

GDP – Inflation – Interest Rate: Nexus in India

Ms. Ramya Gowda

*Deputy Consultant BPA Consulting Investment Bankers and Advisors,
B 1003-04, Kanakia Wallstreet, Chakala, Andheri (East), Mumbai – 400 093*

ABSTRACT

Macroeconomic variables have an impact on the Gross Domestic Product (GDP) of any country. Several studies reveal that inflation and interest rates are amongst the important drivers of economic growth. This study seeks to review whether there exists a relationship between inflation, interest rates and growth in India based on empirical research and review of several studies published on the subject at various platforms. The study is conducted on monthly data for the period covering FY2001-02 to FY2019-20. The methodology deployed for investigating the relationship between the three variables is analysing the co-relation co-efficient and linear regression model.

The results show that there exists a negative relationship between GDP and Interest rate however, the impact being insignificant in the long run. Between, GDP and Inflation, the relation is positive however, it is found to be insignificant in the long term. These findings provide an indication to the policymakers for pulling up the right strings in achieving sustainable growth.

KEY WORDS: GDP, Inflation, Interest Rate, India, Linear Regression

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I. INTRODUCTION

Inflation

Inflation is the persistent increase in general price level in an economy. Inflation rate is an indication of the increase in prices of goods and services over a particular period. The prices generally tend to increase whenever the demand outweighs the supply. Inflation rate in India is measured using different price indices i.e., Consumer Price Index (CPI) and Wholesale Price Index (WPI).

CPI measures the change in retail prices of goods and services that households buy for the purpose of consumption.

WPI measures the average change in wholesale price of a wide spectrum of goods including raw materials, intermediate goods and final products which are traded in the wholesale markets. However, services are excluded from its scope. Consumption being the end use of all economic activities, the price change in the wholesale market is expected to reflect in the retail market as well. WPI rates are compiled and released by the Office of the Economic Adviser (OEA), Department for Promotion of Industry and Internal Trade, Ministry of Commerce and Industry.

Considering the practical difficulty in collecting the prices of all goods traded in an economy, the prices of a representative basket of goods is considered to calculate the change in prices and arrive at the inflation rate. The present WPI series of 2011-12 includes a total of 697 representative items.

WPI in India is used extensively as a measure of inflation and important monetary and fiscal policy changes are often linked to it. It is used extensively for short term policy intervention because it is the only index that is available on a weekly basis with a two week's lag. (D.K.Srivastava, K.R.Shanmugam 2012)

This study considers WPI rates (base year 2011-12) as a measure of inflation as it is a better indicator of changes in prices of goods in the economy.

Repo rate is the rate at which the Reserve Bank of India (RBI) lends money to commercial banks in India. Repo rate is used by monetary authorities to control inflation. Repo Rate is the primary tool used by RBI in its quarterly Monetary and Credit Policy. Monetary Policy serves the dual purpose of maintaining price stability while keeping the objective of growth in the forefront, as price stability is a precondition to sustainable growth.

In the event where inflation is beyond the target set, RBI increases repo rate to make it costlier for commercial banks to borrow from the central bank. This ultimately reduces the money supply in the economy and thus helps in arresting inflation.

As the lending rates for various credit facilities provided by Banks and financial institutions are dependent on the repo rate fixed by RBI, repo rate is the most suitable indicator of interest rates prevalent in the economy. Accordingly, this study uses repo rate as an indicator of interest rate.

GDP(Gross Domestic Product/ growth)is an indicator of the economic health of a country. It is a measure of the economic performance of a country, it also gives indication of the size of the economy. As GDP is such an important indicator, it becomes essential to understand the factors impacting the growth. With deeper understanding and information of the factors impacting GDP, the Government formulates policies and rolls out schemes for the growth of the economy. For developing countries, it is imperative to achieve higher year on year GDP to meet the ever increasing needs of the population and maintain financial health of the country. Accordingly, this paper uses GDP growth rate calculated on 2011-12 base year for studying the impact of variables.

Two such factors believed to be having an impact on the growth of any economy have been Inflation and Interest rate amongst others. The impact of inflation and interest rate on the economy of India has been a widely debated and discussed topic in the economic and financial circles of the country.

Several studies conducted on factors impacting the growth of an economy suggest that inflation and interest rates are amongst few of the most influential factors impacting growth.

Inflation and Interest rate are essential macroeconomic variables capable of changing, transforming and redirecting the growth pattern of a country's economy (Babalola, O. Oladapo et al., 2015).

One of the major macroeconomic objectives of any country is to have a sustained level of economic growth combined with low levels of Inflation and a reasonable level of Interest rate. Hence, the behaviour of both Inflation and Interest rate to a large extent affect the economic growth of a country (Okpe, 1998).

The impact of inflation on growth, output and productivity has been one of the main issues examined in macroeconomics. Theoretical models in the money and growth literature analyse the impact of inflation on growth focusing on the effects of inflation on the steady state equilibrium of capital per capita and output (e.g., Orphanides and Solow, 1990).

From the above findings it is understood that indeed inflation and interest rate are few of the important variables that have an impact on the growth of an economy. The intensity of the impact that these variables have on the GDP depends on various factors including the stage of growth of the economy i.e., developed or developing, dependency on global markets, geographical location of the country, type of population, political scenario, period of study and such other circumstances.

II. LITERATURE REVIEW

Empirical studies evaluating the relationship between growth, inflation and interest rate have historically found all three combinations viz., there exists a positive, negative and no relation between inflation, interest rate and growth.

Friedman (1973:41) summarized the inconclusive nature of the relationship between inflation and economic growth as, historically, all possible combinations have occurred: inflation with and without development, no inflation with and without development.

Udoka and Roland (2012) found that interest rate is one of the determinants of economic growth. They concluded that though interest rate is an indicator of economic growth, an increase in interest rate does not have a significant impact on the growth of a country in the long run.

Interestingly, Bruno and Easterly (1996) observed that episodes of high inflation have witnessed negative growth.

McKinnon, R.I. (1973) and Shaw, E (1973) state that higher real interest rates bring about higher levels of savings that consecutively encourage economic growth. They concluded that real interest rates and economic growth are positively associated.

In an inter- departmental study by a team of RBI, which used both firm-level and macroeconomic data and alternative methodologies, it was found that for 100 bps increase in real interest rate, investment rate may decline by about 50 bps and GDP growth may moderate by about 20 bps.

Mid Quarter Review (MQR) of Monetary Policy dated June 18, 2012 highlighted that estimates suggest that real effective bank lending interest rates, though positive, remain comparatively lower than the levels seen during the high growth phase of 2003-08. This suggests that factors other than interest rates are contributing more significantly to the growth slowdown.

Saymeh and Orabi (2013) analysed the effect of interest rate, inflation and GDP on macroeconomic growth of Jordan over the period 2000-2010. It was opined that a long-term equilibrium relationship existed among variables. However, regression results to check for impacts of both inflation and interest rates on growth rate found that inflation has significant effect on growth rate while only prevailing interest rate has significant influence on growth rate.

Barro, R.J. and Becker, G.S. (1989), on incorporating discounting factor in their model, assured that real interest rates and economic growth are negatively associated.

On studying the impact of inflation on GDP, Fischer (1993) concluded that increased inflation is detrimental to the growth in output as it negatively impacts the investment and productivity as well.

Hidayat and Suman (2014) studied the effect of inflation, interest rates and government expenditure in Indonesia between 2005-2012. It was found that the independent variables had about 99% influence on economic growth. The result was in line with Keynesian theory, which states that government spending spurs economic growth. Interest rates were found to have a negative relationship with economic growth, thus a reduction in rate will increase investment in turn leading to economic growth.

Evans Agalega & Samuel Antwi (2013) found that there is a positive relationship between GDP & inflation rate however, interest rate and GDP were inversely related.

Obamuyi T.M. (2006) state that lending rates have significant effects on GDP implying that there is an inverse long run relationship between GDP growth and interest rates.

W. Stunners (1993) examined inflation growth relationship for 12 developed and developing countries. The empirical findings of the study show that low and zero inflation is an essential condition for high and sustained growth.

Saumitra N Bhaduri in the working paper (77/2013) conducted a wavelet analysis of annual data pertaining to India for the period 1976-2007 and concluded that there exists a negative correlation between the inflation and growth for India, the original series is small and weak. However, after decomposing the data and extracting the long run and short run components, a stronger and persistent negative relationship emerges between growth and inflation while it is insignificant for the longer term.

Prasanna and Gopakumar (2010) in their study on inflation and GDP growth in India, state that if actual output rises above potential output, this will create an upward pressure on wages in the labor market. Higher wages, in turn, will lead to higher production costs and hence higher prices. This conclusion has been supported by empirical findings.

Mallik and Chowdhury (2001) analysed inflation-growth dynamics in four South Asian countries (Bangladesh, India, Pakistan and Sri Lanka) and found statistically significant evidence of a positive relation between these two variables.

Several studies have been undertaken to evaluate the range in which inflation and interest rate can positively impact growth, since all countries endeavour to achieve the right balance between GDP, inflation and interest rate for long term sustenance of growth.

There seems to be a consensus indicating that high inflation in the long run leads to a lower level of economic growth, several other studies have examined this finding for a single country over time. Rangarajan (1997) analysed data for India and established the range of 5-7 percent which has been further confirmed by Samantaraya and Prasad (2001) who suggested that 6.5 percent is the estimated threshold.

In a study comprising 72 countries, reviewing annual data, Burdekin et al (2004) suggested that for developing countries inflation retards growth beyond a low threshold of 3 percent.

The findings of Ghosh and Philips (1998) based on the data collected from IMF member countries for the period 1960-96 noticed that there was a negative relationship between inflation and growth. They observed that at lower inflation rates the relationship was positive i.e., inflation between 2 to 3 percent. However, at higher rates of inflation the impact of inflation on growth is marginal making it less important for growth.

Paul, Kearney and Chowdhury (1997) undertook a study of 70 countries (including 48 developing countries) for the period 1960-1989 and established that there was no causal relationship between inflation and economic growth in 40 per cent of the countries under study, whereas 20 per cent of countries had bidirectional causality and there existed unidirectional (either inflation to growth or vice versa) relationship in the remaining cases. Interestingly, they also reported a positive relationship in some cases and but negative in case of others.

An analysis of 140 nations including both developed and developing countries, Khan and Senhadji (2001) for a period covering 1960 to 1998 established that the range of inflation beyond which there would be a significant slowdown in growth was 1- 3 percent for industrial nations and 11-12 per cent for developing countries.

Based on data of Indian economy from 1981-2004, Dr. Renu Tanwar (2014) concluded that the growth of the economy is not related to inflation, acceleration of growth should be focused forever as one of the foremost economic objectives of the nation. Similarly, inflation may take place due to supply side and demand side factors. Apart from these, the monetary factors and the international factors also may lead to inflation.

III. DATA & METHODOLOGY

For this study, the data has been collected from secondary sources i.e., from RBI, Office of Economic Adviser and Central Statistics Office, India. The study is conducted for 19 year period covering FY 2001-02 to FY 2019-20.

Linear regression model is deployed for analysing the relationship between the variables. The dependent variable is GDP (growth) and independent variables are Inflation and Interest rate.

IV. EMPIRICAL FINDINGS

To assess the relationship between GDP&Inflation and GDP & Interest rate, linear regression model was applied. In the analysis, GDP is the target variable and Inflation & Interest rate are predictor variables.

Before applying the linear regression model, the correlation between GDP and Repo rate was calculated. Correlation is being calculated to quantify the association between GDP and repo rate and regression model to assess the relationship between them.

Growth rate (GDP) and Interest Rate findings:

Correlation coefficient between GDP and Interest rate is negative 0.058. The sign of the correlation coefficient indicates the direction of the association and its magnitude indicates the strength of the association. Since this value is near to zero, it indicates no linear association between these two variables. On applying the linear regression, the following results were arrived at:

	Co-efficient	p-Value
Intercept	6.996	0.000
Repo rate	-0.025	0.575

Therefore, the linear regression equation is given by -

$$\text{GDP} = 6.996 - 0.025 * \text{Repo Rate}$$

Interpretation of p- Values: The data favours the hypothesis that there is zero correlation at 5% level of significance. Changes in the repo rate are not associated with changes in GDP at the population level. Therefore, repo rate is not statistically significant.

Interpretation of Coefficient: The sign of regression coefficient confirms that there is a negative correlation between GDP and repo rate. A negative coefficient suggests that as repo rate increases, GDP tends to decrease. With 1% change in repo rate GDP is expected to change by 0.25%.

Growth rate (GDP) and Inflation findings:

Correlation coefficient between GDP and inflation is 0.173. Since, the value is not near to one, there is no strong linear association between these two variables. On applying the linear regression, the following results were arrived at:

	Co-efficient	p-Value
Intercept	6.623	0.000
Repo rate	0.113	0.008

Therefore, the linear regression equation is given by -

$$\text{GDP} = 6.623 + 0.113 * \text{Inflation}$$

Interpretation of p- Values: At 5% level of significance, we are not able to reject hypothesis that there is correlation between GDP and inflation. Changes in inflation are associated with changes in GDP at the population level and inflation is a statistically significant predictor.

Interpretation of Coefficient: A positive coefficient suggests that as inflation increases, GDP tends to increase. For every 1% change in inflation, we can expect GDP to increase by an average of 0.113% which is not very significant for India.

V. DISCUSSION– GDP, INTEREST RATE AND INFLATION

In developing countries like India, growth is vulnerable to numerous variables like productivity of the industry, the availability of technology, prevalent tax rates, conducive business environment, innovation, the infrastructure and framework of policies, labour laws, risk appetite of lenders and borrowers, swiftness of statutory approvals etc. Alongwith, inflation and interest rate there are multiple variables which are considered to be the determinants of long-term GDP growth viz., physical capital, human resource, foreign and domestic investments, external trade, political scenario, etc. Being an open economy, the country is impacted by uncertainties in the global market which have a bearing on the investment scenario impacting growth. Indian companies today have global footprint and liberalisation in borrowing and FDI has made international funds in the form of ECB, foreign equity, overseas bonds etc. available to Indian companies at cheaper rate which defies the burden of higher interest rate for fresh investments. Owing to these plethora of structural and systemic issues the impact of rate cut or inflation becomes insignificant on the growth in the long run. The new endogenous growth theories, for instance, surmised that inflation has an adverse impact on growth because of its harmful effects on productivity and efficiency.

In the short run interest rates have a significant impact on inflation and growth. As interest rates increase the cost of capital goes up leading to holding back investments this is because majority of the investors are not cash rich and look for bank funds to fund their projects. With reduced investment, employment is affected and movement of money reduces. On the other side increased interest rate also leads to uncertainty in exchange rate as the market expects the rates to ultimately go down discouraging potential foreign investment. This entire phenomena has a deterring impact on the economy leading to slower growth.

On the other end, lower rate of interest results in more money supply increasing the purchasing power of individuals. Due to higher purchasing power the prices of goods increase as demand is more than supply of the goods. This creates an upward pressure on inflation and with increased money supply economic activity and investments increase leading to increase in growth.

GDP growth accelerated from 4.82% in FY 2001-02 to 7.92% in FY 2005-06, witnessing a growth of 3.10% in 5 years. The same period saw a decline in interest rate from 8.00% (FY 2001-02) to 6.50% (FY 2005-06). Similarly, GDP declined by 1.09% from 2010-11 to 2014 -15, however there was an increase in interest rate by 0.75%, reflecting an inverse relationship between these two variables.

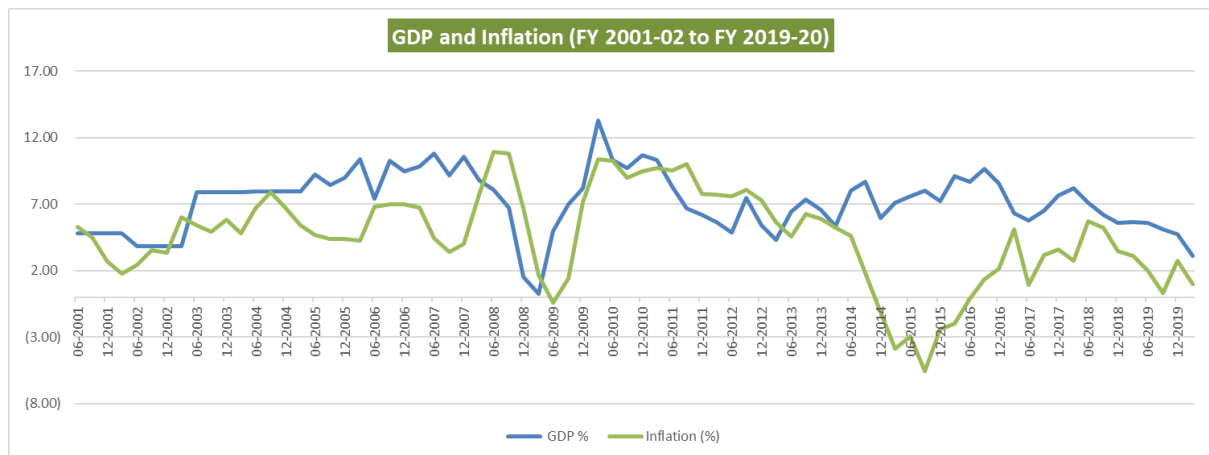


Table 1 GDP and Inflation behaviour

Increase in inflation has an upward pressure on the general price level in the economy impacting the purchasing power amongst the households. However, with higher earnings and increased money supply, economic activity goes up leaving a positive impact on the growth of the economy. It has been theoretically and empirically established that higher inflation deters investment and growth in the long-run.

Inflation in India saw a minor increase (0.74%) from an average rate of 3.70% in FY 2001-02 to 4.44% in FY 2005-06 on the same lines GDP increased by 3.10% during the same period. In the next 5 year period from FY 2006-07 to FY 2010-11 however, GDP increased by 0.44% while inflation increased by average 2.99%. Though the variables are seen to be moving in same direction, however the impact has not been significant.

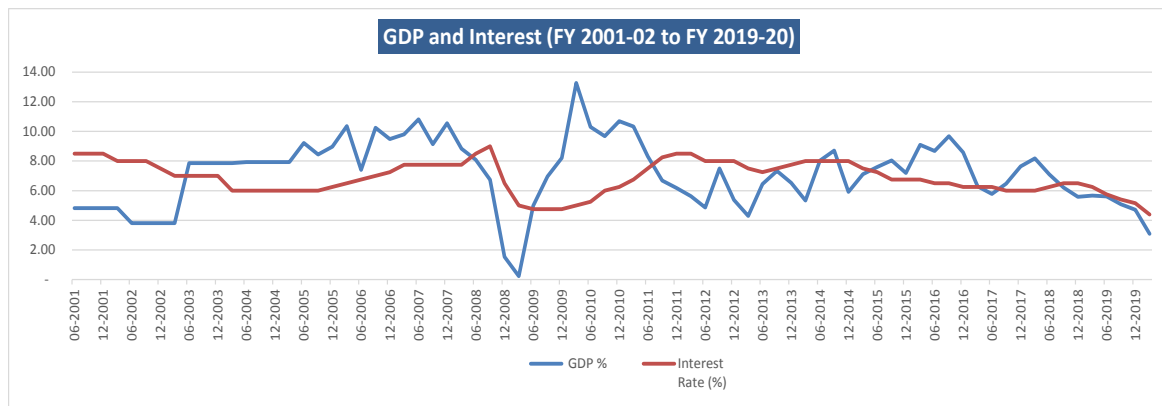


Table 2 GDP and Interest Rate behaviour

VI. CONCLUSION

As evidenced, in the empirical findings for India in the period covering FY 2001-02 to 2019-20, interest rate and GDP are inversely related, implying that as interest rates increase there is a reduction in growth. However, in the long term the impact of interest rate on GDP has been found to be insignificant.

In the empirical research for India, covering the period FY2001-02 to FY2019-20 it has been found that inflation is positively related to GDP, implying that increase in inflation leads to increase in GDP and vice-versa. However, it is also established that the impact of inflation on GDP is not significant in the long term.

Accordingly, policy makers should focus on maintaining inflation at a lower rate and ensure interest rate stability. The central bank of the country is prudent in laying emphasis on maintaining inflation at moderate levels through its policies furthering the cause of growth

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