Advanced Econometrics

Term Paper

"Examining the Relationship between Real GDP, Inflation Rate, and Government Expenditure in India"

SUBHASH KUMAR

232PGF026

1. Abstract:

This study aims to explore the complex connections between how much the government spends, the inflation rate, and the real GDP in India. Given the ongoing changes in the Indian economy, it's crucial to grasp how government spending influences both inflation and economic growth. By thoroughly analysing data, we hope to uncover the intricate relationships between these factors. The findings will provide valuable insights for policymakers, economists, and anyone involved in economic decision-making.

To study this relationship, the study has employed various econometrics techniques, which are as follows:

- Unit root test (ADF) to test for stationary of the variable
- Autoregressive Distributed Lag (ARDL) model to model the relationship between real GDP, Inflation rate and government expenditure.
- Granger Causality to check whether we can use a time series variable to forecast another time series variable.

As the variables are a combination of I(1) and I(0), We use the Autoregressive Distributed Lag (ARDL) model to model the relationship between the variables.

2. Introduction:

India, a rising economic power, has seen dramatic changes in its economic environment in recent decades. The function of government expenditure policies in influencing economic results is fundamental to this process. In order to gain a thorough knowledge of how these factors interact and influence one another in the context of India, this research attempts to find out the complex web that links government spending, inflation, and real GDP.

The consequences of government spending decisions become critical as they attempt to strike a careful balance between promoting economic growth and preserving price stability. Resources are allocated in a way that affects a number of sectors, which in turn affects inflation dynamics and overall economic output. This study attempts to provide insightful information that can guide future policy by carefully examining these links.

3. Literature Review:

The relationship that exists between government spending, inflation, and real GDP has generated a lot of scholarly discussion. Previous research on this relationship's complexity has been done on a worldwide and Indian-specific level. Researchers that have studied the relationship between government expenditure and inflation, including [**Tai Dang Nguyen**] and [**Francisco J. Ruge-Murcia],** have offered important insights into the mechanisms by which price levels are influenced by fiscal policies.

Furthermore, the effectiveness of government spending as a means of promoting economic growth has been studied in the literature. Views on how targeted expenditure in areas like social welfare and infrastructure might lead to increased real GDP have been provided by [**Muhammad Irfan Javaid Attari**] and [**Jitendra Kumar Sinha**].

The particular dynamics of these partnerships in the Indian context, however, are still largely unknown. By offering a comprehensive analysis of the Indian economy that takes into consideration its distinct socio-economic features and policy environment, this study seeks to close this gap.

4. Objective:

- To find the relationship between real GDP, Inflation rate, and Government Expenditure

5. Data:

This study takes a look at the following variables:

- Gross domestic product (GDP):- Gross domestic product is a monetary measure of the market value of all the final goods and services produced in a specific time period by a country or countries. GDP is most often used by the government of a single country to measure its economic health.
- Inflation Rate:- Inflation rate is the percentage change in the average price level of goods and services in an economy over a specific period, indicating the rate at which prices are rising.
- Government Expenditure:- Government expenditure refers to the total amount of money that a government spends on public goods and services, including infrastructure,

education, healthcare, defense, and other programs, within a specific time period.

All data used has been collected annually over period 1970-2022.

Data was taken from the website

- Reserve Bank of India
- Macro Trends
- World Bank

6. Methodology:-

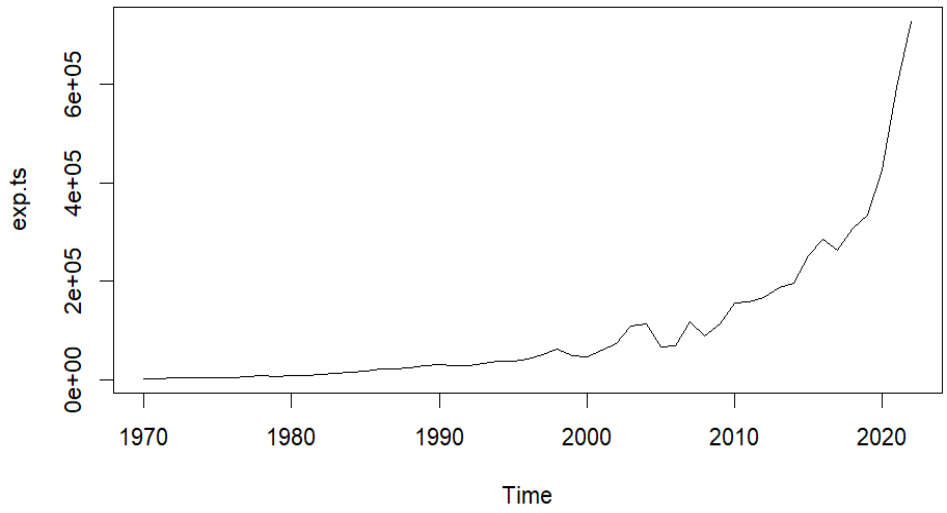
Inflation, real GDP (a measure of economic activity), and government spending in India are the subjects of this study. The long-term data collection will be used by the study to achieve this goal. Public budget reports, inflation indices, and actual GDP data are the primary sources of information.

The researchers plan to apply statistical techniques such as regression analysis to quantify the relationships among government spending, inflation, and real GDP. In addition, they will take into account other variables like interest rates, international trade, and demographics that may have an impact on these connections.

Robustness checks and sensitivity analyses will be used throughout the research to ensure the results are trustworthy. For the results to be reliable and consistent, they must be put through various tests. Ultimately, the aim is to

7. Model Specification:

7.1 Testing for unit root test:-



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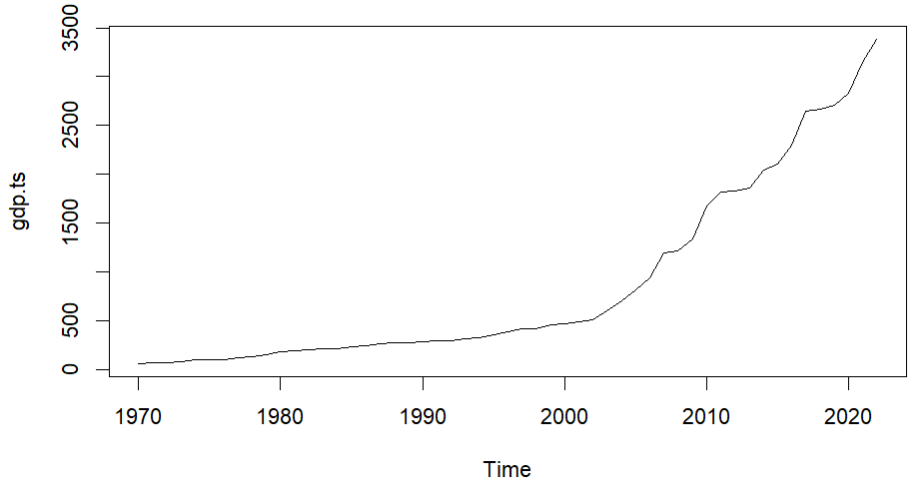

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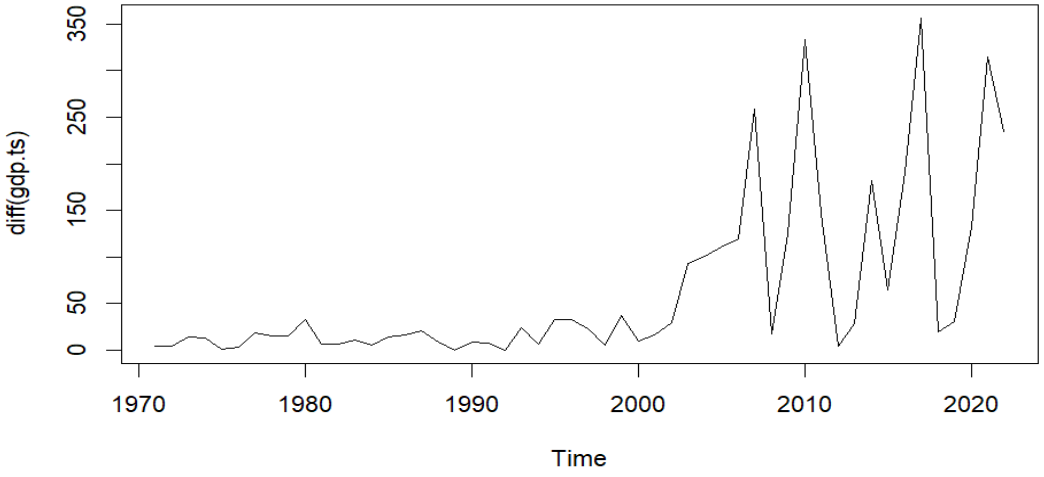

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Variable	p-value I(0)	p-value I(1)
GDP	0.99	0.1
INFLATION RATE	0.1	-
GOVERNMENT EXPENDITURE	0.99	0.02

Condition for stationarity (p-value <0.05)

- GDP is stationary at I(1),
- Inflation rate is stationary at I(0)
- Government Expenditure is stationary at I(1)

Since all the variables are stationary at different integrating order we are going to use ARDL model

Expenditure	Inflation	GDP	AIC
5	5	6	1076.295

This model is best model because it has lowest AIC

7.2 Testing of ARDL Model:

As the variables are a combination of I(1) and I(0), we can go for an Autoregressive Distributed Lag (ARDL) model, which is a multivariate (many variables) time series model developed by Perasan et al. (2001).
It has many advantages over other multivariate time series models like Vector Autoregressive (VAR) model or the Vector Error Correction Model (VECM), such as:

➢ It can be used when you have a mix of I(1) and I(0) variables

➢ It involves just a single equation setup, making it simple to understand and interpret

➢ It can apply to small samples (due to super consistency)

➢ Different variables can be assigned different lag lengths if they are used in the model (Which is contrary to the VAR and VECM models)

A limitation of this model is that it cannot be used directly if you have I(1) variables. However, you can simply take a ln transformation and proceed with the ARDL model.
The ARDL model has 2 components, the short-run impact and the long-run impact, plus the error term, and the general equation is as follows:

a) The short-run component
The short-run component consists of:

- Short run coefficients αi (Greek letter alpha)
- The summation of the ΔYt-I terms (Dependent variable), where i runs from 1 to m
- The summation of the ΔXi (t-1) terms (Independent variables), where i runs from 0 to n/p/q, etc.

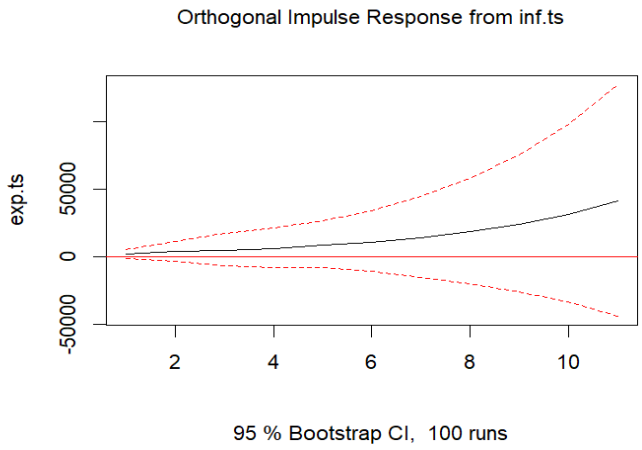
The short run component captures the effect of the independent variables on the dependent variable in the short run.

b) The long-run component

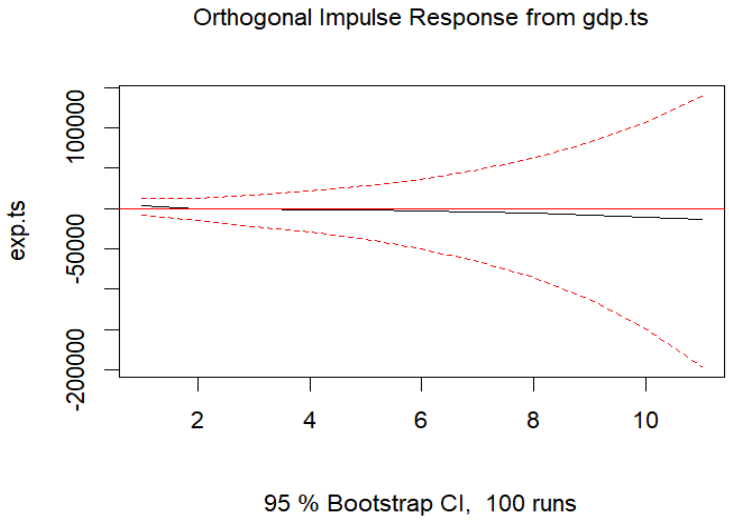
The long-run component consists of:
- Long-run multipliers ϕi (Greek letter phi)
- The long-run values of our variables w.r.t (t-1)

Note: εt refers to the error term.

7.3 Impulse Response Function :



When shock is impose on inflation then government expenditure will show negligible change.



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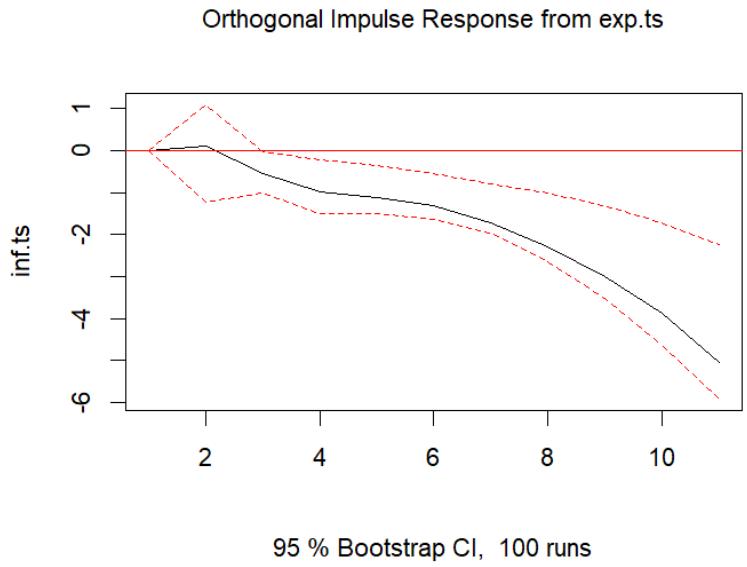
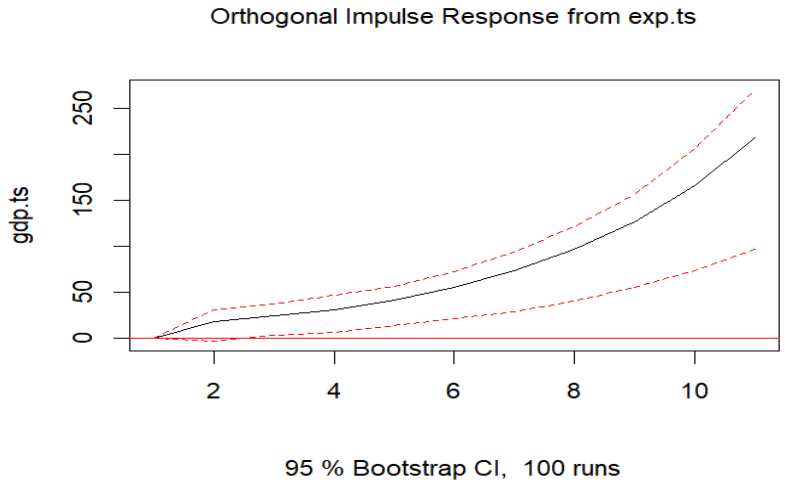


When shock is impose on government expenditure then inflation will show negative response.



When shock is impose on government expenditure then GDP will show positive response.

7.4 Granger Causality Test:

Variable	F – test	P – value
Expenditure to Inflation rate	1.1848	0.2817
Inflation to Expenditure	0.0666	0.7975
Expenditure to GDP	1.9443	0.1695
GDP to expenditure	1.5732	0.1695

- P-value of expenditure effecting the inflation is 0.2817 (p>0.05) means that expenditure is not granger causing inflation.
- P- value of inflation effecting the expenditure is 0.7975 (p>0.05) means that inflation is not granger causing expenditure.
- P- value of Expenditure effecting the GDP is 0.1695 (p>0.05) means that Expenditure is not granger causing GDP.
- P- value of GDP effecting the Expenditure is 0.1695 (p>0.05) means that GDP is not granger causing Expenditure.

(Since my p-value > 0.05 it implies that it is insignificant, which means that there is no variable that granger causes any of the variable.)

8. Conclusion:

As a result of our research, the real GDP of India, the inflation rate, and government spending are all significantly correlated. Government resource allocation decisions have a significant impact on inflation dynamics in addition to economic growth. For growth to be sustained without creating inflationary pressures, expenditure must be carefully balanced. According to our research, funds in important industries must be strategically allocated. Through the

process of navigating these insights, policymakers are better positioned to make decisions that promote stability and economic progress. With India's changing and dynamic environment in mind, this research adds insightful viewpoints to the continuing discussion on successful economic policy.

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