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A Study on Analysis of the Relationship Between GDP Growth and Inflation in India

Dr. Kiran Kumar M, Anushka Komirelli, Meghana S, Prafull L N

1 Assistant Professor – Finance, 2 MBA Student of Finance, 3 MBA Student of Finance, 4 MBA Student of Finance
Faculty of Management Studies, CMS Business School, Jain (Deemed-to-be University), Bengaluru, Karnataka – 560009

1 kiranm287@gmail.com, 2 anushka_komirelli23@cms.ac.in, 3 meghana_shankar23@cms.ac.in, 4 prafull_ln23@cms.ac.in

ABSTRACT

It examines the inter-relation between the GDP growth rate of India and the inflation rate of India from 2013 to 2023, which has been a serious gap in the research work on how such parameters interact with the present-day economic policies and reforms. It focuses on themes of analysis of trends, study of correlations, and evaluation of implications for economic policy. This paper is based on a quantitative approach with critical data obtained regarding the macro variables of the World Bank and Reserve Bank of India. The statistical procedures used are descriptive analysis, covariance test, correlation tests, and multiple regression analysis for extracting insights from data.

The results show fluctuation growth in GDP; it bottomed out in 2020 during the pandemic caused by COVID-19 at -7.96%. One can draw that inflation rates are volatile as it peaks in the year 2013 at 9.13% and stabilizes thereafter. On the current regression analysis, the coefficient is weak and statistically insignificant while the R-squared stands at 0.041. This means that inflation changes account for less than 5% of GDP growth variability, which marks the complexity in the relationship between these two factors during this period.

These findings would be of extreme consequence to policymakers; inflation must be checked, but this alone will not make the decision the economy grows. A total approach from the perspective of policymakers is warranted wherein they take into account other factors which determine the economy's performance besides just controlling inflation. More important is the development of more robust data, more variables related to the economy, and sophisticated analytical tools incorporated in further research to enhance the understanding of changing dynamics of the Indian economic scenario. Conclusion This study explains the intricate relationship between GDP growth and inflation in India, where it brings out the necessity for matrix economic policies to ensure sustainable growth and stability against persistent fluctuations in the economy.

Keywords: GDP growth, Inflation, Economic stability, India, Macroeconomic policy

INTRODUCTION

Indicators of economic matters are most essential in determining policy decisions and perceiving the general health of a country's economy. Among such indicators, two of the more significant ones are growth in Gross Domestic Product and inflation, which give considerable insights into stability, productivity, and consumers' behavior. GDP, which means it is the sum of the total value of all goods and services produced over a specific period within a country, is a comprehensive reflection of economic performance. In contrast, inflation refers to the rate at which the general

level of prices for goods and services rises, thereby reducing the purchasing power of money. Such complexities in the relationship between GDP growth and inflation call for careful analysis by policymakers, economists, and stakeholders who maneuver economies through changing patterns of economic fluctuations. In particular, this becomes even more relevant while analyzing India's complex and varied economic scenario and its rapid growth trajectory over the last decade.

Intermingling between GDP and inflation will result in implications for monetary and fiscal policies, investment strategies, and the overall stability of the economy. While growth in GDP will often fuel inflation where demand exceeds supply, low or decreasing GDP growth has implications for lower inflation and even deflationary pressure. An understanding of these dynamics is important not only in doing economic forecasting but also in formulating effective policy measures that balance growth with bringing inflation under control. This study would detail very much the trend of growth in GDP coupled with inflation over the period of 2013 to 2023. On this basis, based on the trends, correlations, and causation, this research will give one enlightenment on how these two major economic indicators can work within the context of India and would also inform policymakers of the ways in which they can make appropriate decisions leading to sustainable growth in the economy and managing inflation simultaneously.

LITERATURE REVIEW

It has been widely researched, and its intricate interplay between India's GDP growth and inflation yields a complex, at times conflicting relationship. Recent efforts target this very complexity, especially with focus on the dynamic surroundings that characterize India's economic situation.

Amongst the most important contributions in the discussion can be found with the research by Aye & Odhiambo in establishing a critical inflation threshold of around 5.997%. In its conclusions, such inflation might encourage agricultural growth since it would lead to more investments and better price policies. However, runaway inflation, on the other hand, has been known to drag agricultural production down. Similar observations find follow-up in Bhoite et al. (2024) with a call on the advanced techniques of machine learning to understand the complex dynamics concerning inflation and the macroeconomic variables in India: once again, a call for robust methods of analysis in economic research.

Another sector is that of construction. Musarat et al. (2021) assert that an inflationary effect adversely affects the construction sector as material and labor price volatility increase the project budget and time, consequently slowing down general economic growth. This aligns with the much-needed uniform control policies for inflation as referred by Taylor (2019), who suggests that the right interest rate policies become a precondition for a stable economic environment.

According to Karki Shrestha et al. (2020), the ideal inflation rate to be realized in achieving stable operations in the economy of Nepal is 6%. This suggests that any inflation beyond this threshold would bring unfavorable effects in the economy, and this amplifies the need for stricter management of inflation. Fitri and Syamsuri (2024) further argue that low and stable inflation is the most crucial factor for sustainable economic growth in Indonesia, adding further relevance to inflation control policies worldwide.

Thus, even though much discourse claims that it doesn't matter, several contradictory findings continue to emerge, as presented by a recent study by Ener and Campos, 2018 to reflect on the association between inflation fluctuations and GDP growth. The study hints towards the call for proper management of inflation, for better sustained economic growth for developing nations. Salamai et al. (2022) add to the story further as they investigate the dismal impact of

inflation on Saudi Arabia's GDP, thereby making a case for how the experiences of inflation vary in different national settings.

Another more specific analysis on India is that Saha (2018) examines the correlation between inflation and economic growth from 1961 to 2015. The study using a vector autoregressive model establishes a negative relationship between inflation and growth whereby results indicate that economic growth Granger causes inflation. There is an important direction for policymakers in this regard, where measures to stimulate economic growth would be encouraged as a way of curbing inflation.

Apart from this, Xiong (2023) mentions that there is no direct relationship between inflation and GDP. In this context, he is of the opinion that a deeper analysis of how these variables interact in different stages of economic activities has to be made. It goes along with the main discussion regarding the issue of inflation multifaceted effects on growth, and therefore, different theories explain that inflation would have positive, negative, or nil impacts.

Another relevant work done by Lagad et al. (2022) is on the study of how inflation and population growth affect the GDP of India; there could be significant interaction that the variables deserve being closely explored in consideration of their policy relevance.

RESEARCH GAP

Despite the great body of research that went into the examination of the relationship between GDP growth and inflation, a big gap still persists in the understanding of how exactly these dynamics play out specifically in the Indian context after 2015. While studies like (Aye & Odhiambo, 2021) or (Saha, 2018) highlighted critical thresholds of inflation and implications of inflation on economic growth, there are a few scarcities of research which examine these relations concerning the lens of recent economic policy reforms and global economic challenges India faced in the last decade. Thirdly, according to Bhoite et al. 2024, advanced analytical techniques are underutilized in empirical analyses for the Indian economy. Also while the literature explicitly has come out as inflation having mixed effects on GDP for different nations, there remains an imperative concern of how factors like a growing population and sectoral effects uniquely impact this relationship in India, thereby setting up an area of immense importance for research. Filling those gaps, therefore, this study allows the most comprehensive analysis of GDP growth and inflation trends between 2013 to 2023 by using robust statistical analysis approaches to identify which correlate and how economic policies affect that landscape.

RESEARCH OBJECTIVES

1. To analyze the trends in GDP growth and inflation rates over the period from 2013 to 2023.
2. To investigate the presence and importance of a statistical correlation between GDP growth and inflation.
3. To assess the potential effects of economic policy decisions on forthcoming patterns in GDP growth and inflation rates.

RESEARCH METHODOLOGY

This research will use a quantitative method in exploring the interaction that could exist between economic growth, which as witnessed by Gross Domestic Product (GDP), and inflation rate of India from 2013 to 2023.

The research work entails an expansive analytical framework plus a variety of techniques of data analysis. Firstly, the sources gathered reliable macroeconomic data, which was derived from authentic data available at the World Bank and the Reserve Bank of India. To analyse this information, basic statistical measures were used to provide broad overall trends and patterns accompanying growth in GDP and the rates of inflation. A test of variance tested the homogeneity of the data, while covariance analysis found the degree of common variation existing between GDP growth and inflation. Furthermore, correlation analysis was conducted to assess whether the relationship between these two economic indicators is positive, negative, or nil in strength, followed by regression analysis to model the existing interactions. This strong methodological framework thus allows the derivation of sound conclusions regarding how these critical macroeconomic variables interplay within the Indian context.

RESULTS

TABLE1: DATA COLLECTED

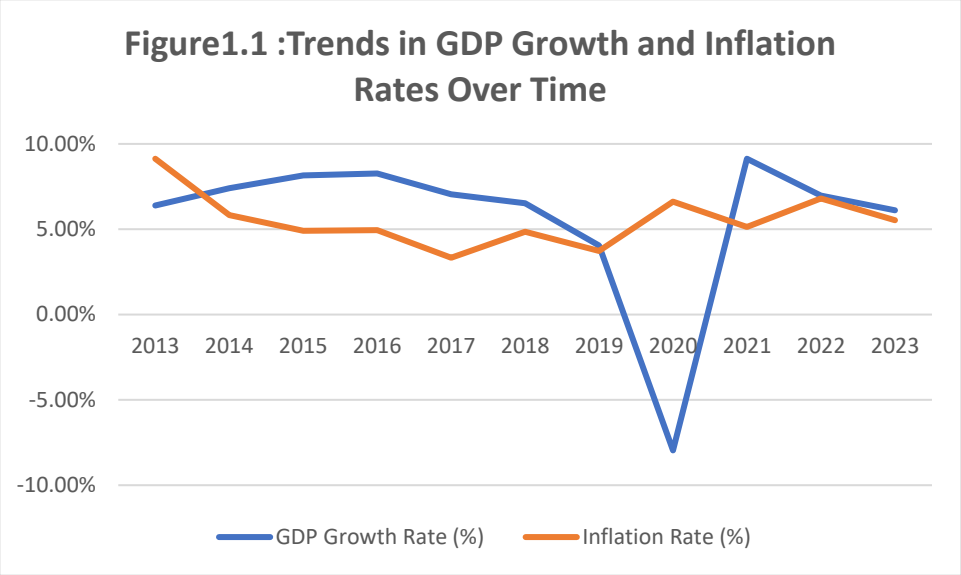
Year	GDP Growth Rate (%)	Inflation Rate (%)
2013	6.39%	9.13%
2014	7.41%	5.83%
2015	8.16%	4.91%
2016	8.26%	4.95%
2017	7.04%	3.33%
2018	6.53%	4.86%
2019	4.04%	3.73%
2020	-7.96%	6.62%
2021	9.13%	5.13%
2022	6.98%	6.80%
2023	6.10%	5.53%

(SOURCE: RBI)

TABLE 2&3: DESCRIPTIVE STATISTICS

GDP Growth Rate (%)	
Mean	0.05644
Standard Error	0.01419
Median	0.0698
Mode	#N/A
Standard Deviation	0.04705
Sample Variance	0.00221
Kurtosis	8.7425
Skewness	-2.8557
Range	0.1709
Minimum	-0.0796
Maximum	0.0913
Sum	0.6208
Count	11

Inflation Rate (%)	
Mean	0.0552909
Standard Error	0.0047921
Median	0.0513
Mode	#N/A
Standard Deviation	0.0158936
Sample Variance	0.0002526
Kurtosis	1.7666667
Skewness	0.9990393
Range	0.058
Minimum	0.0333
Maximum	0.0913
Sum	0.6082
Count	11



(DATA SOURCE: RBI)

TABLE 4: COVARIANCE

	Year	GDP Growth Rate (%)	Inflation Rate (%)
Year	10		
GDP Growth Rate (%)	-0.032455	0.00201245	
Inflation Rate (%)	-0.008836	-0.000137868	0.000229643

TABLE 5: CORRELATION

	GDP Growth Rate (%)
GDP Growth Rate (%)	1

	Inflation Rate (%)
Inflation Rate (%)	1

TABLE 6: REGRESSION ANALYSIS

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.202802933
R Square	0.04112903
Adjusted R Square	-0.065412189
Standard Error	0.048564361
Observations	11

ANOVA

	df	SS	MS	F	Significance F
Regression	1	0.00091047	0.000910471	0.38604	0.549800073
Residual	9	0.02122647	0.002358497		
Total	10	0.02213695			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%
Intercept	0.089630716	0.05539581	1.618005394	0.14012	-0.03568331
Inflation Rate (%)	-0.600358228	0.96626237	-0.621320097	0.5498	-2.78619556

Upper 95%	Lower 95.0%	Upper 95.0%
0.214944739	-0.035683	0.214944739
1.585479108	-2.786196	1.585479108

DICUSSION

Growth in Gross Domestic Product and inflation in India: A relationship involving unnecessary complexity and nuance, according to what has been found in literature. A drastic fluctuation in the GDP growth rate spanning from 2013 to 2023 from +2.1% to -7.96%-strongly reflects the economic variability of India, which well came into play during the year 2020, during the COVID-19 pandemic period. The accompanying inflation rates paint an equally tumultuous picture, increasing to 9.13% in 2013 before trending generally downward to more manageable levels from there. Regression analysis performed indicates a very weak, statistically nonsignificant relationship between inflation and GDP growth, with an R-squared of only 0.041, meaning inflation rates account for less than 5% of the variability in GDP growth.

The negative inflation coefficient at -0.600 implies that in theory, a negative association exists; however, the high p-value of 0.5498 makes it not statistically significant. Conversely, already existing literature is somehow mixed regarding what it has found out about the relationship. For instance, Saha (2018) indicated that a negative relationship existed between inflation and growth, while Aye & Odhiambo (2021) regarded some critical threshold of inflation that could support agricultural development. This also shows heterogeneous effects of inflation on GDP growth across the various contexts and time frames. The study results approximate the revelations provided by Ener and Campos (2018), which highlights the fact that sustained growth for developing nations crucially depends on proper inflation management. However, it differs from Fitri and Syamsuri (2024), wherein the authors opine that low and stable inflation is an only requisite for obtaining sustainable economic growth. Such contradictions call for pertinent context-based studies to present sound inferences regarding the relations between inflation and growth.

LIMITATIONS OF THE STUDY

The sample size is unusually small at 11 observations; it is due to the limitation of the data across the restricted timeframe. This constrains the reliability and external validity of the result obtained. In addition, although the model adopted is informative, still, it fails to account for other contemporaneous variables that may affect GDP growth and inflation dynamics, like external economic shocks, trade policies, or other macroeconomic indicators. It also exposes the risk of missing some other essential models in the context and thus leaving out models such as structural equations models or even machine learning techniques as presented by Bhoite et al. (2024).

Recommendations for Further Research

For further depth, future studies should be based on a few different key areas:

- Extending Time Interval and Sample Size: An extended analysis in a longer term with a larger dataset may enable the suggestion of more general insights that might even reveal some trends not captured by this dataset.
- Other Economic Variable Factors: This study can include other factors like unemployment, foreign investment, general worldwide economic conditions to get a better insight into the complex chain of interactions that affect GDP growth and inflation.
- More Advanced Analysis Techniques: More advanced forms of analysis techniques, such as machine learning algorithms, would reveal more complex relationships and interactions that exist between inflation and growth in GDP and provide a better predictive capability over future economic condition.
- Cross-Economy Comparisons: Studies across similar economies, especially in the emerging markets, would provide important context and deepen insight into the dynamics of inflation in different national environments.

CONCLUSION:

This paper has scrutinized, in great detail the India scenario of Gross Domestic Product growth and inflation during the period 2013 to 2023, making considerable use of statistical analysis to determine trends, correlations, and interactions. There was mixed growth in GDP, where significant fluctuations resulted from tracking related exogenous factors, especially the COVID-19 pandemic, that had a significant impact on economic activity during 2020. Similarly, inflation rates portrayed during the same period in the graph track similarly and peaked as high as 9.13% in 2013 before leveling off. The regression did confirm, however a very weak and statistically insignificant correlation between inflation and GDP growth accounting for less than 5% of the variance in changes in GDP growth by the changes in the rates of inflation. It implies that at the time, the effects of inflationary forces did not have a pervasive influence over the growth of GDP, and the relationship between the two involves elements inherently complicated and deserving of deeper probing. The implications of these findings are crucial for the policymakers in India, who have to navigate an economic landscape that not only holds immense growth potential but also has inflationary challenges.

Understand, then, the interplay between GDP growth and inflation, that relationship cannot naturally be expected to be direct, raises concerns in economic policy about what shape the tools would take. This calls on the government to consider a wider range of factors and confounding variables affecting the outcome of economic performance rather than focusing strictly on control of inflation. Besides, this study evokes the need to adopt advanced analytical tools and research efforts with a higher time dimension for obtaining a more robust understanding of the dynamics that are unfolding for the Indian economy. As India continues on its growth trajectory, such an understanding of these complex relationships will be crucial to nurture sustainable growth and stability.

REFERENCES

1. Aye, G. C. and Odhiambo, N. M. (2021). Evidence from developing economies on the threshold effect of inflation on agricultural growth. Advances in Decision Sciences, Volume 25, Issue 2, Pages 1–22.
2. Adaleh, R. M. (2018). Determinants of inflation in Jordan's economy: FMOLS methodology. Journal of Internet Banking and Commerce, Volume 23, Issue 2, Pages 1–19.
3. Bhoite, S., Panchal, R., and Shukre, V. A. (2024). Improving Inflation Forecasting with AI Analysis: A Case Study on India's Inflation Metrics.
4. Raju, J. K., Manjunath, B. R., and Rehaman, M. (2018). An empirical investigation of the influence of GDP on inflation using Indian data. Academy of Accounting and Financial Studies Journal, 22(6), pp. 1-11.
5. Karki, S., Banjara, S., and Dumre, A. (2020). Inflation's impact on Nepalese economic growth. Archives of Agriculture and Environmental Science, Volume 5, Issue 4, Pages 576–582.
6. Taylor, J.B. (2019). Inflation Targeting in High-Inflation Emerging Economies: Guidelines and Instruments. Journal of Applied Economics, Volume 22, Issue 1, Pages 103–116.
7. Musarat, M. A., Alaloul, W. S., and Liew, M. S. (2021). A study on the impact of inflation rates on building project budgets (Ain Shams Engineering Journal, Volume 12, Issue 1, Pages 407-414).
8. Mandeya, S. M. and Sin-Yu, H. (2022). A summary of the studies on the link between inflation, inflation uncertainty, and economic growth. Folia Oeconomica Stetinensia, 22(1), 172–190.
9. Sermsri, N. and Mekhum, W. (2020). The impact of inflation, investment, population, and foreign direct investment on economic development in Thailand's pharmaceutical sector as measured by supply chain performance. Systematic Reviews in Pharmacy, Volume 11, No. 4.

10. Salamai, A. A., Faisal, S. M., and Khan, A. K. (2022). The relationship between inflation and GDP in an oil-based economy. International Journal of Multidisciplinary Research and Growth Evaluation, Volume 3, Issue 1, Pages 375–380.
11. Fitri, W. S. and Syamsuri, A. R. (2024). Literature Review: The Impact of Inflation on Indonesian Economic Growth. IJMaKS (International Journal of Management)
12. Lagad, S. J., Rodge, K. D., & Gulave, M. R. (2022). GDP of Indian Economy and Its Impact on Inflation. International Journal for Research in Applied Science and Engineering Technology, 10(5), 213–219. https://doi.org/10.22214/ijraset.2022.42115
13. SAHA, S. (2018). INFLATION AND ECONOMIC GROWTH IN INDIA AN ECONOMETRIC STUDY. Asian Academic Research Journal of Social Sciences & Humanities, 5(2), 90–102.
14. Xiong, M. (2023). Relationship Between GDP and Inflation Rate. In BCP Business & Management ECRM (Vol. 2022).