there is a good trend of investment which ultimately results in increasing the GDP per capita and growth of the country. An increase in FDI yields a positive impact on GDP.

To analyse it, we apply regression analysis and obtain the following result.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.898 ^a	.807	.797	252.819585

a. Predictors: (Constant), Foreign Direct Investment (in Billion \$)

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5083886.422	1	5083886.422	79.538	<.001 ^b
	Residual	1214437.111	19	63917.743		
	Total	6298323.533	20			

a. Dependent Variable: GDP per capita (in thousands)

b. Predictors: (Constant), Foreign Direct Investment (in Billion \$)

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	397.195	101.696		3.906	<.001	184.342	610.048
	Foreign Direct Investment (in Billion \$)	30.273	3.394	.898	8.918	<.001	23.169	37.378

a. Dependent Variable: GDP per capita (in thousands)

R square is 0.898 in this case, meaning that there is 89.8% of variation in GDP is explained by FDI. However, the model is significant at 5% level of significance.

The regression equation obtained is:

$$\text{GDP} = 397.195 + 30.273 \cdot \text{FDI}$$

This implies that a unit change in FDI will lead to a change of 30.273 units in GDP, in the same direction.

3. Impact of inflation on GDP per capita

When Inflation is increasing, people will spend more money because they know that it will be less valuable in the future.

Thus a positive impact of Inflation is usually seen on GDP per capita.

We can analyze this impact using regression analysis as follows:

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.305 ^a	.093	.045	548.265053

a. Predictors: (Constant), Inflation Rate (%)

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	587026.743	1	587026.743	1.953	.178 ^b
	Residual	5711296.790	19	300594.568		
	Total	6298323.533	20			

a. Dependent Variable: GDP per capita (in thousands)

b. Predictors: (Constant), Inflation Rate (%)

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	762.434	308.033		2.475	.023	117.713	1407.155
	Inflation Rate (%)	62.524	44.741	.305	1.397	.178	-31.120	156.167

a. Dependent Variable: GDP per capita (in thousands)

R Square is 0.305 in this case, meaning that the individual impact of Inflation on GDP per capita is not very high. However, the model is not significant at 5% level of significance.

The regression equation obtained is:

$$\text{GDP} = 762.434 + 62.524 \cdot \text{Inflation}$$

This implies that a unit change in Inflation will lead to a change in 62.524 units in GDP per capita, in the same direction.

4. Impact of Employment on GDP:

Employment is another indicator of economic development. Employment contributes to economic growth and development: workers produce valuable goods and services, and in turn receive a wage, which they can spend on buying the goods produced. When employment is at maximum the economy is 100% efficient.

We can analyze this impact using regression:

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.985 ^a	.970	.968	99.962562

a. Predictors: (Constant), Employment (% of total Population)

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6108465.772	1	6108465.772	611.304	<.001 ^b
	Residual	189857.760	19	9992.514		
	Total	6298323.533	20			

a. Dependent Variable: GDP per capita (in thousands)

b. Predictors: (Constant), Employment (% of total Population)

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	5869.149	191.746		30.609	<.001	5467.821	6270.477
	Employment (% of total Population)	-91.328	3.694	-.985	-24.725	<.001	-99.059	-83.597

a. Dependent Variable: GDP per capita (in thousands)

R Square is 0.985 in this case, meaning that 98.5% of the variation in GDP per capita can be explained using Employment. The model is significant at 5% level of significance.

The regression equation obtained is:

$$\text{GDP} = 5869.149 - 91.328 * \text{Employment}$$

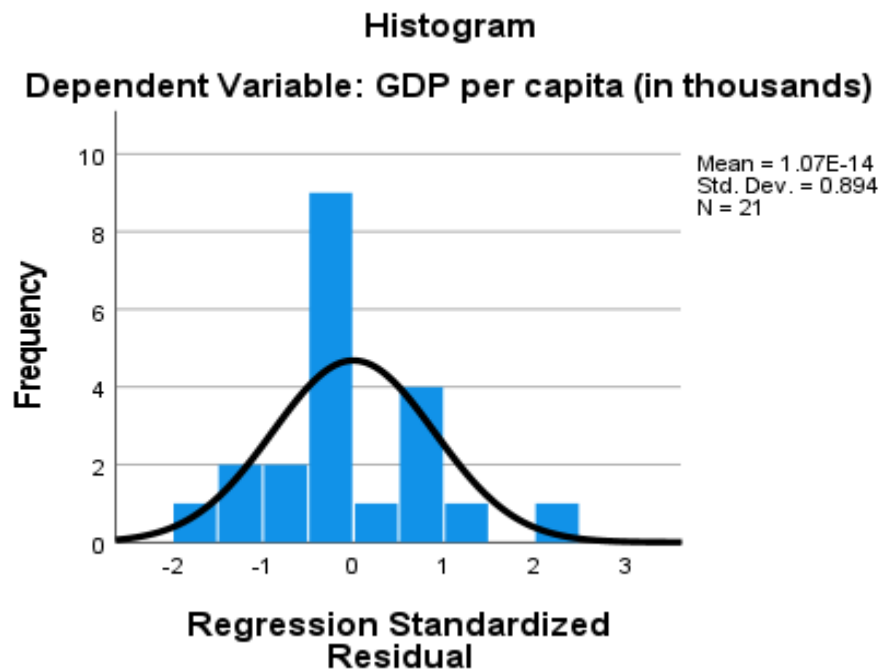
This implies that a unit change in Employment will lead to a change of 91.328 units in the opposite direction. This shows that there is a negative impact of Employment on GDP per capita.

Prerequisites to the Analysis

1. Normality Test:-

One of the main assumptions of Regression Analysis is that the data is normally distributed. We need to ensure that this assumption is not being violated.

On generating a histogram of our data to check normality using SPSS, we get the following:



Thus, we observe that the data is normally distributed since the data represents a bell-shaped curve. So, we can say that it is normally distributed and is a good fit.

2. Descriptive Statistics:

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
GDP per capita (in thousands)	21	441.999	2099.599	1159.10110	561.173927
Trade Balance (in Billion \$)	21	4.23	122.91	50.5429	37.84565
Foreign Direct Investment (in Billion \$)	21	2.17	50.61	25.1676	16.65419
Inflation Rate (%)	21	2.49	11.99	6.3443	2.74013
Employment (% of total Population)	21	42.60	60.09	51.5729	6.05128
Valid N (listwise)	21				

The above table shows the minimum and maximum values as well as the mean and standard deviation of all variables involved. The descriptive statistics are very useful in standardising variables. The mean refers to the average of all values. The standard error is a measure of the statistical accuracy of an estimate.

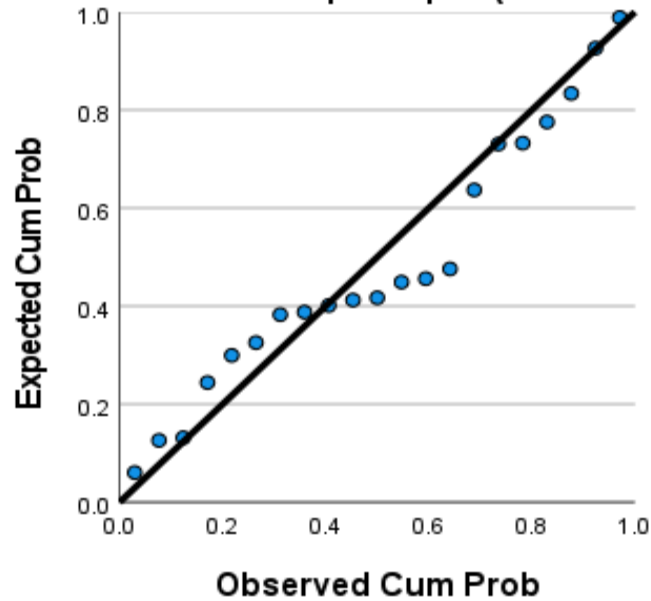
3. Heteroscedasticity and Homoscedasticity:

Heteroscedasticity refers to unequal variances of the error term. This is the situation when independent variable increases, dependent variable will also increase but the variance of dependent variable increases with increase in independent variable.

Homoscedasticity refers to equal variances of the error term. This is the situation when independent variable increases, dependent variable will also increase but the variance of dependent variable will remain the same.

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: GDP per capita (in thousands)

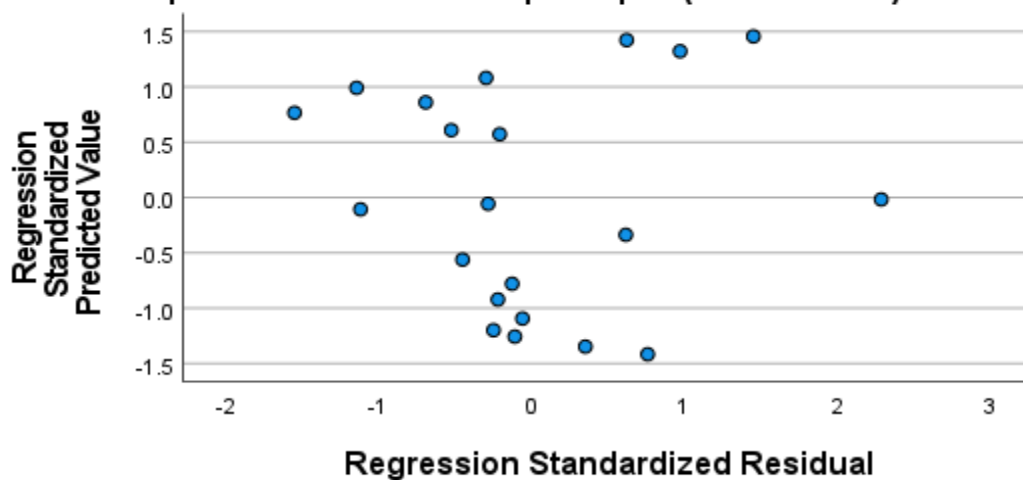


In

this plot, the observed cumulative prob on the X-axis and expected cumulative prob on the Y-axis. There is a linear relationship between the expected and observed cum. Prob as the data points are closed to the fitted lines. Then we can say that the model is significantly fit and there is no heteroscedasticity.

Scatterplot

Dependent Variable: GDP per capita (in thousands)



From this scatter plot diagram, the data points are random and no specific pattern visible in this diagram so, we can say that there is no heteroscedasticity present in the regression model.

4. Multicollinearity:-

As we observed , although R Square was significant, most of the individual variables were not. This is because of multicollinearity. We carried out correlation tests in our analysis using SPSS, the results of the test are as follows:

Correlations			Trade Balance (in Billion \$)	Foreign Direct Investment (in Billion \$)	Inflation Rate (%)	Employment (% of total Population)
Spearman's rho	Trade Balance (in Billion \$)	Correlation Coefficient	1.000	.700**	.614**	-.774**
		Sig. (2-tailed)	.	<.001	.003	<.001
		N	21	21	21	21
	Foreign Direct Investment (in Billion \$)	Correlation Coefficient	.700**	1.000	.443*	-.900**
		Sig. (2-tailed)	<.001	.	.044	<.001
		N	21	21	21	21
	Inflation Rate (%)	Correlation Coefficient	.614**	.443*	1.000	-.392
		Sig. (2-tailed)	.003	.044	.	.079
		N	21	21	21	21
	Employment (% of total Population)	Correlation Coefficient	-.774**	-.900**	-.392	1.000
		Sig. (2-tailed)	<.001	<.001	.079	.
		N	21	21	21	21

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

As can be seen, the other variables are highly correlated with each other, for example, Employment and FDI, Trade Balance and FDI and Employment and Trade Balance. Thus, there is a problem of multicollinearity, due to which our variables were not significant.

5. Autocorrelation:

Autocorrelation refers to the correlation between observations. It is one of the assumptions of CLRM.

The result of Autocorrelation in regression obtained is:

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.917 ^a	.840	.822	236.455904	.856

a. Predictors: (Constant), Foreign Direct Investment (in Billion \$), Trade Balance (in Billion \$)

b. Dependent Variable: GDP per capita (in thousands)

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5291918.434	2	2645959.217	47.324	<.001 ^b
	Residual	1006405.099	18	55911.394		
	Total	6298323.533	20			

a. Dependent Variable: GDP per capita (in thousands)

b. Predictors: (Constant), Foreign Direct Investment (in Billion \$), Trade Balance (in Billion \$)

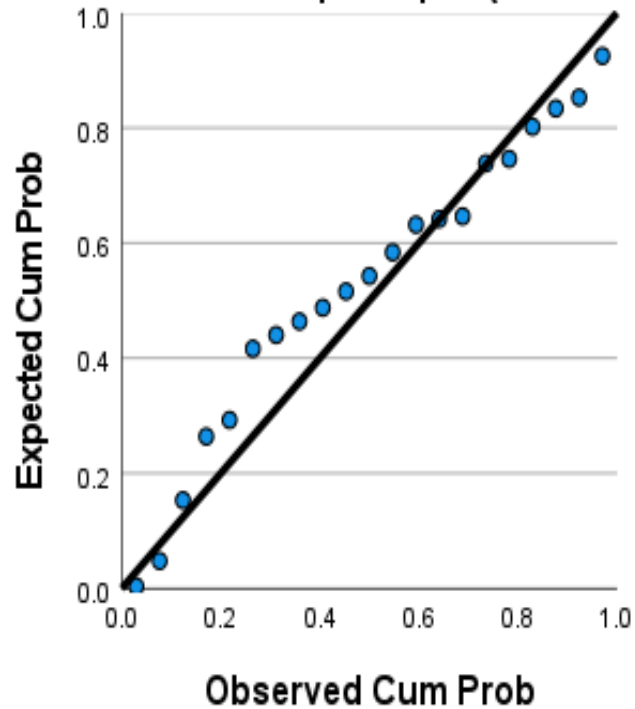
Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	363.151	96.738		3.754	.001	159.913	566.389
	Trade Balance (in Billion \$)	3.966	2.056	.267	1.929	.070	-.354	8.285
	Foreign Direct Investment (in Billion \$)	23.662	4.672	.702	5.065	<.001	13.846	33.477

a. Dependent Variable: GDP per capita (in thousands)

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: GDP per capita (in thousands)



Interpretation:

- The regression model as a whole is significant at 5% level of significance.
- In this case, the value of Durbin Watson is 0.856 from the Model summary table, it means that there is no Autocorrelation between observations because it is less than 2.
- The probability plot graph shows that Autocorrelation is present in this model because the data points are closed to the diagonal line.

Multiple Regression Analysis

1. Hypothesis:

Null Hypothesis (H0): There is no impact of Trade Balance, FDI, Inflation and Employment on GDP.

Alternate Hypothesis (H1): There is an impact of Trade Balance, FDI, Inflation and Employment on GDP.

The Regression Equation will be of the form:

$$\text{GDP} = B_0 + B_1(\text{Trade Balance}) + B_2(\text{FDI}) + B_3(\text{Inflation}) + B_4(\text{Employment})$$

2. Applying Regression Analysis:

The following results are obtained after applying regression on the data:

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.989 ^a	.979	.974	90.898842

a. Predictors: (Constant), Employment (% of total Population), Inflation Rate (%), Trade Balance (in Billion \$), Foreign Direct Investment (in Billion \$)

b. Dependent Variable: GDP per capita (in thousands)

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6166121.942	4	1541530.486	186.567	<.001 ^b
	Residual	132201.590	16	8262.599		
	Total	6298323.533	20			

a. Dependent Variable: GDP per capita (in thousands)

b. Predictors: (Constant), Employment (% of total Population), Inflation Rate (%), Trade Balance (in Billion \$), Foreign Direct Investment (in Billion \$)

Coefficients ^a								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	4788.083	466.706		10.259	<.001	3798.710	5777.456
	Trade Balance (in Billion \$)	1.838	.981	.124	1.874	.079	-.242	3.918
	Foreign Direct Investment (in Billion \$)	4.684	2.731	.139	1.715	.106	-1.106	10.474
	Inflation Rate (%)	-11.999	9.676	-.059	-1.240	.233	-32.510	8.513
	Employment (% of total Population)	-72.977	7.974	-.787	-9.152	<.001	-89.881	-56.074

a. Dependent Variable: GDP per capita (in thousands)

Interpretation:

- Since the analysis is significant at 5% level of significance, therefore we can reject the null hypothesis. This shows that the independent variables that we have considered do have a significant impact on the GDP.
- The coefficient of R Square comes out to be 0.974, which means that 97.4% of the variation in GDP can be explained by using Trade Balance, FDI, Inflation and Employment.
- The regression equation which is formed is:

$$\text{GDP} = 4788.083 + 1.838(\text{Trade Balance}) + 4.684(\text{FDI}) - 11.999(\text{Inflation}) - 72.977(\text{Employment})$$

- Inflation and Employment have a negative coefficient because Inflation and Employment will impact GDP is not certain. In this case, it seems to have a negative impact of Inflation and Employment on GDP. This might be because when India had a high growth rate, increase in Inflation and Employment may not be equally high.
- Trade Balance and FDI have positive coefficients.
- Interpretation of the coefficients:

For example, 1.838 as the coefficient of Trade Balance means that with a unit change in Trade Balance, the GDP will change by 1.838 units in the same direction.

Regression using Double Log Model

The double Log Model is very useful in checking the elasticity among variables. Where proportionate changes are to be estimated, we use the Double Log Model. Since in our analysis, we would like to know the impact of variables in percentage terms as well, we would like to apply regression using the Double Log Model as well.

The regression equation that we will use is:

$$\text{Log(GDP)} = \text{Log(Trade Balance)} + \text{Log(FDI)} + \text{Log(Inflation)} + \text{Log(Employment)}$$

We first need to convert variables into their logarithmic forms. We do so using SPSS.

The results obtained after applying regression are:

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.994 ^a	.989	.986	.06474

a. Predictors: (Constant), Log_Employment, Log_Inflation, Log_TradeBalance, Log_FDI

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.948	4	1.487	354.787	<.001 ^b
	Residual	.067	16	.004		
	Total	6.015	20			

a. Dependent Variable: log_GDP

b. Predictors: (Constant), Log_Employment, Log_Inflation, Log_TradeBalance, Log_FDI

Coefficients ^a								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	16.930	1.076		15.741	<.001	14.650	19.210
	Log_TradeBalance	.134	.032	.288	4.131	<.001	.065	.202
	Log_FDI	.094	.039	.178	2.412	.028	.011	.176
	Log_Inflation	-.017	.047	-.013	-.364	.721	-.118	.083
	Log_Employment	-2.719	.260	-.589	-10.472	<.001	-3.270	-2.169

a. Dependent Variable: log_GDP

Interpretation:

- The coefficient of determination, R square, increased to 0.989 in this model.
- The regression equation is
- $\text{Log}(\text{GDP}) = 16.930 + 0.134(\text{Trade Balance}) + 0.094(\text{FDI}) - 0.017(\text{Inflation}) - 2.719(\text{Employment})$
- Interpretation of the coefficients:
Taking Trade Balance as 0.134, depicts that 1% increase in Trade Balance will lead to 13.4% increase in GDP. The same way other coefficients can be interpreted.
- From the Anova table, we see that the analysis is significant at 5% level of significance. Hence, again we reject the null hypothesis, and it implies that the independent variables have a significant impact on GDP.

Regression using Semi-Log Model

This model is used to measure the proportionate change in the dependent variable due to an absolute change in the independent variable.

$$\text{Log(GDP)} = B1 + B2(\text{Trade Balance}) + B3(\text{FDI}) + B4(\text{Inflation}) + B5(\text{Employment})$$

Applying regression, we get the following results:

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.989 ^a	.978	.972	.09117

a. Predictors: (Constant), Employment (% of total Population), Inflation Rate (%), Trade Balance (in Billion \$), Foreign Direct Investment (in Billion \$)

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.882	4	1.470	176.894	<.001 ^b
	Residual	.133	16	.008		
	Total	6.015	20			

a. Dependent Variable: log_GDP

b. Predictors: (Constant), Employment (% of total Population), Inflation Rate (%), Trade Balance (in Billion \$), Foreign Direct Investment (in Billion \$)

Coefficients ^a								
		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
Model		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	9.767	.468		20.865	<.001	8.775	10.760
	Trade Balance (in Billion \$)	.002	.001	.137	2.023	.060	.000	.004
	Foreign Direct Investment (in Billion \$)	.006	.003	.196	2.358	.031	.001	.012
	Inflation Rate (%)	.011	.010	.056	1.157	.264	-.009	.032
	Employment (% of total Population)	-.062	.008	-.680	-7.704	<.001	-.079	-.045

a. Dependent Variable: log_GDP

Interpretation:

- The value of R Square decreases in this model to 0.978.
- The regression equation becomes:

$$\text{Log(GDP)} = 9.767 + 0.002(\text{Trade Balance}) + 0.006(\text{FDI}) + 0.011(\text{Inflation}) - 0.062(\text{Employment})$$
- The model is significant at 5% level of significance, using Anova table.
- The Trade Balance is significant at 10% level of significance, whereas other variables are not.
- Interpretation of the coefficients:
 Taking the beta coefficient of FDI, 0.006 it represents that a unit change in FDI will lead to 0.6% change in GDP.

Conclusion

We have concluded the following on the basis of our analysis:

1. Since, in all cases, we rejected the null hypothesis, we have established that Trade Balance, FDI, Inflation and Employment are significant and important determinants of GDP.
2. We have also established that our data suffered from the error of multicollinearity, as we observed from the correlation matrix.
3. Using Double log and semi log model we have seen that R Square increases that means our model is perfectly fit.

All the macroeconomic variables used in the study namely- Trade Balance, FDI, Inflation and Employment rate have found to have a relationship with Gross Domestic Product(GDP) either a long run or a causal relationship. This makes it clear that there is, in fact, a relationship between economic growth and these macroeconomic factors. In our study we tried to explain whether the relationship between GDP and different Macro Economic variables was significant or not through Multivariate Regression analysis, ANOVA and Correlation. Firstly, we performed a Normality Test to check whether the data selected for the research is normal or not. After checking the normality, we performed the aforementioned analysis and found that all the variables have a relationship with the dependent variable in some way. We have used Time Series data for India from 1999-2019. A positive Trade Balance(Trade Surplus) and higher FDI growth were found to have a positive impact on the growth of Per Capita GDP of India while the Inflation and Employment Rate showed a negative impact on the same we concluded from Multiple regression analysis.

References

<https://ashraffeps.yolasite.com/resources/EuroMed/Fall2018/The%20main%20determinants%20affecting%20economic%20growth.pdf>

<https://www.arcjournals.org/pdfs/ijhsse/v5-i5/9.pdf>

http://www.igidr.ac.in/conf/money/mfc-13/Inflation%20and%20Economic%20Growth%20in%20India_Prasanna%20and%20Gopakumar_IGDIR.pdf

<https://www.jcreview.com/fulltext/197-1577441457.pdf>

<https://www.econstor.eu/bitstream/10419/176153/1/icrier-wp-131.pdf>

Appendix

Year	GDP per capita (Thousands)	Trade Balance (Billion\$)	FDI (Billion \$)	Inflation rate	Employment of total population
1999	441.999	8.77	2.17	4.67	60.09
2000	443.314	4.25	3.58	4.01	59.65
2001	451.573	4.25	5.13	3.78	59.10
2002	470.987	5.05	5.21	4.30	58.60
2003	546.727	4.23	3.68	3.81	57.76
2004	627.774	12.66	5.43	3.77	56.78
2005	714.861	22.90	7.27	4.25	56.00
2006	806.753	29.98	20.03	5.80	55.08
2007	1028.335	49.73	25.23	6.37	54.11
2008	998.522	62.02	43.41	8.35	53.51

2009	1101.961	73.43	35.58	10.88	52.50
2010	1357.564	74.62	27.40	11.99	51.52
2011	1458.104	119.28	36.50	8.86	49.26
2012	1443.880	122.91	24.00	9.31	47.00
2013	1449.606	55.38	28.15	10.91	46.50
2014	1573.881	60.89	34.58	6.35	45.89
2015	1605.605	48.31	44.01	5.87	45.26
2016	1732.564	40.53	44.46	4.94	44.56
2017	1981.651	83.76	39.97	2.49	43.93
2018	2005.863	100.38	42.12	4.86	43.33
2019	2099.599	78.07	50.61	7.66	42.60