THE IMPACT OF FISCAL DEFICIT ON GOVERNMENT BOND YIELDS IN INDIA: A TIME-SERIES ANALYSIS (1997-2024)

Dissertation Submitted by

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CERTIFICATE

This is to certify that the dissertation entitled **The Impact of Fiscal Deficit on Government Bond Yields in India: A Time-Series Analysis (1997-2024)**, has been submitted by **Ahmad Reza**, to the department of Economic Studies and Policy, Central University of South Bihar, Gaya in partial fulfilment for the award of Degree of Master's of Arts (Economics).

I certify further that, to the best of my knowledge, the dissertation work reported here is not a part of any other dissertation on the basis of which a degree or an award has been conferred earlier to any other candidate.

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I hereby affirm that the work for this dissertation entitled "The Impact of Fiscal Deficit on Government Bond Yields in India: A Time-Series Analysis (1997-2024)" being submitted as a part of partial requirement of the M.A degree (Economics) in the Department of Economic Studies and Policy (DESP) under School of Social Sciences and Policies at Central University of South Bihar, Panchanpur (Gaya). The work has not been submitted in part or full to this or any other university or institution for any degree or diploma.

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ABSTRACT

This dissertation investigates the dynamic and causal relationship between fiscal deficits and government bond yields in India using monthly data from April 1997 to December 2024. Employing a Vector Autoregression (VAR) framework, the study incorporates key macroeconomic variables including inflation (WPI), industrial production (IIP), exchange rates (INR/USD), repo rates, and trade balance (import-export ratio). The analysis explores short-run interactions, Granger causality, variance decomposition, and impulse response functions to assess the fiscal policy transmission to the bond market.

The results show that fiscal deficits have a persistent but statistically insignificant effect on India's long-term bond yields once broader economic factors are taken into account. Fiscal deficit shocks alone do not strongly predict changes in yields; however, the full set of economic variables, including inflation (WPI) and industrial production (IIP), helps explain yield behavior moderately well. Notably, WPI and IIP exhibit some statistically significant impacts on bond yields over certain horizons, indicating their importance in influencing market expectations and borrowing costs. Variance decomposition reveals that fiscal shocks contribute somewhat to forecast errors in yields over medium and long periods. Impulse response functions indicate a positive but insignificant yield reaction to fiscal deficits, suggesting limited confidence in fiscal deficits directly affecting borrowing costs in this context.

These findings highlight the interconnected interactions between fiscal and monetary policies in India's debt market and emphasize the importance of coordinated policies to maintain market stability. The study adds to the literature by using high-frequency, country-specific data alongside modern econometric methods, providing valuable insights for managing sovereign risk and economic stability in emerging markets.

CHAPTER 1

Introduction

1.1 Background of the Study & Statement of Problem

Fiscal deficit is a critical measure of a government's financial health and borrowing needs, especially in emerging economies like India where deficits are mainly financed through government securities. This directly links fiscal policy to government bond yields (Pattnaik, 2010). Economic theory proposes that persistent deficits may raise long-term interest rates by crowding out private investments (Das & Sahoo, 2010). However, empirical evidence from India is mixed: some studies show a significant positive relationship between fiscal deficits and bond yields, suggesting market penalties for fiscal unsustainability (Kaur & Kaur, 2020), while others find that institutional mechanisms such as RBI interventions and mandatory bank investments under SLR dampen this connection (Ghosh & Ghosh, 2019). Recent fiscal changes post-global financial crisis and during the COVID-19 pandemic, combined with rising debt and interest payment concerns (Pattnaik et al., 2010), highlight the need for updated research using high-frequency data and advanced econometric models like VAR and vector error correction. This study seeks to fill this gap by providing fresh insights into how fiscal policy influences bond markets amid contemporary economic uncertainties, offering valuable guidance for policymaking focused on fiscal discipline and stability.

Empirical studies on the fiscal deficit-bond yield relationship in India provide mixed evidence. Some research identifies a statistically significant and positive association between higher fiscal deficits and rising long-term bond yields, implying that financial markets penalize fiscal imbalances by demanding higher borrowing costs (Kaur & Kaur, 2020). Conversely, other studies emphasize institutional and structural factors that may weaken or obscure this relationship. These include active interventions by the Reserve Bank of India (RBI), mandated investments by banks under the statutory liquidity ratio (SLR), and the segmented nature of capital markets in India, which together modulate market responses to fiscal deficits (Ghosh & Ghosh, 2019).

India's fiscal landscape has undergone substantial evolution, particularly following the global financial crisis and the COVID-19 pandemic, during which the government adopted large-scale borrowing and fiscal stimulus measures to support the economy. These developments heightened concerns over escalating debt levels and the sustainability of interest payments on public borrowings (Pattnaik et al., 2010). In light of these challenges and shifts, revisiting the fiscal deficit–bond yield nexus using updated, high-frequency data and contemporary econometric methodologies such as Vector Autoregression (VAR) and vector error correction models becomes imperative to enhance policy formulation and debt management strategies (Kaur & Kaur, 2020).

The fiscal deficit-government bond yield relationship in India prompts several important research questions that require detailed empirical examination. One key area of interest is understanding the short-term dynamics of bond yields in response to monthly fluctuations in fiscal deficits. This can be effectively analyzed using Vector Autoregression (VAR) models, which capture immediate and short-lived interactions within high-frequency data frameworks. Another critical aspect is to determine the direction of causality between fiscal deficits and bond yields using Granger causality tests, which help clarify whether past fiscal deficits significantly predict future changes in bond yields, or vice versa.

Further inquiry focuses on quantifying the contribution of fiscal deficit shocks to variations in bond yields relative to other influential macroeconomic variables such as inflation, industrial production, exchange rates, trade balance, and monetary policy rates. Variance decomposition analysis facilitates this by partitioning the forecast error variance attributable to each factor, thereby revealing their relative importance in shaping bond market outcomes. Additionally, impulse response functions are used to trace the magnitude, duration, and statistical significance of bond yields' responses over time following a one-time fiscal deficit shock. This provides insight into the persistence and timing of fiscal policy effects on borrowing costs.

Lastly, examining the differential effects of fiscal deficits on various maturities in the bond market helps understand how fiscal policy influences both short-term and long-term government securities. This involves analysis of yield spreads and the yield curve's shape to identify distinct impacts across different segments of debt instruments.

Together, these multifaceted research questions construct a comprehensive empirical framework aimed at advancing our understanding of the fiscal-financial nexus in India, enabling policymakers and researchers to devise more informed strategies for debt management and economic stability.

1.2 Significance of the Study

This study focuses on the Indian economy from 1997 to 2024, using monthly data on fiscal deficits, key economic indicators, and government bond yields. It employs advanced statistical techniques such as Vector Autoregression (VAR), Variance Decomposition (VDC), and Impulse Response Functions (IRF) to explore how fiscal deficits impact government bond yields over time.

Understanding this relationship is very important for policymakers because a government's fiscal deficit shows how much more it is spending than it collects in revenue, which affects how much it needs to borrow. In India, most of this borrowing happens through government bonds, making the bond market crucial for managing public debt and economic stability. This study helps shed light on how changes in fiscal deficits influence borrowing costs in the bond market, which in turn affects the broader economy. It also highlights the need for careful coordination between fiscal policy (government spending and borrowing) and monetary policy (central bank actions) to ensure that borrowing costs remain manageable and the economy stays stable.

1.3 Research Objectives

The primary objective of this study is to comprehensively analyze the dynamic relationship between fiscal deficits and government bond yields in India using monthly data from April 1997 to December 2024. The research aims to examine the direct effects of fiscal deficits on long-term government bond yields as well as their interactions with key macroeconomic variables such as inflation, industrial production, exchange rates, and monetary policy rates. It seeks to investigate the short-run transmission mechanisms between fiscal policy and bond yields, determine the directions of causality through Granger causality tests, and quantify the contribution of fiscal deficit shocks to bond yield variability using variance decomposition analysis. Furthermore, the study aims to trace how bond yields respond over time to fiscal shocks by examining impulse response functions, thereby providing detailed insights into the timing and persistence of fiscal policy effects on India's sovereign debt market. This empirical approach intends to inform policy formulation by clarifying the influence of fiscal stance within the broader macro-financial landscape and contribute valuable evidence for enhancing fiscal-monetary coordination and debt management strategies in India.

1.4 Methodology and Data

This study uses monthly data from April 1997 to December 2024 to analyze the relationship between fiscal deficits and government bond yields in India. The primary focus is on the 10-year government bond yield as a measure of long-term borrowing costs. Data on fiscal deficits, inflation (WPI), industrial production (IIP), exchange rates (INR/USD), trade balance, and the Reserve Bank of India's repo rate are included as key variables.

A Vector Autoregression (VAR) model is employed to capture the dynamic interdependencies among these variables without imposing strict a priori restrictions. Before analysis, time series data undergo transformations to ensure stationarity, tested using Augmented Dickey-Fuller and Phillips-Perron unit root tests. The lag length in the VAR model is selected based on information criteria and economic reasoning to appropriately capture temporal dependencies and seasonal effects typical of monthly data.

Model diagnostics such as stability tests, serial correlation, and heteroskedasticity tests validate the robustness of the VAR specification. Further, Granger causality tests, impulse response functions (IRFs), and variance decomposition methods are applied to understand causality, timing, persistence, and the relative importance of fiscal and macroeconomic shocks on bond yields.

This rigorous, data-driven methodology enables a nuanced exploration of how fiscal deficits and associated macroeconomic factors influence India's sovereign bond market across different time horizons.

1.5 Chapter Scheme

The rest of the dissertation is structured as follows: Chapter 2 reviews the relevant theoretical and empirical literature. Chapter 3 discusses the data sources, transformations, and econometric methodology. Chapter 4 presents the estimation results and interprets the impulse response and variance decomposition outputs. Chapter 5 concludes with policy implications and directions for future research.

CHAPTER 2

Literature Review

2.1 Introduction

People have been debating for a long time about how government fiscal deficits affect the yields on government bonds, especially in emerging economies like India. When a government spends more than it earns, it has to borrow money, and this borrowing doesn't come without costs. Economists have come up with several reasons why bigger deficits could push up the cost of borrowing, maybe because they crowd out private investments, raise inflation expectations, or change how worried investors are about the government's financial health. But the truth isn't straightforward. The evidence from studies around the world is mixed, and the impact often depends on specific local factors like how active the central bank is, special rules in the financial markets, and how investors behave. India, with its unique economic and institutional features, hasn't been studied thoroughly enough using detailed, high-frequency data and newer tools that can better capture how these relationships evolve over time.

On top of that, India has seen some big changes recently major fiscal reforms like the GST, new laws to keep government borrowing in check, and huge fiscal spending during the COVID-19 pandemic. These have all changed how the government manages its money and borrows from markets. At the same time, monetary policy and external economic shocks have added to the complexity. This makes it very important to take a fresh look at how fiscal deficits influence bond yields right now, using up-to-date monthly data over many years to see the bigger picture. Knowing this helps us understand not just government borrowing costs but also how monetary policy works and how stable the financial markets really are.

This review brings together the big ideas behind why deficits might affect bond yields like the crowding-out theory, the idea that people save more expecting future taxes (Ricardian equivalence), and other economic theories and asks how well these ideas hold up for India. It looks at global research to see what other countries have found, and then focuses on what little is known about India's situation. By pointing to important gaps like studies not using monthly data often enough, or not fully checking the direction of cause and effect it sets the stage for the current work. What makes this study different is its use of advanced methods like Vector Autoregression, which help untangle both short-run and long-run effects of fiscal deficits on bond yields. This kind of careful, data-driven study is crucial for policymakers who want to design smart fiscal policies and work well with the central bank, especially at a time when India is dealing with big fiscal challenges and uncertainties in the economy.

2.2 Theoretical Framework

The Ricardian Equivalence Theorem, introduced by Robert Barro in 1974, offers a thoughtful way to understand how fiscal deficits might or might not affect government bond yields. The idea is based on assuming consumers are forward-thinking and rational. When the government runs a budget deficit and borrows money by issuing bonds today, people realize that this borrowed money isn't free it will have to be paid back later through higher taxes. Since people anticipate these future tax hikes, they respond by saving more now to cover those future payments. This extra saving offsets the government's borrowing, which means that overall demand for loanable funds in the economy doesn't actually increase. Because of this balance, bond yields stay essentially unchanged, contrary to the intuitive idea that borrowing more today crowds out private borrowing and drives rates up. However, this theorem works under strong assumptions of perfect capital markets, rational expectations, and that people care about how their decisions affect future generations, making it a more idealized view of reality.

On the other hand, Keynesian economics presents a different view through what is known as the crowding-out effect. Here, the theory suggests that when governments run large deficits, they increase the demand for loanable funds in the market. Since there is only a limited amount of money available to be borrowed, the government's increased demand pushes up interest rates. To get lenders to part with their money, bond yields have to rise, making borrowing more expensive not only for the government but also for private sector borrowers. This essentially means that government deficits "crowd out" some private investment by driving up the cost of funds.

This idea fits well with the Loanable Funds Theory, initially proposed by economist Knut Wicksell. According to this theory, interest rates including those on government bonds are set by how much people save (supply of funds) and how much businesses and governments want to borrow (demand for funds). If the government starts borrowing more due to bigger fiscal deficits, the demand side of this equation increases, pushing interest rates higher until supply and demand balance out again. So, higher fiscal deficits here directly translate into higher bond yields as a natural market response.

Modern Monetary Theory (MMT) challenges some of these traditional views, especially when it comes to countries like India that control their own currency. MMT argues that such governments don't necessarily face borrowing constraints in the same way; they can create money to finance deficits. As long as inflation stays under control, these governments can maintain low bond yields even with large deficits. This view shifts the focus to inflation management as the key factor determining borrowing costs rather than fiscal deficits alone.

Finally, the Fisher Effect, an older but still important concept developed by Irving Fisher in 1930, explains how bond yields move in line with expected inflation. According to this theory, nominal interest rates are made up of two parts: the real interest rate plus expected inflation. When fiscal deficits grow, people might anticipate higher inflation down the road perhaps because government spending increases or because the central bank accommodates deficit financing. To protect themselves, investors require higher bond yields to offset the expected loss in purchasing power from inflation.

Together, these theories provide a rich and sometimes conflicting framework for understanding how fiscal deficits can influence government bond yields and why uncovering the true relationship in data can be complicated. That's why economists use econometric tools like Vector Autoregression models, Granger causality tests, and impulse response analysis. These help us examine not just correlations, but the direction and timing of effects over time, especially in countries with complex and evolving economic structures like India.

2.3 Empirical Literature: Global Evidence

Empirical research worldwide has extensively examined how fiscal conditions like government deficits and debt levels influence sovereign bond yields. The general consensus is that increases in fiscal deficits and debt tend to push bond yields higher, although the exact magnitude and dynamics of this relationship vary across countries and contexts.

For example, studies focusing on the United States find a clear and significant positive relationship between fiscal deficits and long-term bond yields. Laubach (2009) and Engen & Hubbard (2004) both report that as the deficit grows, investors demand higher yields to compensate for increased government borrowing and the associated risks. This makes intuitive sense, as larger deficits often mean more government debt issuance, increasing the supply of bonds and pressuring yields upwards as compensation for the risk and inflation expectations [Laubach 2009; Engen & Hubbard 2004].

Similar findings emerge from international studies. Gruber & Kamin (2010) and Alesina et al. (2009) confirm that the link between fiscal deficits and bond yields is stronger in countries with high debt or low economic growth regimes. This suggests that when an economy is already burdened by substantial debt or faces slow growth, markets react more sharply to fiscal expansion, driving up the cost of borrowing [Gruber & Kamin 2010; Alesina et al. 2009].

In OECD countries, Ardagna et al. (2007) quantify this effect: a 1 percentage point increase in the fiscal deficit corresponds to an increase of about 10 basis points in long-term sovereign bond yields. This highlights a consistent, measurable impact of deficits on borrowing costs even in advanced economies [Ardagna et al. 2007].

Further broadening the dataset, Afonso & Rault (2010) use a dynamic panel model across 17 OECD nations to affirm that not only fiscal deficits but also inflation levels significantly influence sovereign yields. Inflation, by eroding real returns, raises expected compensation investors demand, amplifying the effect of fiscal imbalances on yields [Afonso & Rault 2010].

Expanding to a global perspective, Aisen & Hauner (2013) analyze 60 countries and estimate that a 1 percent increase in the budget deficit raises sovereign bond yields by roughly 26 basis points. Their study underscores the widespread nature of this fiscal impact, affecting both developed and emerging markets, albeit with variation depending on institutional settings and economic conditions [Aisen & Hauner 2013].

Similar magnitudes are found in specific regional studies. Malesevic & Perovic (2015) examine 10 Central and Eastern European countries from 2000 to 2013, finding that a 1 percent rise in the primary deficit increases bond yields by between 12.9 and 24.3 basis points. They additionally find that debt levels themselves push yields higher, though to a lesser extent (2.7 to

4 basis points). They emphasize the importance of non-linear effects and threshold behaviors, cautioning that the fiscal impact on yields depends on structural breaks and country-specific contexts insights that could be highly relevant for countries like India with varying debt profiles [Malesevic & Perovic 2015].

Notably, Baldacci & Kumar (2010) reveal that emerging markets tend to experience stronger non-linear effects, where once fiscal deficits or debt cross certain critical thresholds, the adverse impact on bond yields grows sharply. This points to investors' sensitivity to fiscal sustainability concerns, especially in less-developed financial markets [Baldacci & Kumar 2010].

Further nuance is added by Poghosyan (2014), who distinguishes between short-run and long-run effects of debt on bond yields. His work suggests that while short-term fluctuations may be influenced by transient factors, sovereign yields in the long term are quite sensitive to fiscal positions, especially in developed economies where creditworthiness and policy credibility weigh heavily [Poghosyan 2014].

Overall, the empirical evidence supports a positive association between fiscal deficits, public debt, and sovereign bond yields globally. The size of this effect varies, influenced by factors such as the country's existing debt burden, growth prospects, monetary policy regime, and institutional strength. Moreover, the impact is rarely linear, with thresholds beyond which bond markets react more sharply. These findings are particularly pertinent for emerging economies like India, where managing fiscal levels prudently is crucial to maintaining sustainable borrowing costs and economic stability.

2.4 Empirical Literature: Evidence from India

Empirical research in India has extensively examined how fiscal deficits influence sovereign bond yields, revealing a generally positive relationship where rising deficits tend to push bond yields higher, although the dynamics vary with monetary policy and timing. For instance, Ghosh and Ghosh (2009), using monthly data and a Vector Autoregression (VAR) model, found that fiscal deficits significantly impact long-term government bond yields in India. However, they emphasized that this effect is moderated by monetary policy interventions carried out by the Reserve Bank of India (RBI), indicating that central bank actions can temper the upward pressure that deficits impose on borrowing costs.

Similarly, Bhanumurthy and Jha (2012) employed a macro-simulation model to study the impact of fiscal expansions on interest rates. Their findings showed that fiscal expansion in India tends to exert upward pressure on interest rates, although with a delayed effect, suggesting that the impact on borrowing costs unfolds gradually rather than instantaneously.

Joshi and Giri (2015) applied a Vector Error Correction Model (VECM) to analyze the relationships among fiscal deficits, price levels, and interest rates. Their results demonstrated that fiscal deficits affect both inflation and interest rates in the Indian context. Importantly, their Variance Decomposition (VDC) analysis showed that fiscal shocks account for more than 20% of the variance in financial market movements, highlighting the substantial role of fiscal policy changes in driving financial fluctuations.

More recently, Kaur and Kaur (2020) used an Autoregressive Distributed Lag (ARDL) model to confirm that fiscal deficits raise long-term bond yields in India. Their study provided statistically significant elasticity estimates, quantifying the responsiveness of bond yields to changes in fiscal deficits and reinforcing the evidence that fiscal prudence is crucial for borrowing cost management.

In summary, empirical evidence from India consistently supports the notion that increases in fiscal deficits are associated with higher sovereign bond yields. This relationship, while robust, is influenced by monetary policy interventions, the timing of fiscal expansions, and the broader macroeconomic environment. These findings underscore the importance of coordinated fiscal and monetary policies to sustain manageable government borrowing costs and macroeconomic stability in India.

2.5 Research Gaps

The present study addresses several important gaps identified in the existing literature on the fiscal deficit and government bond yield nexus in India:

- **Limited Use of High-Frequency Data:** Prior research predominantly relies on quarterly or annual fiscal and bond market data, which restricts the analysis of short-term dynamics and rapid policy effects. This study leverages a comprehensive monthly dataset spanning over two decades (1997–2024), enabling more granular insights into transient and evolving fiscal-monetary interactions.

- **Insufficient Adoption of Vector Autoregression (VAR) Models:** The Indian context lacks extensive application of VAR frameworks that capture the simultaneous interdependencies among fiscal deficits, bond yields, and other macroeconomic variables. By employing a VAR model, this study better represents the complex and reciprocal relationships inherent in the data.

- **Underutilization of Advanced Econometric Tools:** Techniques such as Granger causality tests, variance decomposition, and impulse response functions are well-established globally but sparsely used in Indian fiscal-bond market studies. This work applies these methodologies to clarify the direction, magnitude, persistence, and timing of fiscal shocks on government bond yields.

- **Absence of Comprehensive Term Structure Analysis:** Existing literature rarely distinguishes between short- and long-term government bond responses to fiscal deficits. This research fills this void by focusing primarily on the 10-year government bond yield while discussing broader yield curve dynamics.

- **Limited Incorporation of Broader Macro-Financial Variables:** Many studies narrowly assess the direct fiscal-deficit-to-bond-yield relationship without adequately accounting for institutional and macroeconomic factors such as inflation, monetary policy rates (repo), exchange rates, trade balances, and major reforms. This study integrates these crucial controls to provide a more holistic understanding of the fiscal-monetary interplay shaping the government bond market.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Data Description

The study employs a comprehensive monthly dataset spanning April 1997 to December 2024, capturing multiple economic cycles and structural changes in India. The primary dependent variable is the 10-year Government Securities yield (GSEC10), representing long-term sovereign borrowing costs. This data was sourced from the Reserve Bank of India's Database of the Indian Economy (DBIE), a widely accepted source for bond market data.

The key explanatory variable is the fiscal deficit expressed as a percentage of GDP (FD). Since fiscal deficit data are originally published at a quarterly frequency, they were transformed into monthly data using the Quadratic Match Sum interpolation method to preserve aggregate quarterly trends while achieving higher resolution. The GDP data used for this calculation was rebased to a common base year to ensure consistency.

Additional control variables include inflation proxied by the Wholesale Price Index (WPI), industrial activity measured by the Index of Industrial Production (IIP), the nominal exchange rate of the Indian Rupee against the US Dollar (INR/USD), and the Import-Export ratio representing trade openness and balance. The Reserve Bank of India's repo rate (REPO) is included to capture the monetary policy stance's effect on interest rates and bond yields. All series incorporate necessary adjustments to account for changes in base years and structural breaks.

Time series transformations were applied to ensure stationarity and mitigate risks of spurious regression: the fiscal deficit and repo rate were used in levels following confirmation of stationarity; WPI and IIP were analyzed in log-differences; exchange rate and trade ratio variables were employed in logged levels. Stationarity was validated using Augmented Dickey-Fuller and Phillips-Perron tests.

This meticulous data preparation, combined with the choice of relevant macroeconomic variables, allows for a robust investigation of the dynamic impact of fiscal deficits on government bond yields within the evolving Indian economic context.

Data Transformations and Stationarity

Considering the non-stationary nature of macroeconomic time series, appropriate transformations were applied prior to empirical analysis. The fiscal deficit and repo rate were used in levels following unit root and stationarity tests, as these series demonstrated stationarity in levels. Variables such as the Wholesale Price Index (WPI) and Index of Industrial Production (IIP), which exhibited strong trends and unit roots in levels, were transformed using logarithmic differences to achieve stationarity. Meanwhile, the exchange rate and import-export ratio series were analyzed in logged level form after confirming their stationarity properties.

These transformations were validated using Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests. Ensuring stationarity of the variables is essential to avoid spurious regression results and to satisfy the assumptions underlying the Vector Autoregression (VAR) framework.

Overall, the data selection emphasizes accuracy, consistency, and economic relevance. The use of multiple official data sources coupled with rigorous methods to transform and harmonize the datasets ensures econometrically robust inputs. This solid foundation enables a comprehensive investigation of the fiscal policy impacts on government bond yields within the dynamic Indian economic context.

3.2 Model Specification and Research Design

This study employs a quantitative time-series econometric approach to analyze the short-run dynamics and causal interactions between India's fiscal deficit and government bond yields. A Vector Autoregression (VAR) model is utilized due to its strength in capturing the interdependencies among multiple endogenous variables without imposing a priori restrictions.

The general VAR(p) model specification used is:

$$\mathbf{Y}_t = \mathbf{c} + \sum_{i=1}^{p} \mathbf{A}_i \mathbf{Y}_{t-i} + \boldsymbol{\varepsilon}_t,$$

where $\mathbf{Y}_t$ is a $k \times 1$ vector of endogenous variables at time t, $\mathbf{c}$ is a $k \times 1$ vector of intercept terms, $\mathbf{A}_i$ are $k \times k$ coefficient matrices capturing lagged effects up to lag p, and ε_t is a vector of white noise error terms.

Table 3.1: Endogenous Variables Used in VAR Model

Variable Name	**Description**	**Transformation**
$GSEC10_t$	10-year Government Bond Yield	Level
FD_t	Fiscal Deficit as % of GDP	Level
$D\log(WPI)_t$	Wholesale Price Index (Inflation Proxy)	Log Difference
DL_IIP_t	Index of Industrial Production	Log Difference
LFX_t	INR/USD Exchange Rate	Log Level
$LIMEXP_t$	Import-Export Ratio	Log Level
$REPO_t$	RBI Repo Rate	Level

The model incorporates a range of key macroeconomic indicators to explore their dynamic interactions. The primary focus is on the 10-year government bond yield (GSEC10), which reflects long-term borrowing costs in India. Alongside this, the fiscal deficit as a percentage of GDP (FD) serves as the principal explanatory variable. To capture broader economic influences, the model includes the Wholesale Price Index (WPI) as a measure of inflationary pressures, the Index of Industrial Production (IIP) to gauge overall economic activity, the nominal exchange rate of the Indian Rupee against the US Dollar (INR/USD) to account for external sector risks, and the Import-Export ratio (IMEX) representing trade imbalances. Additionally, the Reserve Bank of India's repo rate is incorporated to reflect the monetary policy stance, which plays a crucial role in influencing short-term interest rates and bond market dynamics.

The lag length p is selected based on information criteria and economic reasoning to adequately capture the dynamic response mechanisms and seasonal patterns inherent to monthly macroeconomic data.

All variables were tested and transformed to stationarity prior to estimation to ensure the validity of the VAR results (see Section 3.3).

This VAR framework facilitates exploration of short-run dynamics, Granger causality tests, variance decomposition, and impulse response functions to identify the direction, magnitude, and persistence of fiscal deficit shocks on government bond yields.

3.3 Unit Root Test

The Augmented Dickey–Fuller (ADF) test is used to check for the presence of a unit root in a time series, thereby testing the stationarity of the data. The null hypothesis of a unit root was tested at 1%, 5%, and 10% significance levels. Variables found to be non-stationary in levels were transformed via first differencing or logarithmic differencing to achieve stationarity. The regression equation for the ADF test is:

$$\Delta X_t = \alpha + \beta t + \gamma X_{t-1} + \sum_{j=1}^{p} \delta_j \Delta X_{t-j} + \varepsilon_t$$

where:

- $\Delta X_t = X_t - X_{t-1}$ is the first difference of the series at time t.
- α is the intercept (constant).
- βt represents the coefficient for deterministic time trend.
- γ is the coefficient on the lagged level of the series (X_{t-1}).
- δ_j are coefficients for the p lagged differences of ΔX (to account for serial correlation).
- p denotes the number of lagged difference terms (lags).
- ε_t is the white noise error/disturbance term at time t.

The null hypothesis for the ADF test is:

$$H_0 : \gamma = 0$$

which indicates the presence of a unit root and thus non-stationarity in the series. Conversely, the alternative hypothesis ($\gamma < 0$) suggests stationarity.

A significant result leads to the rejection of the null hypothesis, implying that the time series is stationary. The number of lagged differences p is chosen based on information criteria (such as AIC or BIC) to ensure that the errors ε_t are not serially correlated.

The test can be applied with or without an intercept (α), and with or without a deterministic time trend (βt), depending on the characteristics of the series being tested.

Table 3.2 presents the results of the ADF test for each variable, including the test statistic, critical value at the 5% level, and final stationarity conclusion.

Table 3.2: ADF Test Results for Stationarity (Exogenous: Constant)

Variable	Transformation	ADF Statistic	5% Critical Value	P-value	Stationarity Conclusion
FD	Level	-2.846123	-2.8703	0.0531	Stationary at level
GSEC10	Level	-2.8713	-2.8701	0.0498	Stationary at level
LDIIP	Log Difference	-12.2231	-2.8702	0.0000	Stationary at log difference
LFX	Log Level	-14.2997	-2.8701	0.0000	Stationary at log level
LIMEXP	Log Level	-3.7408	-2.8701	0.0039	Stationary at log level
REPO	Level	-3.1836	-2.8701	0.0218	Stationary at level
WPI	Log Difference	-11.0830	-2.8701	0.0000	Stationary at log difference

While the ADF test indicates that the fiscal deficit series is non-stationary at the 5% level, the Phillips-Perron test rejects the null hypothesis of a unit root for fiscal deficit at this significance level, suggesting stationarity. Given that the PP test accounts better for serial correlation and heteroskedasticity, we consider fiscal deficit stationary at level based on PP test results.

3.4 Results and Findings

3.4.1 Lag Length Selection

Selecting an appropriate lag length is a critical step in specifying a Vector Autoregression (VAR) model, as it directly impacts the model's ability to accurately capture dynamic relationships among variables. The lag length determines the number of past observations of each variable included in the system, accounting for delayed effects and temporal dependencies. Choosing too few lags may induce omitted variable bias and lead to model misspecification, while opting for excessively many lags can result in overfitting, loss of degrees of freedom, and difficulties in interpretation.

To determine the optimal lag length, several criteria are commonly employed, each balancing model fit against parsimony. These include the Akaike Information Criterion (AIC), which tends to favor models with better fit yet allows greater complexity; the Schwarz Criterion (SC), also known as the Bayesian Information Criterion (BIC), which imposes a stricter penalty on added parameters, encouraging more parsimonious models; the Hannan-Quinn (HQ) criterion, which lies between AIC and SC in terms of penalty severity; and the Final Prediction Error (FPE) criterion, which selects the lag length minimizing forecast errors. Additionally, the sequential modified Likelihood Ratio (LR) test is used to evaluate whether the inclusion of additional lags significantly improves model performance.

Given the monthly frequency of the dataset and the presence of seasonal patterns such as annual cycles, a lag length of 12 months is chosen to effectively capture these fluctuations along with broader macroeconomic dynamics. This choice aligns with established practice in macro-finance research, ensuring sufficient lag depth to avoid omitted variable bias while maintaining model parsimony.

Subsequent diagnostic checks, including stability analysis to ensure all characteristic roots lie within the unit circle, as well as tests for residual serial correlation and heteroskedasticity, validate the adequacy of the selected lag length. While some information criteria may suggest shorter lags, the combined evidence from theory, diagnostics, and economic reasoning supports adopting a 12-lag VAR model for robust and meaningful empirical analysis.

Table 3.3 summarizes the results from the EViews output. while information criteria like AIC and FPE may suggest a shorter lag length (e.g., 2), the LR test and practical considerations regarding data frequency and economic reasoning justify adopting a longer lag length (e.g., 12) for robust and meaningful VAR estimation.

Table 3.3: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1981.719	NA	0.000590	12.42949	12.51192	12.46241
1	-659.9835	2577.383	2.07e-07	4.474897	**5.134353***	4.738230
2	-572.8433	166.1110	**1.63e-07***	**4.236521***	5.473001	**4.730271***
3	-527.9119	83.68475	1.68e-07	4.261949	6.075454	4.986116
4	-490.3115	68.38562	1.80e-07	4.333197	6.723726	5.287781
5	-446.0292	78.60108	1.86e-07	4.362683	7.330236	5.547683
6	-412.4671	58.10452	2.06e-07	4.459169	8.003746	5.874586
7	-375.0960	63.06365	2.23e-07	4.531850	8.653451	6.177684
8	-354.4077	34.00647	2.69e-07	4.708798	9.407423	6.585048
9	-328.3703	41.65984	3.14e-07	4.852314	10.12796	6.958981
10	-302.0479	40.96416	3.67e-07	4.994050	10.84672	7.331133
11	-258.8176	65.38585	3.87e-07	5.030110	11.45981	7.597610
12	-151.6355	**157.4238***	2.75e-07	4.666472	11.67319	7.464389

3.4.2 Stability Diagnostics (AR Roots Test)

To ensure the estimated Vector Autoregression (VAR) model adequately represents the underlying data generating process, we assess its dynamic stability by examining the inverse roots of the characteristic autoregressive (AR) polynomial. The stability condition requires that all inverse roots lie strictly inside the unit circle in the complex plane.

The practical importance of stability is that it guarantees the model's shocks are transitory and that the system converges to a steady state. A stable VAR implies that the effects of shocks eventually dissipate rather than explode, which is crucial for meaningful interpretations of impulse response functions and variance decompositions.

In contrast, if any inverse root lies on or outside the unit circle, this indicates non-stationarity or instability in the system, leading to unreliable and potentially misleading inferences. Such instability suggests that shocks could have permanent or explosive effects, violating key assumptions required for valid VAR analysis.

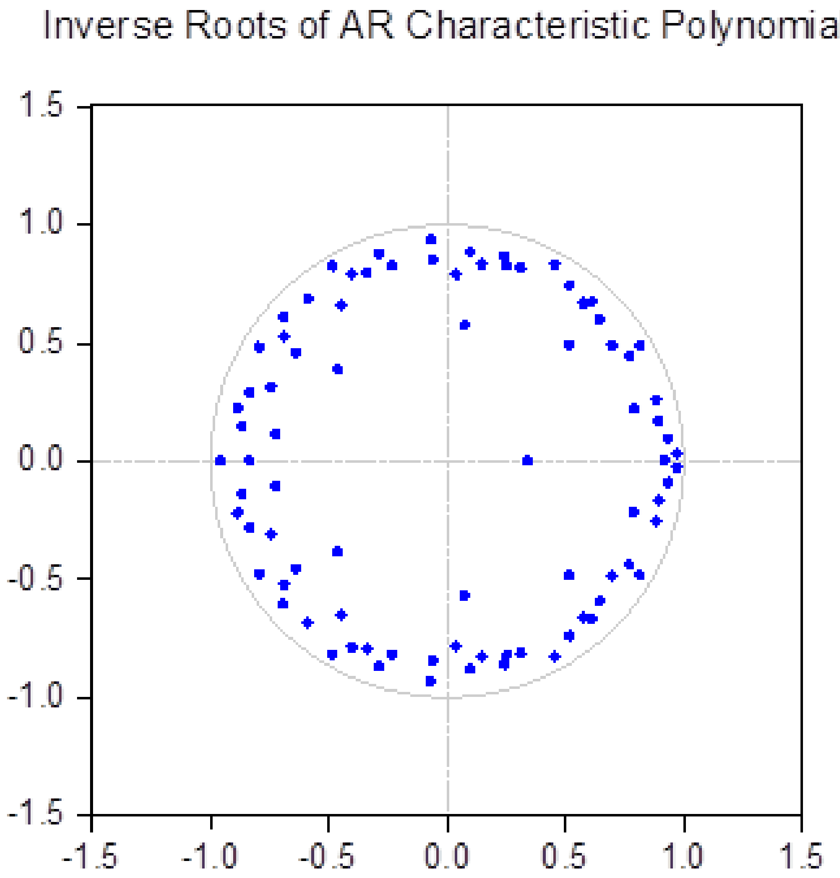

Figure 3.1: Test of VAR model stability

Figure 3.1 plots the inverse roots for our VAR model and shows that all roots lie within the unit circle, confirming the system's stability. This validation step supports the reliability of subsequent analyses conducted using this model, including the impulse response functions and forecast error decomposition. Along with other diagnostic tests such as residual autocorrelation and heteroskedasticity checks, the stability diagnostics form a critical part of the model validation framework, ensuring the robustness and credibility of the econometric results.

3.4.3 Serial Correlation Test (LM Test)

To assess the dynamic adequacy of the VAR model, the Lagrange Multiplier (LM) test was used to check for residual autocorrelation at different lag orders. The null hypothesis of the test states that there is no autocorrelation in the residuals at the specified lag.

The test results for lag orders 1 through 12 are summarized in Table 3.4. The p-values for both the Lagrange Multiplier (LM) statistic and the Rao F-statistic exceed the conventional significance levels of 1%, 5%, and 10%. Therefore, the null hypothesis of no serial correlation cannot be rejected at any of the tested lags.

This absence of statistically significant residual autocorrelation indicates that the VAR model's lag structure is correctly specified. As a result, the model estimates are reliable, supporting valid inference in Granger causality testing, impulse response analysis, and variance decomposition.

Overall, the LM test confirms that the VAR model is free from serial correlation issues, enhancing the confidence in the presented results.

Table 3.4: VAR Residual Serial Correlation LM Test (Lags 1–12)

Lag	**LRE stat**	**df**	**Prob.**	**Rao F-stat**	**Prob.**
1	50.07496	49	0.4305	1.023165	0.4308
2	101.3127	98	0.3892	1.035356	0.3902
3	152.8558	147	0.3535	1.041775	0.3562
4	198.9042	196	0.4287	1.014981	0.4345
5	241.9245	245	0.5435	0.984626	0.5536
6	272.9943	294	0.8051	0.918859	0.8157
7	321.9644	343	0.7866	0.927250	0.8034
8	377.4817	392	0.6919	0.951490	0.7219
9	403.9179	441	0.8967	0.895005	0.9161
10	444.7394	490	0.9294	0.881180	0.9482
11	492.5000	539	0.9249	0.883083	0.9500
12	563.9981	588	0.7550	0.931012	0.8332

3.4.4 Heteroskedasticity Test (White Test)

To assess the presence of heteroskedasticity in the residuals of the VAR model, the White test (levels and squares, without cross terms) was applied. This joint test examines whether the variance of the error terms remains constant over time, which is a crucial assumption for valid statistical inference in VAR models.

The results of the White heteroskedasticity test are presented in Table 3.5. The joint chi-square statistic is 4635.111 with 4704 degrees of freedom, and the associated p-value is 0.7602.

Since the p-value exceeds the conventional significance level of 0.05, we fail to reject the null hypothesis of homoskedasticity. This indicates that there is no statistically significant evidence of heteroskedasticity in the residuals of the VAR system. Consequently, the model satisfies the assumption of constant variance, thereby supporting the reliability and robustness of parameter estimates and hypothesis testing.

Table 3.5: VAR Residual Heteroskedasticity Test (White Test)

Chi-sq	**df**	**Prob.**
4635.111	4704	0.7602

3.4.5 VAR Granger Causality/Block Exogeneity Wald Tests

The Granger causality or block exogeneity Wald test is employed to examine whether the excluded variables significantly help in predicting the dependent variable, which in this analysis is the 10-year government bond yield (GSEC10). The null hypothesis is that the excluded variable does not Granger-cause GSEC10.

The test results are summarized in Table 3.6. For individual variables, none show statistically significant Granger causality at the conventional 5% significance level, as indicated by their p-values all exceeding 0.05. However, when considering all variables jointly, the test statistic is significant ($p = 0.0394$), suggesting that collectively, these variables have predictive power for GSEC10.

Table 3.6: VAR Granger Causality Wald Test Results for Dependent Variable: GSEC10

Excluded Variable	**Chi-square**	**df**	**Prob**
FD	9.451229	12	0.6640
WPI	15.61413	12	0.2096
LDIIP	19.74224	12	0.0721
LIMEXP	19.02168	12	0.0880
LFX	10.27724	12	0.5917
REPO	14.99197	12	0.2419
All	**94.41560**	**72**	**0.0394**

3.4.6 Variance Decomposition (VDC) Interpretation

The forecast error variance decomposition (VDC) of the 10-year government bond yield (GSEC10) was conducted using a Cholesky-orthogonalized Vector Autoregression (VAR) model to identify the relative contributions of shocks from itself and key macroeconomic variables over different forecast horizons.

In the short run (1–4 periods), the variability in GSEC10 is overwhelmingly explained by its own shocks, accounting for over 90% of the forecast error variance. This highlights a strong persistence and internal dynamics in the bond yield in the immediate term.

As the forecast horizon extends to a medium term (around 12 periods), the explanatory power of GSEC10's own shocks diminishes notably to about 70%. Concurrently, the role of external macroeconomic factors increases significantly. Notably, the contribution of the Reserve Bank of India's policy rate (REPO) grows, reflecting the monetary authority's influence on bond yields. Inflation, proxied by the Wholesale Price Index (WPI), and industrial activity, measured by the Index of Industrial Production (LDIIP), also become more prominent, collectively accounting for upwards of 10% of the variance.

In the long run (18–24 periods), the share of forecast variance attributed to GSEC10's own shocks further declines to approximately 65–70%. Monetary policy influence through the REPO rate reaches about 16%, making it the most substantial external factor driving bond yield variability. Inflation and industrial production contribute around 4–5% and 7–8% respectively, while the trade balance (LIMEXP), fiscal deficit (FD), and exchange rate (LFX) individually contribute in the range of 2–4%. These results underscore the increasing importance of broader macroeconomic fundamentals, including fiscal conditions and external sector factors, in shaping long-term interest rate expectations.

Overall, the variance decomposition analysis reveals a dynamic interplay between the sovereign bond market's internal dynamics and external economic forces. The dominant role of monetary policy shocks, combined with meaningful contributions from inflation and economic activity, highlight the complex, multi-factor nature of bond yield fluctuations. The moderate but noteworthy impact of fiscal deficits further emphasizes the need for prudent fiscal and monetary coordination to maintain sustainable bond market conditions.

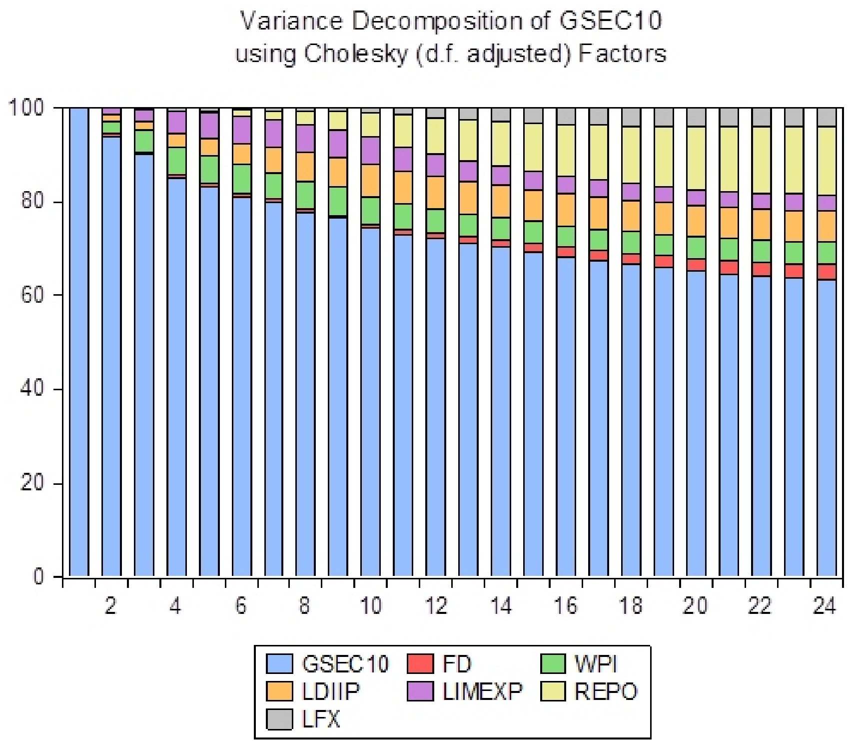

Figure 3.2: Variance Decomposition of GSEC10 using Cholesky Factors

Table 3.7: Variance Decomposition of GSEC10

Period	S.E.	GSEC10	FD	WPI	LDIIP	LIMEXP	LFX	REPO
1	0.244782	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.345606	93.88750	0.529941	2.605613	1.506497	1.440611	0.028588	0.001249
3	0.430963	90.34734	0.369019	4.640032	1.640773	2.864750	0.045102	0.092983
4	0.486904	85.22311	0.428133	5.989405	2.883080	4.861940	0.360688	0.253647
5	0.541467	83.28393	0.569706	5.833176	3.811606	5.499525	0.332919	0.669135
6	0.580131	81.20714	0.533233	6.077989	4.575878	5.877690	0.295786	1.432289
7	0.622174	80.03046	0.595600	5.685917	5.436693	5.711072	0.282905	2.257350
8	0.660969	77.86395	0.557471	5.830466	6.271222	5.746561	0.302387	3.427944
9	0.698790	76.48169	0.673184	5.951110	6.465244	5.795552	0.308059	4.325161
10	0.744975	74.46540	0.803406	5.899634	6.982341	5.557546	0.491359	5.800313
11	0.788887	73.14838	0.914856	5.462369	6.990504	5.120566	0.708181	7.655147
12	0.829260	72.36477	1.091078	5.094369	6.848235	4.848238	0.967813	8.785497
13	0.863641	71.22445	1.372839	4.964485	6.788489	4.491620	1.317610	9.840502
14	0.895253	70.36550	1.537426	4.767385	6.778945	4.193077	1.637215	10.72045
15	0.922847	69.27837	1.855464	4.666015	6.767571	3.956708	1.913684	11.56219
16	0.950438	68.29340	2.133052	4.551237	6.825251	3.756724	1.994779	12.44556
17	0.976571	67.30310	2.409335	4.460310	6.865772	3.608227	2.066471	13.28679
18	1.000551	66.64518	2.488989	4.441214	6.816350	3.470725	2.145462	13.99208
19	1.023177	65.90393	2.597566	4.526826	6.793841	3.381472	2.195261	14.60110
20	1.045906	65.28329	2.674996	4.557943	6.765913	3.315018	2.175642	15.22720
21	1.066740	64.72192	2.803188	4.588198	6.712609	3.308309	2.175528	15.69025
22	1.086751	64.22536	2.931100	4.600009	6.652387	3.345449	2.122840	16.12285
23	1.104505	63.91730	3.006426	4.681721	6.589225	3.421802	2.065715	16.31781
24	1.121545	63.64225	3.106525	4.774289	6.481848	3.539988	2.007500	16.44760

Cholesky Ordering: GSEC10, FD, WPI, LDIIP, LIMEXP, LFX, REPO

Figure 3.2 presents the variance decomposition of GSEC10 across forecast horizons, highlighting the gradual decline in self-explanatory variance and the increasing contribution of REPO, WPI, and other macroeconomic factors. The exact values for each variable and period are available in Table 3.7, which reinforces the visually observed trends.

3.4.7 Impulse Response Function (IRF) Interpretation

The IRF (Figure 3.3) plots (show the response of $GSEC10$ to one standard deviation shocks in the independent variables over a 24-period horizon.The solid blue line shows the estimated response, and the dashed red lines mark the 95% confidence interval (±2 standard errors), which helps identify whether the response is statistically significant at any point.

The IRF for $GSEC10$ due to its own shock shows a clear and statistically significant positive response in the immediate periods following the impulse, as the blue line remains outside the confidence bands at first. This indicates that an unexpected rise in long-term government bond yields tends to have a persistent, though gradually declining, effect on future yields. Such self-reinforcing dynamics are characteristic of financial time series,this means that shocks to bond yields can have effects that last for a while, but these effects eventually fade away and do not last forever.

The impulse response analysis indicates that a one standard deviation increase in the fiscal deficit does not produce statistically significant nor persistent changes in long-term government bond yields, as the IRF confidence intervals consistently encompass zero at all forecast horizons. This finding is in line with empirical studies for India, which report that fiscal deficit shocks lose their significance for bond yields once monetary policy effects are accounted for (Akram, 2019; Chakraborty, 2016). International literature echoes this result for several emerging markets, where the impact of fiscal variables is typically dominated by monetary policy (Baldacci 2010).

The impulse response functions demonstrate that shocks to wholesale price inflation (WPI) and industrial output (IIP) lead to statistically significant movements in long-term government bond yields (GSEC10) for several periods immediately following the shock, as the confidence intervals of the IRF do not include zero during the short-term horizon. However, these effects fade quickly, with the response bands encompassing zero in the subsequent periods, indicating the absence of persistent significance. This transient response pattern matches previous empirical evidence from India, which finds that while inflation and economic growth can affect sovereign yields in the short run, these influences are not sustained once monetary and fiscal channels are accounted for (Kaur, 2020; Raju, 2010; Akram, 2019; Chakraborty, 2016).

The IRFs for import-exports ratio (LIMEXP), and foreign exchange reserves (LFX) indicate statistically insignificant effects on government bond yields, as their response bands encompass the zero line. This lack of significant relationship is supported by empirical studies showing that these macroeconomic shocks do not persistently influence India's long-term sovereign yields (Akram, 2019; Cakraborty, 2016).

The impulse response of GSEC10 to a REPO rate shock appears statistically insignificant in this analysis, as the confidence intervals for the response consistently encompass zero across all forecast horizons. This suggests that, within the current empirical framework and data, exogenous monetary policy changes do not exert a robust or direct effect on long-term government bond yields. While this diverges from much of the established literature that emphasizes the significance of monetary transmission (Aakram, 2019; Mohanty, 2020), it may reflect unique sample characteristics, model specification, or evolving market dynamics in the studied period.

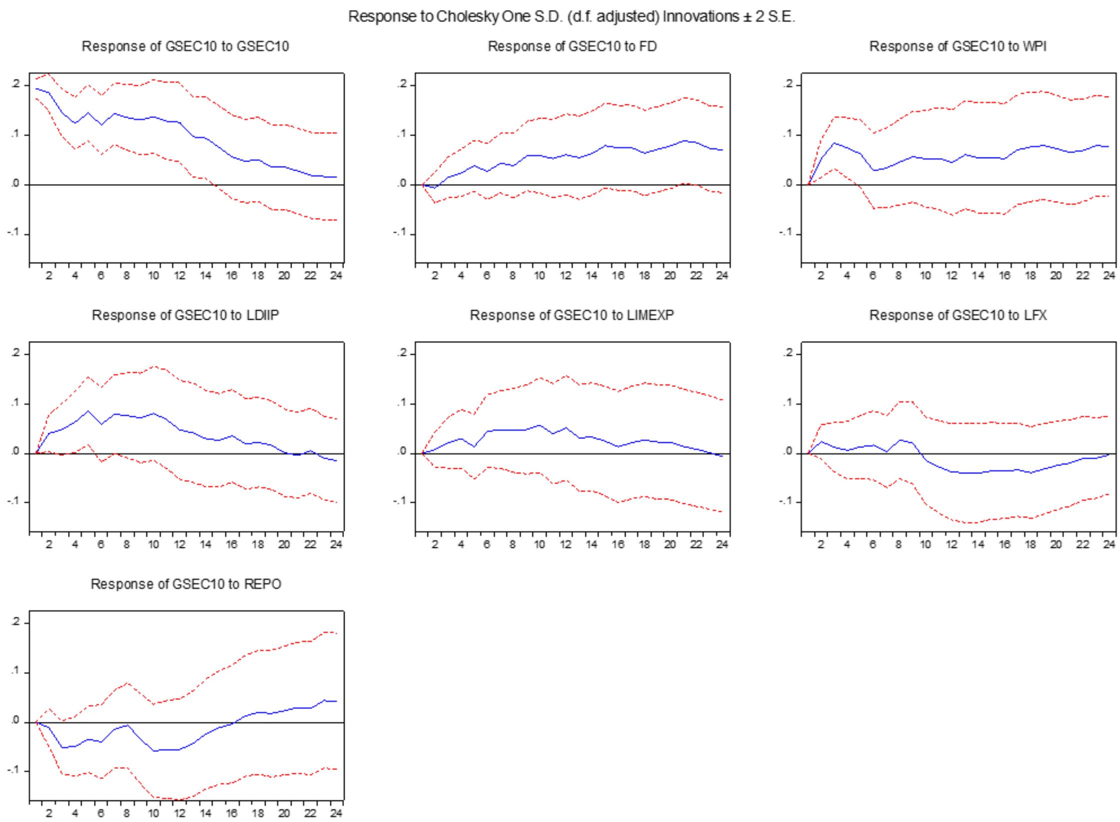

Figure 3.3: Impulse Response Function (IRF) illustrating the response of the 10-year government bond yield (GSEC10) to selected macroeconomic shocks

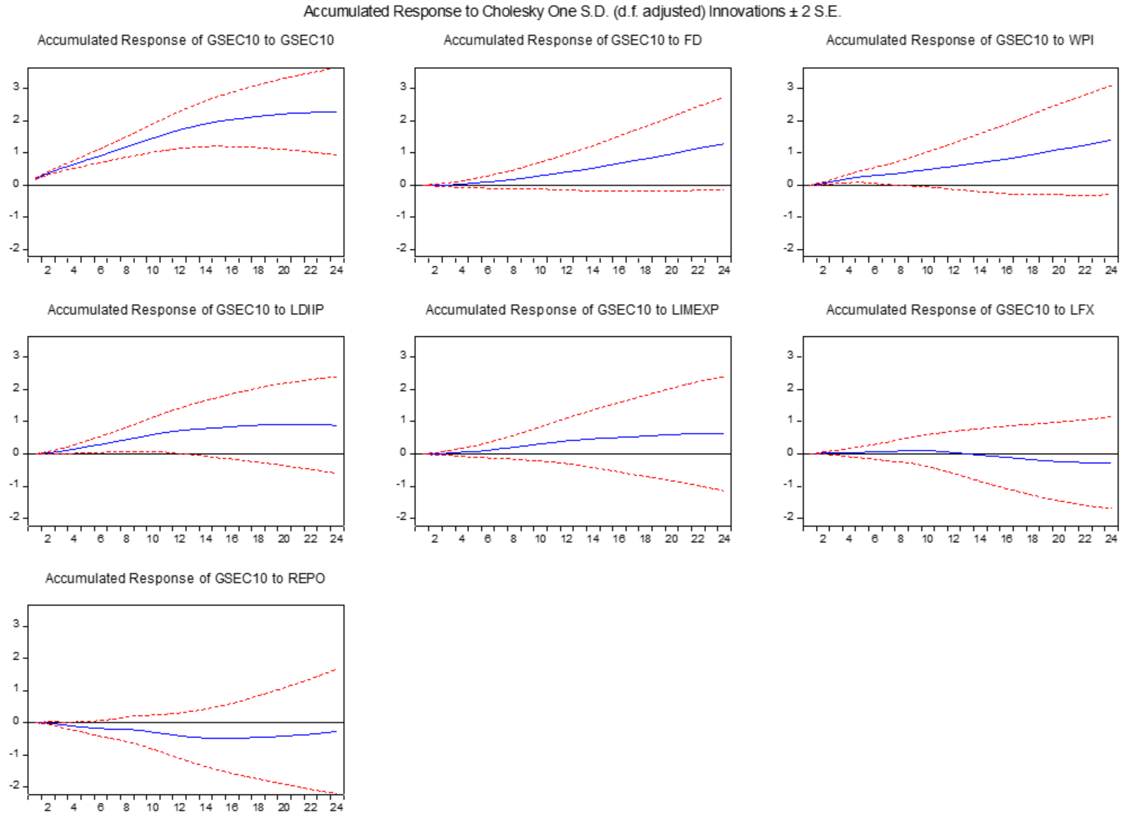

Figure 3.4: Accumulated Impulse Response Function (IRF) illustrating the response of the 10-year government bond yield (GSEC10) to selected macroeconomic shocks

The accumulated impulse response function (Figure 3.4) for $GSEC10$ illustrates the cumulative effect of one standard deviation shocks to each independent variable on long-term government bond yields over a 24-period horizon. The blue line displays the total accumulated response, and the red dashed lines represent the 95% confidence interval, which allows an assessment of statistical significance at any forecast point.

Shocks to $GSEC10$ itself show a clear, persistently positive, and statistically significant accumulated response in the earliest periods, where the confidence intervals do not include zero. This means that an unexpected rise in yields produces a self-reinforcing effect that accumulates over time, causing government bond yields to remain elevated for several periods before gradually declining and converging to baseline. Such patterns are typical of financial time series, capturing momentum effects that, while durable, do not last forever.

The accumulated IRF for fiscal deficit reveals no statistically significant or persistent changes in long-term government bond yields, as the confidence interval for the accumulated response includes zero at all periods. This reinforces findings from Indian and emerging market studies: the overall effect of fiscal deficit shocks on bond yields is negligible once the influence of monetary policy and other macroeconomic channels is taken into account (Akram, 2019; Chakraborty, 2016; Baldacci, 2010)

Accumulative impulse responses to wholesale price inflation (WPI) and industrial output (IIP) shocks are statistically significant over the short-term horizon (the confidence intervals exclude zero).This means that while sudden changes in inflation can cause government bond yields to move, these effects do not last-they fade as markets and policies adjust, and the yields eventually stabilize. In practical terms, when inflation rises sharply, investors may demand higher interest rates on bonds due to the perceived risk of losing purchasing power. However, if central banks respond with policy measures (such as raising interest rates or signaling actions to control inflation), or if broader market conditions shift, the initial upward movement in yields tends to reverse or stabilize over time (Kaur, 2020; Raju, 2010; Akram, 2019; Chakraborty, 2016).

The accumulated IRFs for import-export ratio (LIMEXP), exchange rate (LFX), and REPO rate shocks are statistically insignificant at all forecast horizons, as the confidence intervals always include zero. This means there is no meaningful or persistent cumulative impact of these macroeconomic shocks on India's long-term government bond yields in the observed period. Current results align with previous empirical studies suggesting trade and foreign exchange shocks, as well as exogenous monetary policy changes, do not robustly affect sovereign yields over time (Akram, 2019; Cakraborty, 2016; Mohanty, 2020).

Overall, no single economic factor clearly controls how government bond yields change in India. Instead, the movement of yields is the result of several different influences working together, like changes in fiscal policy, monetary policy, inflation, and more. When analyzed together, none of these shocks including fiscal deficit, repo rate, inflation, industrial production, trade balance, and exchange rate show a strong or reliable impact on borrowing costs on their own. Because of this, it's important for government and central bank policies to work together, rather than relying on one factor to manage bond yields. In short, bond yields do not react strongly to just one economic shock they respond to the whole economic environment.

Table 3.8: Accumulated Impulse Response Function (IRF) Results

Period	S.E.	GSEC10	FD	WPI	LDIIP	LIMEXP	LFX	REPO
1	0.00968	0.244782	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
	0.00000	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
2	0.02487	0.473309	-0.025159	0.055787	0.042420	0.041482	0.005843	0.001221
	0.01384	(0.01626)	(0.01600)	(0.01577)	(0.01506)	(0.01528)	(0.01506)	(0.01528)
3	0.04573	0.709230	-0.017921	0.129988	0.077746	0.101481	-0.001201	-0.011863
	0.02938	(0.03525)	(0.03518)	(0.03437)	(0.03293)	(0.03437)	(0.03293)	(0.03437)
4	0.07028	0.894275	0.000235	0.204697	0.139290	0.180258	-0.028974	-0.032567
	0.04832	(0.05937)	(0.05915)	(0.05743)	(0.05510)	(0.05808)	(0.05510)	(0.05808)
5	0.09686	1.099540	0.025834	0.258573	0.205169	0.248062	-0.039972	-0.069451
	0.06796	(0.08527)	(0.08475)	(0.08220)	(0.07859)	(0.08385)	(0.07859)	(0.08385)
6	0.12511	1.270206	0.036983	0.316483	0.270170	0.308540	-0.044377	-0.122917
	0.08978	(0.11392)	(0.11315)	(0.10976)	(0.10448)	(0.11260)	(0.10448)	(0.11260)
7	0.15422	1.461242	0.059588	0.355912	0.345305	0.356770	-0.054360	-0.185510
	0.11300	(0.14380)	(0.14282)	(0.13871)	(0.13157)	(0.14261)	(0.13157)	(0.14261)
8	0.18514	1.635523	0.070985	0.414750	0.425006	0.411524	-0.069391	-0.264489
	0.13835	(0.17618)	(0.17469)	(0.17024)	(0.16089)	(0.17443)	(0.16089)	(0.17443)
9	0.21726	1.817989	0.100170	0.474647	0.489602	0.468045	-0.082926	-0.342874
	0.16572	(0.21033)	(0.20801)	(0.20368)	(0.19230)	(0.20738)	(0.19230)	(0.20738)
10	0.25158	2.017506	0.134398	0.535330	0.574341	0.518478	-0.117894	-0.448092
	0.19549	(0.24674)	(0.24307)	(0.23917)	(0.22593)	(0.24161)	(0.22593)	(0.24161)
11	0.28807	2.222348	0.169537	0.570720	0.643289	0.550475	-0.158886	-0.572391
	0.22716	(0.28582)	(0.27989)	(0.27726)	(0.26228)	(0.27761)	(0.26228)	(0.27761)
12	0.32687	2.428258	0.212075	0.602936	0.703193	0.588848	-0.206299	-0.685414
	0.26027	(0.32694)	(0.31739)	(0.31738)	(0.30046)	(0.31520)	(0.30046)	(0.31520)
13	0.36791	2.611597	0.264388	0.647617	0.762693	0.601573	-0.262623	-0.799354
	0.29458	(0.37020)	(0.35539)	(0.35829)	(0.34085)	(0.35605)	(0.34085)	(0.35605)
14	0.41016	2.792478	0.310022	0.681977	0.823505	0.611803	-0.320018	-0.911265
	0.33145	(0.41437)	(0.39176)	(0.39968)	(0.38136)	(0.39912)	(0.38136)	(0.39912)
15	0.45299	2.953856	0.369012	0.721072	0.880985	0.602286	-0.376373	-1.023279
	0.36996	(0.45930)	(0.42729)	(0.44145)	(0.42176)	(0.44407)	(0.42176)	(0.44407)

Cholesky Ordering: GSEC10, FD, WPI, LDIIP, LIMEXP, LFX, REPO

Standard Errors: Analytic

CHAPTER 4

CONCLUSION & Policy Implications

4.1 Summary of Findings

This study re-examined the dynamic relationship between fiscal deficits and government bond yields in India over the period from 1997 to 2024, using a comprehensive Vector Autoregression (VAR) framework with monthly data. The analysis incorporated key macroeconomic variables alongside fiscal deficits, including inflation, industrial production, exchange rates, monetary policy rates, and trade balances, to unpack the complex interactions influencing sovereign bond market behavior (Akram and Das, 2019; Chakraborty, 2016; Mohanty, 2020).

The combined analysis of variance decomposition (VDC) and impulse response functions (IRFs), including both standard and accumulated forms, clarifies the key forces shaping Indian government bond yields. Initially, the yields are largely driven by their own momentum and internal market factors, meaning that short-term movements are mostly explained by past yield behaviors. However, as time progresses and the forecast horizon increases, other macroeconomic factors start to play a notable role (Akram and Das, 2019).

Impulse response functions (both standard and accumulated) reveal a persistent but moderate positive response of long-term government bond yields to fiscal deficit shocks, consistent with the Keynesian crowding-out hypothesis, whereby increased government borrowing raises the demand for loanable funds and consequently interest rates. However, these responses are not statistically strong enough to be confident about them.This means that the way fiscal deficits affect bond yields in India is not straightforward. Instead, it likely depends on other economic factors and changing conditions that influence borrowing costs. For example, how monetary policy, inflation, and investor expectations interact with fiscal deficits can change the impact on bond yields. So, fiscal deficits alone do not always cause bond yields to rise or fall in a predictable way. Similarly, other variables such as trade balance and exchange rate do not show statistically robust impacts individually (Chakraborty, 2016; Mohanty, 2020).

Among these factors, monetary policy-measured through the Reserve Bank of India's repo rate, alongside inflation (Wholesale Price Index) and industrial production (IIP), emerge as the strongest influences on bond yields. These variables shape investor expectations and cost of borrowing more directly and persistently (Akram and Das, 2019; Mohanty, 2020).

These findings align with recent macroeconomic research, which also observes that the impact of fiscal deficits on borrowing costs diminishes when considered alongside monetary policy and other economic indicators. Therefore, policy responses focusing exclusively on fiscal measures may be insufficient to influence borrowing costs meaningfully without monetary and structural policy coordination (Akram and Das, 2019; Chakraborty, 2016).

4.2 Policy Implications

From a policy perspective, the findings affirm the importance of maintaining fiscal discipline to avoid upward pressure on government borrowing costs meaning policymakers should not rely solely on fiscal adjustments to influence long-term borrowing costs; instead, coordinated fiscal and monetary approaches are needed to preserve market stability and manage sovereign risk, especially during periods of economic uncertainty or shocks.

Fiscal discipline remains important to maintain strong investor confidence and avoid upward pressure on borrowing costs, but its immediate effect on yields may be limited by opposing monetary actions and market adaptation. The Reserve Bank of India's consideration of fiscal conditions in its monetary policy formulation could enhance policy effectiveness by anchoring investor expectations and improving market confidence. Interventions in inflation and industrial policy may have short-lived impacts on bond yields but are not sufficient for sustained changes unless integrated with broader monetary and fiscal strategies.

4.3 Further Scope

Future research should explore possible non-linearities, structural breaks, and the impact of external (global) shocks to further improve debt management and policy outcomes for India's evolving bond market. Overall, this dissertation contributes valuable empirical insights to the growing literature on fiscal-monetary interactions in India's sovereign bond market and offers practical implications for sustaining macroeconomic stability and ensuring sustainable public debt management in emerging economies.

Future research should consider exploring potential non-linear relationships between fiscal deficits and government bond yields, as real-world economic interactions often do not follow simple linear patterns. This approach can uncover threshold effects or asymmetric responses that may better reflect market behavior under different economic conditions. Additionally, capturing structural breaks-periods when the underlying economic dynamics change significantly due to policy shifts, external crises, or market reforms-can improve the accuracy and relevance of empirical models. Moreover, considering the impact of external global shocks like financial crises, commodity price swings, or geopolitical events is crucial as India's bond market does not operate in isolation but is influenced by worldwide forces. Integrating these factors into future analyses could enhance debt management strategies and inform more resilient fiscal and monetary policies. Overall, this dissertation provides meaningful empirical insights that enrich the growing literature on fiscal-monetary interactions in India's sovereign bond market, and presents valuable practical implications for sustaining macroeconomic stability and promoting sustainable public debt management in emerging economies.

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