



Impact of macroeconomic variables on GDP: Evidence from Pakistan

Abid Hussain*, Hazoor M. Sabir and Mirza Muhammad Kashif

Department of Business Administration, Government College University, Faisalabad, Pakistan.

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ABSTRACT

This research examines the impact involving macroeconomic variables like inflation, real exchange rate and interest rate on GDP of Pakistan within the light involving 32 year time series data from 1980 to 2011. Research was a secondary data based, Descriptive statistics and multiple regression investigation was used to analyze the information. Econometric model used by analysis was comprised of GDP seeing that dependent variable even though the independent factors were interest rate, exchange rate and inflation rate. Data taken from intending for these variables through the website of the State Bank of Pakistan in addition to the World Bank. The individual significance of the variables, overall value and fairness of the econometric model analyzed. The study found that there's a significant effect of inflation rate, interest rate and exchange rate of GDP. So far as the indicators of co-efficient are concerned, the inflation rate interest rate had a negative impact on GDP while exchange rate possessed positive relation to GDP. Based on the results and analysis it is suggested that the Government adopted tight monetary policy due to inflation because the results suggest that inflation provides significant effect but negative relation to GDP. In the case of developing countries like the Pakistan quality value of the exchange rate must be maintained since the results show that there's a considerable and constructive impact involving exchange rate with GDP. Ceiling of interest rate should reduce to boost the economy.

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Introduction

A great degree regarding macroeconomic uniformity attained within the last several years provides caused a fair restoring for the overall design progressively; despite almost all of the significant economic catastrophes inside the background of countries. The economy brought up by the internally 1% in the year, after having a sacrifice of following the using diffident progress inside 2008-09 has been 1.2%. But the particular restoring remains delicate as well as the steadying needs to get put together in order that the advancements are generally not shed within the last a couple of challenging years.

The particular economic development exhibits the particular toughness for far away from protected confronts several considerable challenges' for the overall economy. Just about all industries in the overall economy have never conducted or perhaps many nations around the world location seem to possess added this little inside the diffident development. So that, ultimately, you can meet up with. The particular career aspirations, you can find large variety of contestants for the labor pool. A massive continuing progress level should be achieved inside the longterm.

An assortment of minimal economical planetary and also raising pay out, personal debt and also inflationary stresses, meaningfully lower, the govt. Power to so that you can devote motivate the economy of several international locations. Beneath the several situations, the particular functional development the particular coverage concerns may practically lasting stays the particular flaw, for that better economical joining by making use of regional source deployment, inside assimilation together with lowering how the big wealth of authority area. Simply by increasing and also employing the particular expertise of community industry expenses.

The traditional see within macroeconomics routines which long term as well as expected modifications in our price associated with monetary inflation tend to be natural: in the long run, they cannot impact actual action. Still an amazing kind of proof shows that suffered higher prices associated with monetary inflation may have negative implications with regard to actual financial development during the long term.

These days, the general opinion amongst those who claim to know the most about finance appears to be which higher prices associated with monetary inflation trigger not only for a few people, however for combination financial overall performance. Still there are certainly a lot less contract concerning the accurate relationship between monetary inflation as well as financial overall performance, and also the system through which monetary inflation impacts financial action is actually.

The consequence of long term raises within the monetary inflation price with regard to long-run action appears to be very complex. The actual general opinion concerning the negative a result of monetary inflation upon actual financial development shows just a little section of the entire image. Lately, rigorous numerous dedicated to the actual nonlinear relationship between both of these factors. Which is, in reduced prices associated with monetary inflation, the connection is not really substantial and even good; however in greater prices, monetary inflation features a substantial unfavorable impact on development. Marrone as well as Easterly (1998) indicated that numerous financial systems have observed suffered inflations associated with 20% in order to 30% without having struggling any kind of obvious main negative implications.

Even though absolutely no general opinion however is available concerning the accurate framework from the tolerance results within the relationship between monetary inflation as well as financial overall performance, generally there appears to

Tele:

E-mail addresses: gcuf11@gmail.com

be the small question with that monetary inflation as well as actual action tends to be adversely as well as nonlinearly connected.

Objective of the study:

In this study we've got examined the impact associated with some significant macroeconomic parameters on GDP of Pakistan. GDP shows the economic health of the country, is affecting from many macroeconomic variables like inflation, country wide income, interest rate, exchange price.

- To find the impact of interest rate on GDP.
- To find the significant relationship of the inflation rate with gross domestic product.
- To find the statistical impact of exchange rate on GDP.

Methodology:

This chapter aims to point out the research methodology. It will focus on issues such as; data collection techniques, data analysis methods to find out the impact of macroeconomic variables on GDP, evidence from Pakistan.

Data Collection

This research is secondary and time series data based. The study is a long term analysis as 32 years data for the period of 1980-2011 was used for this study. The data were collected from the handbook of statistics on the following:

- World Bank Website
- State Bank of Pakistan Website

Data for the period of 1980 to 2011 collected from the annual basis, 32 years' observation. Data collected for this research was time series. Time series data values of different variables observed and collected on the basis of annual percentage growth rate.

These are the dependent and independent variables which are written below:

Table 1

Sr. No.	Variables	Dependent/ Independent
1	Gross Domestic Product (GDP)	Dependent
2	Interest Rate (INT)	Independent
3	Inflation Rate (INF)	Independent
4	Exchange Rate (EXR)	Independent

Independent variables:

Variables which show the same effect on dependent variables is called independent variables, there are three independent variables are used like interest rate, inflation rate and exchange rate. These above variables short introduction given below:

Interest Rate (INT)

A rate which is charged or paid for the use of money. An interest rate is often expressed as an annual percentage of the principal. It is calculated by dividing the amount of interest by the amount of principal. Interest rates often change as a result of inflation and State Bank policies.

Inflation Rate (INF)

Inflation means the increase of the general price higher level of goods together with services in an economy after a while. Inflation would be the main indicator of the economy. It offers important insight for that economic state of your country together with sound macroeconomic plans to overpower this. Stable price ranges besides providing some sort of development environment for your economic growth and also elevate the poor who stands out as the most for sale in society. In Pakistan inflation has developed into a serious problem and a main hurdle

when it comes to progress. Inflation is usually a key variable that has a significant have an impact on poverty.

Inflation is defined as a sustained increase in the general level of prices for goods and services. It is measured as an annual percentage increase. As inflation rises, every dollar you own buys a smaller percentage of a good or service. The value of a dollar does not stay constant when there is inflation. The value of a dollar is observed in terms of purchasing power, which are the real, tangible goods that money can buy. When inflation goes up, there is a decline in the purchasing power of money.

Exchange Rate (EXR)

The rate of any foreign-exchange deal for fast delivery. Generally known as "benchmark rates", "straightforward rates" or perhaps "outright rates", spot costs represent the cost that some sort of buyer expects to repay in a foreign currency in yet another currency.

Dependent variables:

Variables which are affected by independent variables are called dependent variables.

Gross domestic product (GDP)

It's an extensive term which in turn shows the complete performance of the country by means of its escalating or lessening growth rate. In a financial season all personal values produced in the country within the shape from the finished goods and services in a specific period of time, however GDP is normally calculated on an annual groundwork. It's included most of public as well as private consumptions, federal outputs, exports as well as investments less imports which might be made in the financial year in the defined edges.

Analytical Technique

In order to examine the relationship between inflation, exchange rate, interest rate and GDP regression analysis were undertaken. The multiple regression tests was run for that purpose which showed the effects of interest rate, exchange rate, inflation on country's output or GDP.

Here in this study data is time series and regression model was applied to the analysis and to find out the impact of macroeconomic variables on GDP.

In this research detailed statistics have been used, and much more specifically importance testing that may be the t-test in order to assess if you'll find significant differences in side macroeconomic varying on low domestic merchandise. The reasoning for using descriptive statistics is always to identify whether you will find there's a significant difference in variables in line with the type regarding firm and enable a greater explanation with the relationship involving macroeconomic variables on low domestic merchandise. T-test had been also applied to check this validity regarding results purchased from the regression model. F-test applied to check the effect of all of the independent variables on the dependent variable.

Statistical Model

Statistical model developed for this study to examine the impact of macroeconomic variables on GDP, evidence from Pakistan Statistical model is the course of developing relationships between several variables in the form of mathematical equations which shows that, how statistically a variable relates with some other variable.

The statistical model for this study is as follows:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \epsilon \dots \dots \dots (1)$$

Where:

- Y = Show Gross domestic product (GDP)
- β_0 = Constant
- X1 = Interest Rate (INT)

- X2 = Inflation Rate (INF)
- X3 = Exchange Rate (EXR)
- ξ = error term

The equation “1” can be rewritten as:

$$Y = \beta_0 + \beta_1INT + \beta_2INF + \beta_3EXR + \xi \dots\dots\dots (2)$$

Where in equation (2) “Y” is dependent variable representing GDP; and “β₀” is constant “β₁” is coefficient of explanatory variable (Interest Rate), β₂” is coefficient of second independent variable (Inflation Rate) and β₃” is coefficient of third independent variable (Exchange Rate) and “ξ” is error term, it is assumed to remain constant and have zero mean over the time.

Model specification

Variables definition has already been discussed and measurements of variables in all the models are given in Table No. 1

Hypothesis

Building on the review of the extant literature discussion above, the main hypotheses of the study is to be tested as follows:

- H1:** Interest Rate has significant impact on gross domestic product
- H2:** There is statically significant impact of inflation on GDP
- H3:** Exchange Rate has strong relationships with gross domestic product

To check that whether all independent variables (macroeconomic variables) have some impact on the dependent variables (GDP) or not?

In order to examine the relationship between inflation, exchange rate, interest rate and GDP regression analysis were undertaken. The multiple regression tests was run for that purpose which showed the effects of interest rate, exchange rate, inflation on country's output or GDP.

Results:

Descriptive Statistics

To examine the relationship between series, first of all to check out the statinarity of the data by Moving average method applied. Secondly the data is used to examine the statistical behavior by employing descriptive statistics. Descriptive statistics are performed to examine the distribution of data to account for mean, median, standard deviation.

Descriptive Statistics (Table 2)

	Minimum	Maximum	Mean	Std. Deviation
GDP	1.01	10.22	5.038	2.11
INT	-11.96	19.90	3.543	7.16
INF	-17.58	33.47	6.721	12.22
EXR	-57.93	131.34	27.129	54.96

The average annual growth rate in percentage of Gross domestic product shows high average change of 5.038% per year with a standard deviation of the mean 2.11%. GDP growth rate maximum (increase) of 10.22% in one year and maximum increase (decrease) 1.01%. The average annual growth rate in percentage of Interest shows high average change of 3.543% per year with a standard deviation of the mean is 7.16%. INT growth rate maximum (increase) of 19.90% in one year and maximum increase (decrease) 11.96%. The average annual growth rate in percentage of Inflation shows high average change of 6.721% per year with a standard deviation of the mean is 12.22%. INF growth rate maximum (increase) of 33.47% in one year and maximum increase (decrease) 17.58%. The average annual growth rate in percentage of Exchange rate shows high average change of 27.129% per year with a standard deviation of the

mean is 54.96%. INT growth rate maximum (increase) of 131.34% in one year and maximum increase (decrease) 57.93%.

Regression Analysis

In regression analysis, goodness of fit, individual significance and coefficient analysis of each independent variable and overall significance of the model were examined.

Through this analysis, H1, H2 and H3 were also tested.

Regression Analysis (Table 3)

Model	R	R Square	Adjusted Square	R	Std. Error of the Estimate
1	.706a	.498	.444		1.63576

a Predictors: (Constant), exchange, interest, inflation

In the model summary table 3, the capital "R" in shows coefficient of correlation.

The coefficient of correlation from the sample data measures the strength direction of a linear relationship between two variables. The range of the correlation coefficient is from -1 to +1. If there is a strong positive linear relationship between the variables, the value of "R" will be close to +1. If there is a strong negative linear relationship between the variables, the value of "R" will be close to -1. When there is no linear relationship between the variables or only a weak relationship, the value of "R" will be close to 0.

In the above model the value of R² is 0.44 which means that 44.4% of dependent variable GDP is explained through independent variables which are exchange rate, interest rate and inflation of the country. This value is low because GDP of any country depends on various factors like political stability, government consumption, exports and imports of a country etc.

ANOVA (Table 4)

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	74.266	3	24.755	9.252	.000b
Residual	74.920	28	2.676		
Total	149.186	31			

a. Dependent Variable: GDP

b. Predictors: (Constant), EXR, INT, INF

In order to find the overall significance of the model F-Statistics were analyzed.

Table 4 above shows that the F- statistics of the model are 9.252 which conclude the econometric model is significant. The individual significance of the variables was determined by their t values. Coefficient analysis of the variables was undertaken by the values of the coefficients of the respective variables.

Coefficients (Table 5)

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	3.573	1.342		2.66***	.013
INT	-.383	.120	-.524	3.18***	.004
INF	-.213	.091	-.390	2.35***	.026
EXR	.025	.007	.492	3.61***	.001

a Dependent Variable: GDP

Notes: Asterisks denote statistical significance at the 1%(***), 5% (**), or 10% (*) level in two-tailed tests. Values of Gross domestic product, Interest rate, Inflation rate and Exchange rate are taken percentage growth rate on an annual basis.

For the inflation rate, t value remained 2.35 which show that inflation rate has significant impact on GDP, hence H1 accepted. For interest rate, t value was found 3.18 which show interest rate have significant impact on GDP, H2 also accepted. The t value of exchange rate, last independent variable, was found 3.61 which show significant impact of exchange rate of GDP, hence H3 also accepted.

Discussion

In this study we empirically investigated relationship among interest rate, inflation rate, exchange and GDP in the case of Pakistan. The relationship of inflation with GDP was found significant and verifies the results of Dornbush (1993), De Gregorio (1993) and Barro (1995). Our study also verifies the findings of studies of Mallik & Choudhry (2001) and Easterly (1998) that had concluded that the extreme value of inflation either low or high badly hurts the economic growth of the country. Therefore, the central bank should emphasize the price stability in a country and should adopt tight monetary policy. Our results, however, do not conform to the results of study of Smyth (1992, 1994, and 1995).

Using the findings of these studies, inflation possesses insignificant relationship with monetary growth. Whereas each of our studies has concluded that you will find there's a significant adverse relation involving inflation and economic increase. It shows that a boost in inflation brings about a decrease in economic increase, hence confirming findings of the studies associated with Blejer (2000) and Qayyum (2006). The findings in our study show there's negative yet significant relationship between rate and GDP which verifies the consequence of Fry (1995) and Galbis (1995) with regards to significance. But concurrently our information contradicts the particular findings of these two studies with regards to the direction of the relationship.

These studies reveal that there exists a positive relationship between economic growth and interest rate whereas our study shows that in case of Pakistan low interest rate boosts the investment which directly affects the economic growth positively. Our results also verify the work of Rodrik (2008) who concluded that devaluation of currency boosts economic growth in case of developing countries. Likewise, the results of our study showed that real exchange rate has significant impact on GDP that verifies the results of (Mann, 1989).

Summary:

Conclusion

Based on the statically study of the information and the link between the analysis it had been concluded in which an end all selected variables my partner and i.e. Interest rate, exchange charge and inflation received significant influence on GDP. The findings in this study usually are analogous to the cited literature that there is a major impact regarding inflation in economic growth from the country, appraising regarding effect regarding low inflation in growth from the economy of your country while low inflation reasons enhancement throughout savings in addition to high interest rate on remains directly create the boost in financial, the additional lending means people increases their investment that is a positive sign for your economic growth from the country.

It will be further concluded in the analysis from the data that there is the negative relationship between inflation in addition to economic growth eventually. But it disagreed that has a study within the cited books that inflation in addition to economic increase rates usually is positively associated. It can be concluded in which inflation's sensitivity to increase more than that is regarding growth to changes throughout inflation.

The coefficient of interest rate shows a relationship together with GDP. As it truly is discussed within the literature evaluation that then there isn't any clear proof of the relationship between change rate in addition to economic growth as it varies by country to country. In this paper I've got determined the connection between change rates in addition to economically increase and in line with the results we conclude that there is positive in addition to significant relationship between change rates in addition to an economic increase of Pakistan eventually.

The eye rate ought to be suitable to create deposits which usually directly accomplish certain requirements of investments and so people have the chance to save his or her money with all the banks rather than investing any place else. In order to overpower inflation Federal government should consider measures because as this kind of research report concludes that there's a negative relative between inflation and so economic growth to further improve the monetary growth inflation ought to be controlled. A good monetary policy ought to be used as a measure to overpower inflation. In addition to the various measures to overpower inflation it is strongly recommended which the Central Bank must reduce the printing of money which can be a significant measure to diminish inflation.

According to this particular research influence of trade routes in terms of the real trade rate of economic progress is significant along with the relationship is positive with all the economic progress therefore higher exchange rate ought to be maintained in order to boost the economic progress.

Limitations

In this study we try to generate the trustworthy analysis with this study. Despite this research, findings and conclusion present a lot of literature on the impact of macroeconomic variables on GDP. Even there are some limitations in this research which can be used for further study in the future.

➤ *Lack of resources:* we have a short period of time along with limited resources; to maximize the validity of this study one can increase the number of Counter is in the future.

➤ *Small area of research:* this research was conducted only in Pakistan.

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