

**THE ROLE OF MONETARY AND FISCAL
POLICIES IN SHAPING PRICE DYNAMICS IN
PAKISTAN**



**PAKISTAN INSTITUTE
OF DEVELOPMENT
ECONOMICS**

by

Muhammad Khubaib

PIDE2023FMPHILECO13

Supervisor

Dr. Haider Ali

MPhil Economics

PIDE School of Economics

**Pakistan Institute of Development Economics,
Islamabad**

2025



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Supervisor:

Dr. Haider Ali

Signature: _____

Internal Examiner:

Dr. Ahsan Ul Haq

Signature: _____

External Examiner:

Dr. Amanat Ali

Signature: _____

Director,

PIDE School of Economics: Dr. Iftikhar Ahmad

Signature: _____

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Signature of the Student

Name of Student

Muhammad Khubaib

Dedications

This thesis is dedicated to my parents and friends, whose constant love, prayers, and unwavering support have been my greatest source of strength and inspiration throughout this journey. I am especially grateful to my parents for always standing by my side.

Acknowledgments

All praise to Almighty Allah, the Most Gracious and the Most Merciful, whose countless blessings and guidance enabled me to successfully complete this journey.

I extend my sincere gratitude to my supervisor, Dr. Haider Ali, for his invaluable guidance, encouragement, and constructive feedback. His mentorship and supportive approach were truly inspiring.

I am also grateful to all my teachers at PIDE for their motivation and for fostering a rich academic environment that strengthened my learning and research skills. Finally, my heartfelt thanks to my friends for their constant support and encouragement throughout this journey, especially my class fellows Nehan Khushi and Alam Khan and my roommates Mahed Ali and Faizan Asif.

Abstract

This thesis examines how monetary and fiscal policy stances jointly determine the dynamics in growth of price level in Pakistan. Employing a five-variable Vector Autoregression (VAR) augmented with a Markov-Switching Regime model, the analysis covers quarterly data from 1991Q1 to 2023Q4 and includes a dummy capturing periods of monetary fiscal coordination. The VAR traces the spillover effects of debt growth, interest rates, output, and policy shocks on inflation. The results indicate that fiscal policy shocks, especially debt-financed deficits under a non-Ricardian regime, generate sustained inflationary pressure. In contrast, contractionary monetary shocks often produce a short-run “price puzzle” (inflation temporarily rises) and, under fiscal dominance, have little long-run impact on inflation variance. Crucially, the empirical evidence shows that independent interest rate hikes are ineffective unless backed by fiscal discipline. Only when monetary tightening is accompanied by credible fiscal consolidation does inflation slow down significantly.

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Chapter I: Introduction

1.1. Introduction

Global inflation rates surged after governments' fiscal stimulus and financial transfers to households during COVID-19, which elevated the aggregate demand, and encouraged central banks to shift to an active monetary stance to counter inflation. Pakistan is no different; in the second quarter of 2023, the country's inflation rate hit the all-time high of 38% (see Figure 1). State Bank of Pakistan (SBP) responded to this high inflation by sharply tightening monetary policy over time, increasing the policy rate from 7% in the third quarter of 2021 to 22% by the second quarter of 2023. Although the goal of this high policy rate was to reduce inflation, it has had significant fiscal repercussions, especially due to increase in the cost of debt serving for the government which widens the fiscal deficits, raises the price level from the demand side when government issues more debt and increasing the cost of doing business from the supply side.

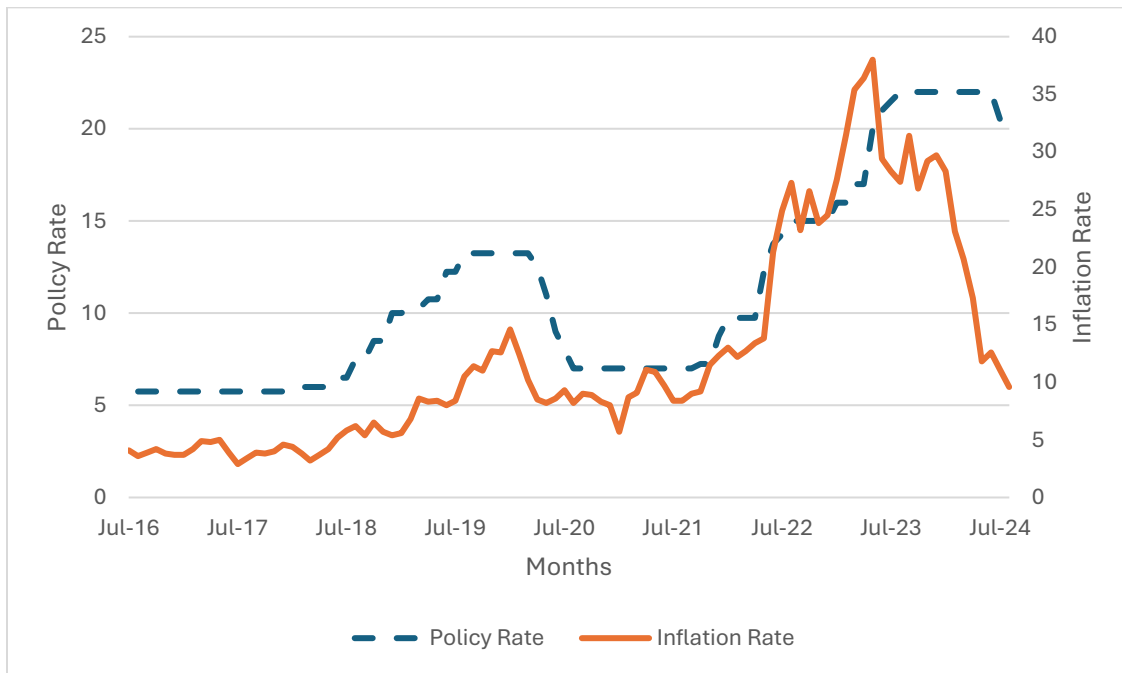


Figure 1: Movements of Policy Rate (with lag) and Inflation Rate (2016-2024)

As per SBP Act 1956 the objective of Pakistan's monetary policy was price stability without any hindrance to economic growth (Akhtar, 2008). However, the idea of Phillips curve suggests the

trade-off between economic growth and inflation control. The average sacrifice ratio, as determined by the (Ball, 1994) for four high-inflation periods in Pakistan between 1974 and 2017, is 0.662, however, these findings are highly sensitive to measuring of sacrifice ratio and real output loss (Haque & Jalil, 2021). The sacrifice ratio reflects the economic cost, in terms of output loss to bring 1 percent inflation down. The inflation rate remained above the historical average of 8 percent in the last few fiscal years. An active monetary stance theoretically should curb inflation by reducing aggregate demand. However, high inflation rates raise concerns about the limitations of active monetary regime when fiscal policy is non-Ricardian (active) and drives aggregate demand.

For instance, debt to output ratio for Pakistan declined from 75 percent at the end of 2023Q2 to 67.2 percent at the end 2024Q2 but the gross value of debt increased from 62.88 trillion to 71.23 trillion and nominal GDP grew by 26 percent. This scenario reflects a non-Ricardian fiscal regime that dampens the effect of active monetary regime. Inflation will persist as long as fiscal authorities finance deficits through borrowing, particularly when taxes and expenditures are not adjusted in response to changes in monetary policy stance. An active monetary policy alone lacks the power to bring price stability. The question arises of how much Pakistan's economy has been affected by a policy framework in which the central bank maintains an active monetary policy to curb inflationary pressure. At the same time, the government remains non-Ricardian, doesn't adjust taxes and expenditures, and keeps issuing debt to stay solvent. Pakistan experienced a high inflation period, with low growth rates of 0.3 percent in FY2022-23 and 2.38 percent in FY2023-24 in this active monetary (AM) and active fiscal (AF) policy pairing.

1.2. Research Problem

Monetary and fiscal policies jointly determine the price level in an economy. Monetarists believe that inflation is everywhere a monetary phenomenon, but the Fiscal Theory of Price Level (FTPL) offers a contrasting view. FTPL suggests that in fact, fiscal policy is a key determinant of price level. The FTPL posits that price levels adjust to ensure that the Present Value of Budget Constraint (PVBC) holds, balancing the real value of government debt with expected future surpluses. In other words, if government liabilities increase or surpluses decrease, the price level would need to rise to reduce the real value of liabilities and maintain the PVBC.

Pakistan's fiscal policy has generally been dominant for most of the period since 1977 (Shaheen, 2012) and has been insensitive to monetary policy stance. When Fiscal authorities prevent adjusting the taxes or expenditures in response to active monetary policy the price level rises until PVBC holds. Fiscal dominance and persistent budget deficits stem from multiple factors, particularly the political economy of budgeting. Governments often face strong pressure to provide subsidies and expand spending in order to satisfy constituencies, which undermines fiscal discipline. Although a statutory debt ceiling of 60 percent of GDP exists, public debt has consistently exceeded this limit, reflecting weak enforcement of fiscal rules. In addition, soft budget constraints allow governments to revise budgets frequently, introducing new expenditures or tax measures multiple times within a fiscal year. Together, these dynamics erode credibility, weaken commitment to fiscal sustainability, and contribute to chronic fiscal imbalances. So, an increase in the nominal interest rate intended to control inflation by monetary policy increases the debt burden for the government. With the pegged interest rate rule, the government is allowed unlimited debt monetization (Bassetto, 2008).

Empirical evidence shows that the money supply growth rate, government borrowing, and exchange rate depreciation are the main drivers of inflation in Pakistan. A 10 percent increase in money supply adds 80 basis points and a 10 percent increase in government borrowing adds 100 basis points to the average inflation rate (Jalil, 2021). Pakistan exhibits statistically significant relationship between money growth and budget deficits (Batool, et al., 2024). Thus, an increase in money supply due to fiscal demand despite an active monetary regime would fail to control inflation. Pakistan's inflation is more of a fiscal phenomenon than a monetary one and originates from finance of fiscal deficits from bank borrowing (Agha & Khan, 2006). Furthermore, monetary policy is ineffective in controlling inflation (Chaudhry & Chaudhry, 2006). Previous studies confirmed the FTPL but did not differentiate between active/passive policy regimes nor examine coordination effects. This study fills that gap by identifying regimes through Markov Switching model and incorporated the time periods of coordinated policies in a VAR framework as dummy, thus capturing how inflation responds differently under coordinated versus uncoordinated policies.

In 2022 the government of Pakistan passed the amendment to the SBP Act, and the government is restricted to direct borrowing from the SBP and will borrow from alternate sources at market-based interest rates, which will increase the cost of borrowing for the government and increase in nominal

interest rate activates the FTPL. While foreign sources offer borrowing at a low interest rate, it comes with the risk of widening the current account deficit. An independent central bank follows an inflation-targeting regime, which has implications for the fiscal side, as an increase in interest rate raises the real value of government liabilities, the general price level will rise so the real value of the debt declines. The central bank of Brazil influenced by price stability in 1980s worsened the inflationary situation because of fiscal effects of monetary policy, the fiscal policy because of tough budgetary situation, in which large portion of budget was reserved for debt servicing (Loyo, 1999). The FTPL will be held through a non-Ricardian fiscal regime despite the level of central bank independence (Eusepi & Preston, 2011). An active stance by the monetary policy of SBP to control inflation also hurts domestic output and is highly sensitive to monetary policy shock (Shahid, Qayyum, & Malik, 2017). While the FTPL highlights fiscal dominance, institutional constraints such as weak enforcement of the Fiscal Responsibility and Debt Limitation (FRDL) Act, frequent political cycles, and revenue mobilization challenges limit the feasibility of fiscal consolidation in Pakistan. These institutional weaknesses explain why monetary tightening often fails to stabilize prices in practice.

The prior literature in Pakistan has studied the FTPL, which we have discussed in section 2.4, but our study primarily focuses on identification of the monetary and fiscal policy regimes through Markov Switching (MS) model. We create a dummy variable of coordinated macroeconomic monetary and fiscal policies through the regimes identified by MS model. The classification of monetary and fiscal policy pairings, such as Active Monetary (AM)/Passive Fiscal (PF), Passive Monetary (PM)/Active Fiscal (AF), and others is theoretically grounded in the literature on policy interactions. If fiscal policy is unresponsive to the level of debt and does not adjust the taxes fiscal policy is active (non-Ricardian) and the under passive fiscal policy (Ricardian) the government adjust the revenues in response to the level of debt (Leeper, 1991). Similarly, an active monetary (AM) policy strongly responds to inflation by raising nominal interest rates and passive monetary (PM) policy weakly responds to inflation (Sorger, 2005). An active fiscal policy will determine the price level regardless of the central bank independence, and to achieve price stability prudent fiscal policy is necessary (Eusepi & Preston, 2011).

When government follows an active fiscal policy that creates fiscal dominance in which fiscal policy influences the decisions of monetary policy, it is a threat to the central bank independence

(Leeper, 2023). An active monetary policy coupled with a passive fiscal policy (Ricardian) helps control inflation by dampening aggregate demand. However, if fiscal policy is active (non-Ricardian) in nature, and the autonomous central bank remains committed to price stability, an increase in interest rates raises the cost of debt servicing. To remain solvent, the government may respond by issuing additional debt instead of adjusting future primary surpluses. This behavior can activate the FTPL, as a result the price level adjusts to ensure the real value of debt sustainable. As the objective of central bank autonomy is to achieve price stability will be compromised.

1.3. Research Questions

1. Can active and independent monetary regime ensure price stability in Pakistan's economy, particularly when the government is running fiscal deficits?
2. How does the inflation rate respond under a regime of coordinated macroeconomic policies?

1.4. Research Objectives

1. The main objective of the research is to examine the interactions between monetary and fiscal policy in determining price levels in Pakistan's economy.
2. This study examines the impact of coordinated policy regime to inflation.

1.5. Explanation of the Key Terms

- Active fiscal policy is non-Ricardian; it does not adjust taxes to stabilize public debt.
- Passive fiscal policy is Ricardian; it adjusts taxes to ensure debt sustainability.
- Active monetary policy responds strongly to inflation by raising nominal interest rates more aggressively than passive policy, giving greater weight to inflation than to the output gap.
- Passive monetary policy reacts less forcefully to inflation and places relatively more emphasis on stabilizing the output gap.

1.6. Significance of Study

The key contribution of this research is its empirical application of the Markov-Switching model in the case of Pakistan, providing a structured framework to assess how policy alignment or misalignment affects price stability. The innovation of this study lies not only in applying the Markov-Switching approach but also in introducing a coordination dummy that empirically

identifies the role of fiscal-monetary alignment. While earlier studies established the FTPL in Pakistan, they largely ignored how regime shifts, and coordination episodes alter inflation dynamics. The study's inclusion of coordination of macroeconomic policies as a dummy variable highlights the role of policy alignment in achieving the objective of price stability in a developing economy with recurring fiscal deficits. The findings highlight the importance of coordination among macroeconomic policies. AM coupled with PF or PM coupled with AF is a suitable pairing for Pakistan, and the effectiveness of SBP's autonomy depends on fiscal coordination for macroeconomic stability.

1.7. Organization of Study

The study is structured as follows: Chapter 2 reviews the existing literature on FTPL, policy coordination, Central Bank Independence, and related empirical evidence from Pakistan. Chapter 3 outlines the study's theoretical base, while Chapter 4 describes the time series methodology. Chapter 5 presents and explains detailed empirical results. Finally, Chapter 6 offers policy recommendations and concludes the study.

Chapter II: Literature Review

2.1. Introduction

Monetary and fiscal policies are the key tools of governments to influence macroeconomic outcomes. Monetary policy is managed by central banks to control money supply, adjustment of interest rates to achieve the objective of price stability. Fiscal policy on the other hand is driven by government decisions regarding taxation and public spending. Literature on interaction of monetary and fiscal policy has been widely studied that underscores the importance of coordination between them, when their objectives regarding inflation and output are different. The dominance of either fiscal or monetary is better. Agreement about inflation and output targets results in monetary-fiscal symbiosis, yields optimal points despite disagreements about the relative weights of objectives (Dixit & Lambertini, 2001).

According to monetarists “inflation is always and everywhere a monetary phenomenon”. However, this is true under the assumption of Ricardian equivalence. (Eusepi & Preston, 2018) shows the fiscal foundation of inflation which is based on imperfect information. Under the imperfect information the Ricardian assumption doesn't hold which implies that the level of public debt and its composition matters for inflation. The higher duration of the debt produces the wealth effects that increase the aggregate demand results in higher price level. This weakens the intertemporal impact of monetary policy thus to anchor inflation expectations more aggressive monetary policy is required. (Sargent & Wallace, 1981) showed that, in monetarist economies where money base has close link with the price level, when the government is allowed to increase the revenues by seignorage, monetary policy may temporarily curb inflation by contraction but lose control over long run inflation due to persistent fiscal deficits. If the expectations come into play, expected inflation impacts demand for money, thus monetary policy contraction would fail to control current inflation.

2.2. Fiscal Theory of Price Level

In contrast to the monetarist theory in which growth rate of money supply increases the inflation, and debt is not inflationary until it is not monetized the FTPL argues that both the quantity of money and the level of government debt set the price level in an economy, inflation reduces the value of both. When the fiscal policy is unresponsive to debt, the unanticipated monetary policy contraction raises the nominal interest rate, leads to higher real debt and lowers the real balance,

and the price level adjusts. If taxes in future increase with the increase in real debt, then the monetary contraction lowers the current inflation and vice versa (Leeper, 1991). Similarly, (Sims, 1994) argued that price level can't be determined alone by monetary policy. Fiscal policy also plays an important role in determining the price level through people's belief regarding value of fiat currency. Ramsey optimal approach used by (Cardani, et al., 2020) to show strong fiscal backing is favorable relative to the condition where only central bank alone concerned with the price stability using inflation target. Policies under which fiscal authorities accommodate monetary policy, fiscal disturbances are unable to influence the equilibrium prices and interest rates (Aiyagari & Gertler, 1985).

FTPL was criticized by (Buiter, 2002) due to the assumption of monetization of debt by the central bank, although if central bank follows money supply rule instead of an interest rate rule, then monetization of debt is not possible and non-Ricardian theory would become inconsistent. However, (McCallum & Nelson, 2005) argue that the increase in general price level in non-Ricardian fiscal policy is due to an increase in bond stock even if the money supply is fixed. This conflicts with traditional monetary theory, that expects an increase in prices is due to increase in money supply. Fiscal policy plays an important role in determining price levels through issuance of bonds.

Policymakers need to understand determining factors of inflation. The government must stabilize debt to enable monetary policy to target inflation. Alternatively, when the government issues nominal bonds the roles of monetary and fiscal policy are reversed as proposed by conventional view, monetary policy stabilizes debt through setting the nominal interest rate and fiscal policy determines inflation (Leeper & Walker, 2012). When the government expands debt by issuing bonds, fiscal policy is key determinant of price level (Gordon & Leeper, 2006). At fiscal limit further government stabilize debt by raising price level and monetary policy determines the trade-off between current and future inflation rates (Leeper, 2013).

Coordination among monetary policy and fiscal policy is important to achieve objectives. In Sweden and Switzerland monetary policy could not achieve the targeted inflation rate, despite lower interest rates to accelerate inflation because fiscal policy was rule based (Leeper, 2016). This indicates the limitations for monetary policy without fiscal backing. Similarly, (Bianchi & Ilut, 2017) argues that when fiscal policy is leading, and unresponsive to debt stabilization, fiscal

deficits generate long lasting and continuous impacts on inflation, in such case monetary policy loses its control over inflation targeting. If monetary policy tries to lower the inflation rate by raising nominal interest rates without fiscal backing it will fail to achieve its target.

2.3. Central Bank Independence (CBI)

There's a central question in political economy: what decisions should be made by politicians that has generally a shorter tenure in office who are motivated to make discretionary policies and what decisions should be passed on to bureaucrats that spent a larger duration in the office? The modern theory of central bank independence has its intellectual roots in the time inconsistency problem, an agent with rational expectations perceives a discretionary policy and behaves accordingly (Kydland & Prescott, 1977; Barro & Gordon, 1983) that creates inflation bias and results in accelerated Philips curve. To remove the inflation bias in monetary policy due to time inconsistency (Rogoff, 1985) proposed to appoint a central banker who is more conservative and put more weightage on inflation stability than the output. Early approaches to anchor expectations included medium term targets in the US and UK in the 1980s and exchange rate targets in Europe.

(Parkin & Bade, 1978) construct the first CBI index. All the following works (Alesina, 1989; Grilli, et al., 1991; Cukierman, et al., 1992; Alesina & Summers, CBI, 1993) moved away from the Bade-Parkin approach of classifying and ranking central banks. These alternate measures are mostly focused on de-jure independence of central banks in industrialized nations. The most widely used CBI index is that of (Cukierman, et al., 1992).

Central banks independence is closely related to inflation targeting (IT), an independent central bank related to lack of coordination between macroeconomic policies, also impact the effectiveness of monetary policy (Qanas & Sawyer, 2024). Empirical evidence from inflation-targeting economies illustrates the varied outcomes of adopting IT. (Ball & Sheridan, 2004) find weak support for IT's effects in advanced economies while emerging economies demonstrate more positive outcomes (Batini & Laxton, 2007; Gonçalves & Salles, 2008). (Brito & Bystedt, 2010) suggest that IT does not have significant impact in emerging market economies, but IT may perform better with less independent central banks. (Shareef, Sultan, & Sheikh, 2024) find that more autonomy of State Bank of Pakistan leads to more macroeconomic stability and less inflation volatility.

(Bhat, et al., 2023) utilized ARDL technique to find the long run relationship between central bank independence and fiscal deficits in India, results showed that the increase in central bank independence index (CBI) levels lead to reduction in fiscal deficits. However the CBI impact on fiscal deficits highly dependent on political system, in democracies the CBI level has been effectively contained fiscal deficits but in non-democratic countries like Russia, Venezuela, and Belarus it doesn't effectively perform the function of inflation control because it also depends on institutional setup (Bodea & Higashijima, 2015). The strong negative correlation between inflation variability and CBI was observed in advanced economies but no correlation to be found between real variables and CBI (Alesina & Summers, 1993). Another study for 17 Latin American countries with the historical record of 100 years de-facto central bank independence give evidence of strong negative association between inflation and CBI, also with the increase in CBI the likelihood of high inflation episodes falls (Jácome & Pienknagura, 2022). (Bedikanli, 2018) used panel data for 31 OECD countries the results showed that higher CBI have negative impact on inflation. The higher level of CBI in developing countries is associated with a lower rate of inflation (Garriga & M. Rodriguez, 2020).

2.4. Empirics from Pakistan

Pakistan government exploits different sources to finance its deficit. Bank borrowing is more inflationary in case of Pakistan as compared to non-banking borrowing. (Ali & Khalid, 2019). As per (Agha & Khan, 2006) who used Johansen cointegration analysis for data of FY 1973 to FY 2003, inflation in Pakistan is more explained as fiscal phenomena, it originates from bank borrowing to finance budget and fiscal deficits. (Shahid, Qayyum, & Malik, 2017) used dynamic stochastic general equilibrium model to investigate the monetary and fiscal policy interaction in Pakistan, results show that fiscal policy shocks have impact on inflation, and monetary policy also affect fiscal policy, fiscal discipline is important for effective monetary policy. Fiscal policy is inflationary in Pakistan and budget deficits are positively related to seigniorage suggest active non-Ricardian regime. The changes in monetary policy stance affect inflation and output (Shaheen, 2013). Similarly, (Batoool et al., 2024) used ARDL by combining monetary and fiscal variables for period 1971 to 2020 and found a long run relationship between money growth and fiscal deficits and between inflation and money creation in Pakistan.

Inflation is a complex process in which fiscal side along with monetary and supply side factors contributes (Raza & Mughal, 2022). The study of (Shah, Ali, & Ziad, 2021) used the ARDL method in their study and the empirical evidence shows that fiscal policy is less effective in the long run and public debt to output ratio is positively related to policy rate. Active monetary policy reduces inflation, public debt and depreciation of currency. Positive shocks in fiscal spending have a much greater impact on inflation rate during fiscal dominant regime, to escape inflation volatility prudent fiscal authorities need to stabilize debt and monetary policy to target inflation (Choudhri & Malik, 2012; Sharif & Nawaz, 2024) . (Akram & Rias, 2011) used VAR to analyze the impact of monetary and fiscal policies and found that interaction of both policies determines the price level in Pakistan. (Hussain, et al., 2020) confirmed the FTPL in Pakistan using NARDL technique in the long run, and reducing the government expenditures would help in price stability.

2.5. Policy Coordination

Coordinated policies can achieve more favorable outcomes. Fiscal policy can contribute to reducing unemployment if it is coordinated with monetary policy (Arestis, 2015). Fiscal multipliers are significantly higher under coordination of monetary and fiscal policies than without it (Eggertsson, 2006). During the 1990's when government of Fiji was running fiscal deficits, monetary policy kept domestic interest rates low to accommodate the fiscal policy, allowed cheaper financing of deficits, that helped to insure price stability (Ali & Jayaraman, 2001). The coordination among policies in response to shock increases the speed of convergence to the steady state, bringing the economy closer to planned targets compared to outcomes from non-cooperative policy moves (Tabellini, 1986). (Dahan, 1998) emphasizes the importance of coordination, citing the budgetary implications of central bank actions and the monetary consequences of government decisions.

(Beetsma & Bovenberg, 2001) underline the need for explicit inflation targets for central banks, complemented by credible commitments from fiscal authorities to reduce debt to sustainable levels and maintain fiscal discipline. (Arby & Hanif, 2010) argues both monetary and fiscal authorities have been independent in their decisions between 1964-65 to 2008-09. On very few occasions these two authorities coordinated, but most coordinated interactions were clustered during military regimes, that can be a reason for macroeconomic stability during such durations. A monetary

policy shock interacts with fiscal policy and deteriorates the fiscal surplus in Pakistan, weak coordination among macroeconomic policies is observed (Andlib, et al., 2012; Nasir et al., 2010).

2.6. SBP's Path to Autonomy

Before financial reforms in Pakistan, there was minimal coordination between monetary and fiscal policies, and the State Bank of Pakistan (SBP) lacked operational independence. During 1973-1990, weak budgetary discipline led to high domestic borrowing, resulting in a debt structure with administratively controlled yields. The government offered low returns on securities to banks while providing higher returns on national savings schemes, misaligning monetary policy. Fiscal demands dictated both the quantity and price of domestic credit.

The 1990s brought significant changes in monetary and debt management. Amendments to the Banks (Nationalization) Act of 1974 in 1997 ended the government's exclusive right to establish banks, while changes to the Banking Companies Ordinance (BCO) of 1962 enhanced SBP's supervisory role. The 1994 amendment to the SBP Act of 1956 institutionalized coordination by forming the Monetary and Fiscal Policies Coordination Board (MFPCB), tasked with aligning fiscal, monetary, and exchange rate policies. The Board included key government and SBP officials. Secretary Finance Division was also a part of SBP's board and had voting rights. In 1997, further reforms dissolved the Pakistan Banking Council, transferring its functions, assets, and liabilities to SBP, granting it greater independence. In 2002 regulations The SBP implemented measures to improve monetary policy and create market mechanisms for interest rates. This included lowering the discount rate and reducing yields on Treasury Bills (IMF, 2004).

The 2012 amendments expanded SBP's role to include financial market operations, foreign exchange reserves management, and setting minimum reserve requirements for banks. It also reinforced SBP's autonomy by prohibiting external influence from any authority and entity. Moreover, the 2015 amendment introduced an independent Monetary Policy Committee (MPC) to formulate and recommend monetary policy, comprising the Governor, senior executives, board members, and external economists appointed by government. The MPC gained authority over monetary policy, including interest rates and government borrowing limits. Until 2021 the tenure of governor of the SBP was 3 years which could be extended for another 3 years.

In 2021, further amendments to the SBP Act of 1956 prohibited government borrowing from SBP, except for specific refinancing facilities. The MFPCB was abolished, and a new coordination mechanism between SBP and the government was introduced. Additionally, SBP officials were granted legal immunity for actions taken in good faith. The federal government retained authority to appoint and remove deputy governors and MPC external members. SBP was given the clear mandate of price stability as its primary objective, without any prejudice to primary objective, the secondary and tertiary objectives include financial stability and support of general government economic policies respectively. The governor of SBP now serves a five-year term, up from the previous three years can also be extended once.

Chapter III: Theoretical Base

3.1. Monetarist Arithmetic

At the most basic level, monetarism is reduced to $MV=PY$, if velocity is constant and output is exogenous, then the money supply determines the price level, and central banks control the money supply, and are responsible for price determination. In this case, there is no need for coordination between the policy authorities. An increase in nominal interest rate lowers aggregate demand, which as a result suppresses inflationary pressure. This is true under the assumption of Ricardian equivalence when the government adjusts the primary surpluses by raising tax revenue, reducing government spending, or both. In a simple cash in advance model explained by (Canzoneri, et al., 2010) where households maximize their utility

$$U_t = E_t \sum_{j=t}^{\infty} \beta^{j-t} u(c_j) \quad (3.1)$$

where c_t is consumption, β is the discount factor, and E_t represents expectations. Each time-period is further divided into two exchanges, the financial exchange and goods exchange, for detail see (Canzoneri, et al., 2010), the households face cash in advance constraint $M_t \geq P_t c_t$ for goods exchange, and implying the need for money for transactions. The financial constraint is given by

$$[M_{t-1} - P_{t-1}c_{t-1}] + I_{t-1}B_{t-1} + P_t y = M_t + B_t + P_t \tau_t \quad (3.2)$$

where B_t is nominal government bonds, I_t is the gross nominal interest rate, y is the fixed household endowment, and τ_t is a lump-sum tax. The cash in advance constraint faced by government is

$$M_t = P_t(c_t + g) = P_t y \quad (3.3)$$

In this model the government spending (g) is constant, and velocity is also constant. Since the government spending is constant the Euler equation is

$$1/\beta = I_t E_t [P_t/P_{t+1}] \equiv R_t \quad (3.4)$$

R_t is gross real interest rate which is linked to discount factor. The consolidated budget constraint of the government in financial exchange is

$$I_{t-1}B_{t-1} = S_t + B_t + (M_t - M_{t-1}) \quad (3.5)$$

Where S_t is primary surplus. In real terms the above equation becomes

$$1/\beta b_{t-1} = s_t + b_t + [m_t - m_{t-1}(1 + \pi_t)] \quad (3.6)$$

After applying transversality condition the PVBC becomes

$$d_t = (1/\beta)b_{t-1} = K_{cb,t} + K_{gov,t} \quad (3.7)$$

Where $K_{cb,t} \equiv y \sum_{j=t}^{\infty} \beta^{j-t} \pi_j$ and $K_{gov,t} \equiv \sum_{j=t}^{\infty} \beta^{j-t} s_j$. According to (Sargent & Wallace, 1981) unpleasant monetarist arithmetic if central bank makes a first move and set the path for π_j then government must raise the primary surplus to insure $d_t - K_{cb,t} = K_{gov,t}$. In this scenario, the monetarist definition of inflation is satisfied and $P/P = M/M$. However, if the government makes the first move and sets the path s_j then sooner or later central bank must provide the seigniorage to insure $d_t - K_{gov,t} = K_{cb,t}$. In this case the central bank faces a trade-off between current and future inflation.

3.2. FTPL

(Sargent & Wallace, 1981) assumed real government bonds but FTPL assumes nominal government bonds, PVBC can be expressed differently since both money and bonds are nominal. Then the government liabilities at the start of the period in financial exchange is $A_t \equiv M_{t-1} + I_{t-1}B_{t-1}$ then the equation (3.5) can be written as

$$a_t = \beta a_{t+1} + [(i_t/I_t)m_t + s_t] \quad (3.8)$$

Where small subscripts represent the real government liabilities, real primary surplus and $(i_t/I_t)m_t$ is real seigniorage.

$$a_t = (M_{t-1} + I_{t-1}B_{t-1})/P_t = \sum_{j=t}^{\infty} \beta^{j-t} [s_j + (i_j/I_j)m_j] \Leftrightarrow \lim_{T \rightarrow \infty} [\beta^T a_{t+T}] = 0 \quad (3.9)$$

The value of the real bonds is determined at the start, while the value of nominal bonds is not predetermined but it fluctuates with the price level. The real value of government debt changes with the change of price level in the economy. The proponents of the FTPL emphasize that PVBC is a valuation equation, and equation is an identity rather than the behavioral equation and necessary for equilibrium to hold. The separation of the tax revenues and seigniorage leads to the PVBC as

$$M_{t-1} + I_{t-1}B_{t-1}/P_t \equiv a_t = K_{cb,t} + K_{gov,t} \quad (3.10)$$

Where $K_{cb,t} \equiv \sum_{j=t}^{\infty} \beta^{j-t} (i_j/I_j)y$ and $K_{gov,t} \equiv \sum_{j=t}^{\infty} \beta^{j-t} s_j$. If the central bank and government move independently of PVBC, price level will increase to satisfy the PVBC. FTPL depends on the supply of nominal bonds, since government control the supply, the fiscal policy has key role in determining price level.

Expectations regarding the government policies determine the expected returns on both real and nominal assets. Fiscal policy and monetary policy jointly determine the level of inflation. Under certain conditions either the quantity theory of money (QTM) or fiscal theory of price level (FTPL) prevail. Ricardian fiscal policy when there's no debt expansion and money printing to finance deficits (seigniorage) in QTM will prevail, and in non-Ricardian fiscal policy when money demand is satisfied at the pegged nominal interest rate to finance the government deficits FTPL will emerge. When the government expenditures are financed by tax revenue and monetary policy performs its conventional function QTM will emerge. When government finance budget deficits thorough bonds (debt expansion) fiscal policy will determine the price level. The conventional roles of monetary and fiscal policy are switched in non-Ricardian regime, fiscal policy determines price level by lowering real value of debt and monetary policy stabilizes debt by adjusting nominal interest rate.

Chapter IV: Data & Methodology

4.1. Data

Table 1: Definitions and Sources of Variables

Variables	Definition	Source
SBP Post 2022 Reform (ϕ_t)	Dummy variable, 1= post 2022 SBP reform otherwise 0.	
Coordination (θ_t)	Dummy variable, constructed after Regime Identification.	
Inflation Rate (π_t)	$\pi_t = \left(\frac{CPI_t - CPI_{t-1}}{CPI_{t-1}} \right) \times 100$	IFS
Output Gap (y_t^*)	Calculated through HP filter using annual Real GDP, till FY 2015-16 and quarterly onward.	(Kemal & Arby, 2004) & PBS
Reverse Repo Rate (r_t)	SBP ceiling rate of interest rate corridor.	SBP
GDP Growth Rate (Y_t)	Annual real GDP growth rate converted to quarterly, and quarterly onward FY 2015-16.	MoF & PBS
Tax Revenues to GDP Ratio (t_t)	$t_t = \frac{\text{Total Tax Revenue}}{\text{Nominal GDP}}$ Annual data series is converted to quarterly.	MoF
Government Expenditures to GDP ratio (g_t)	$g_t = \frac{\text{Government Expenditures}}{\text{Nominal GDP}}$ Annual data series is converted to quarterly.	MoF
Debt to GDP ratio (b_t)	$b_t = \frac{\text{Total Public Debt}}{\text{Nominal GDP}}$	MoF
Growth Rate in Total Public Debt (d_t)	$d_t = \log(\text{Total Debt}_t) - \log(\text{Total Debt}_{t-1})$	MoF
Exchange rate (er_t)	PKR per USD.	IFS

This study utilizes quarterly data from the year 1980Q2 to 2024Q2 while data of some variables are available on a quarterly basis such as inflation and reverse repo rate. Variables that have annual frequency such as debt to GDP ratio, government expenditure to GDP ratio, tax to GDP ratio is converted to quarterly frequency by using (Chow& Lin, 1971) methodology. The output gap is calculated by using real GDP from 2 sources (Kemal & Arby, 2004) and Pakistan Bureau of Statistics (PBS) and converted to the base year of 2015-2016. The annual frequency transformed to quarterly frequency and then output gap is estimated using HP filter.

The coordination dummy is derived using a Markov Switching model. While fiscal policy regime data is available from the 1980s, consistent data for monetary policy, specifically the reverse repo rate is only available from 1991Q1. Using an interest rate proxy was avoided, as the Markov Switching Model would interpret it as a structural break in the series, potentially biasing regime identification. Another dummy variable is used for the additional analysis post SBP reforms in 2022Q1. The remaining variables are standard macro time series. We use quarterly data for Pakistan 1991Q1–2024Q2 because of data limitation. Debt growth is the log differenced (which is \approx growth rate) in public debt. GDP growth is real GDP growth (% change). Inflation is the quarterly inflation rate (CPI growth). Reverse repo rate is used as monetary policy stance. Data for the analyses is gathered from 4 sources that include SBP, Ministry of Finance (MoF), PBS and International Financial Statistics (IFS). The definitions and sources of data are mentioned in Table 1.

4.2. Methodology

This study aims to identify monetary and fiscal policy regimes under simple Markov Switching model. After the identification of the regimes, incorporate the θ_t in time periods when policies remained coordinated into a Vector Autoregressive (VAR) model.

4.2.1. Markov Switching Model

The use of MS models in the current study is theoretically and empirically sound in examining dynamic interaction between monetary and fiscal policy. Linear models usually assume linear policy behavior through time, which is not realistic when reflecting economic policy changes. In contrast, MS models allow for regime changes, enabling the identification of different policy stances like active and passive monetary and fiscal policies and their transition over time. Such a

specification corresponds to the theoretical framework provided by (Leeper, 1991), who stressed the importance of policy regime combinations for macroeconomic determination. Empirical studies have demonstrated the efficacy of MS models in capturing policy regime shifts. For example, (Davig et al., 2006) applied an MS framework in modeling monetary and fiscal policy interactions with the implication of regime change to understand the determinants of policy effectiveness. (Bianchi, 2012) applied an MS-VAR model in exploring the U.S. economy with the conclusion that incorporating regime shifts offers better understanding of macroeconomic dynamics. (Kim & Nelson, 2017) have used MS models to apply to U.S. monetary policy and shown that changes in regimes impact policy analysis and forecasting significantly.

The model involves analyzing macroeconomic policies through MS framework. This approach introduces a latent (unobservable) regime variable S_t , m regimes can be identified, but we are assuming two regimes for each policy, to characterize regime-switching dynamics, m regimes can be identified for each state, the model uses different specifications to describe the observed behavior of macroeconomic variables. This allows the identification of distinct policy regimes, such as active and passive monetary or fiscal policy.

$$y_t = \begin{cases} \alpha_0 + \beta_x S_t^1 x_t + \varepsilon_t, & S_t = 1 \\ \alpha_0 + \beta_x S_t^2 x_t + \varepsilon_t, & S_t = 2 \end{cases} \quad (4.1)$$

Where $\beta_x S_t$ are regime specific responses and ε_t is i.i.d $N(0, \mu^2)$ The state variable S_t evolves according to a first-order Markov process, with the transition between states defined by the probabilities:

$$P = \begin{pmatrix} P(S_t = 1|S_{t-1} = 1) & P(S_t = 2|S_{t-1} = 1) \\ P(S_t = 1|S_{t-1} = 2) & P(S_t = 2|S_{t-1} = 2) \end{pmatrix} = \begin{pmatrix} P_{11} & P_{12} \\ P_{21} & P_{22} \end{pmatrix} \quad (4.2)$$

where $p_{ij}(i, j = 0, 1)$ denote the transition probabilities of $S_t = j$ given that $S_{t-1} = i$ are the probabilities of transitioning from state i to j . The Markov process ensures that the probability of being in a specific state depends only on the previous state, not on earlier periods.

Monetary and fiscal policy reaction functions are based on the study of (Davig & Leeper, 2011) who integrates Markov-switching rules for U.S. monetary and fiscal policies into dynamic stochastic general equilibrium (DSGE) model with nominal rigidities, allowing for an analysis of government spending effects under different policy regimes AM/PF, PM/PF, PM/AF, AM/AF to

empirically test for the case of Pakistan for policy interaction. Pakistan fiscal policy is Markov process (Ali & Ahmad, 2020) and the monetary policy in developing countries follows Markov process (Nain & Kamaiah, 2020).

4.2.1.1. Monetary Policy Specification

An active monetary regime responds to inflation and raises the nominal interest rate in this Regime-Switching Taylor-Type Rule and passive monetary regime only weakly responds to inflation.

$$r_t = \alpha_0 (S_t^M) + \alpha_\pi (S_t^M) \pi_t + \alpha_y (S_t^M) y_t^* + \alpha_{er} (S_t^M) er_t + \sigma_r (S_t^M) \varepsilon_{rt} \quad (4.3)$$

Where r_t is nominal interest rate, π_t inflation, y_t^* output gap, er_t is exchange rate and S_t^M represent the monetary regime. We add the er_t in baseline model as exchange rate depreciation and growth in import prices also impact inflation in Pakistan (Jalil, 2021; Chaudhry & Chaudhry, 2006).

4.2.1.2. Fiscal Policy Specification

An active fiscal regime/ non-Ricardian regime that is not responsive to the debt levels, taxes are not adjusted by government to stabilize debt. The government ensures the solvency by raising the inflation rate, declining the real debt liabilities. A Passive fiscal regime is Ricardian where government adjusts taxes and spending to stabilize the debt.

$$t_t = \gamma_0 (S_t^F) + \gamma_b (S_t^F) b_{t-1} + \gamma_g (S_t^F) g_t + \gamma_y (S_t^F) y_t^* + \sigma_\tau (S_t^F) \varepsilon_{\tau t} \quad (4.4)$$

Where t_t is tax revenues to GDP ratio, b_{t-1} lagged debt to output ratio, g_t government purchases to output ratio, y_t^* output gap and S_t^F indicates the fiscal regime.

4.2.2. The Vector Autoregressive (VAR)

To estimate the dynamic responses in inflation, VAR model is utilized where a policy coordination dummy along with debt growth, GDP growth, inflation, and interest. The vector of endogenous variables (in the order used) is $\theta_t, d_t, Y_t, \pi_t$ and r_t . The coordination dummy (θ_t) is a binary indicator of fiscal-monetary regime: it equals 1 in periods when the monetary and fiscal authorities' actions are "coordinated" (specifically, when one of the two Leeper-identified equilibrium regimes holds) and 0 otherwise. Following (Leeper, 1991) policy-regime framework, we set the dummy to 1 if either (a) monetary policy is active and fiscal policy is passive (Ricardian) or (b) monetary policy is passive and fiscal policy is active. In practice, this captures the two regimes that yield

determinate outcomes according to FTPL theory. All other times (when the authorities do not fit these consistent pairings) the dummy is 0. Intuitively, “active monetary + passive fiscal” is the classic monetary-dominant (Ricardian) regime and “active fiscal + passive monetary” is the fiscal-dominant (non-Ricardian) regime.

We estimate the VAR in levels (or growth rates) despite potential non-stationarity. The handling of nonstationary variables in VAR models remains debated. (Sims, 1980) argued that differencing nonstationary variables can potentially remove valuable long-run information in the data. He maintains that VAR models, particularly when used for structural analysis and forecasting, should be estimated in levels to preserve dynamic interdependencies. Likewise, (Enders, 2008) highlight that the key role of VAR analysis is not to find efficient parameter estimates but to study interrelationships between variables. We estimate the VAR with variables at level or growth rates even though π_t series have unit roots at 5% but stationary at 10% for ADF test, as it is calculated by growth in consumer price index (CPI), but other unit root tests show stationary at level like Phillips–Perron (PP) and KPSS test at 5%. Y_t after quarterly transformation becomes non-stationary and r_t is also non-stationary variable. The stability condition of the VAR model when performed at level was tested through the Roots of the Characteristic Polynomial test. Eigenvalues confirm that all eigenvalues lie within the unit circle, indicating that the VAR system is stable, results are provided in the appendix.

The VAR is unrestricted, treating all these variables symmetrically with no priori restrictions imposed.

$$X_t = A_0 + A_1X_{t-1} + A_2X_{t-2} + \cdots + A_pX_{t-p} + u_t, \quad t = 1, 2, \dots, T \quad (4.5)$$

where:

- $X_t = [x_{1t}, x_{2t}, \dots, x_{nt}]'$ is the vector of endogenous variables,
- A_0 is an $n \times 1$ vector of intercepts,
- A_j for $j = 1, \dots, p$ are $n \times n$ matrices of autoregressive coefficients,
- u_t is an $n \times 1$ vector of reduced-form residuals with $E[u_t] = 0$ variance-covariance matrix Σ_u .

Each equation regresses the current variable on its own lags and on lagged $\theta_t, d_t, Y_t, \pi_t$ and r_t . We include the θ_t , the dummy variable as endogenous regime-shift indicator in each equation so that it can affect levels of the macro variables. (Dueker, 2005; Monnet, 2014) has used dummy variable as endogenous that regressed on its own lags in VAR. The optimal lag length of 2 is selected by using Schwarz Information Criterion (SIC) and ensure residuals are well-behaved. No restrictions are imposed, allowing the VAR to capture any feedback between $\theta_t, d_t, Y_t, \pi_t$ and r_t regime dummy.

Impulse-Response functions (IRF) and analyzed the response of macroeconomic variables to one standard deviation shock in these variables. How the shock of one standard deviation shock impacts the other variables, if the shock of one standard deviation in debt generates the positive response of inflation, this would imply that FTPL holds in Pakistan, and if the shock in monetary policy stance generate negative response in inflation, would imply the effectiveness of monetary policy in inflation control.

Finally the forecast error variance decomposition (FEVD) is performed for inflation and other variables which explains how much of the forecast error variance of inflation and GDP growth rate is attributable to shocks in each variable. Of special interest is the share of inflation variability explained by debt-growth shocks versus interest rate (monetary) shocks. If inflation forecast error is largely due to shocks in debt growth, that indicates a fiscal/FTPL channel: large debt changes translate into price changes (wealth effect). If inflation variance is dominated by interest shocks, that suggests monetary policy (interest) is the main driver of inflation, consistent with Ricardian/monetary dominance.

Policy Coordination Regime θ_t Interpretation

Through the inclusion of the θ_t , we can examine differences across regimes. We compute IRFs and variance decomposition. The expected IRFs to reflect more textbook outcomes: stability in debt in coordination, because the fiscal policy tries to stabilize debt or monetary policy stays passive when the fiscal policy is non-Ricardian. The expected response of inflation to coordination of macroeconomic policies to be negative, as the coordination of policies either activate the QTM in which monetary policy can determine inflation, or the fiscal policy can determine inflation, but

monetary policy stays passive, which helps the fiscal policy with lower debt servicing cost that result in lower fiscal deficits.

Our methodology estimates the model with quarterly VAR of five variables: a Leeper-style coordination dummy θ_t and d_t, Y_t, π_t, r_t . The estimated model is with 2 lags of each variable (no restrictions) and focuses on the dynamic responses and variance decompositions of this system. The θ_t indicate the time periods of “active–passive” policy alignment (monetary-active/fiscal-passive or fiscal-active/monetary-passive). Impulse-response functions then show how fiscal shocks d_t and monetary shocks r_t, π_t propagate in each regime, revealing whether π_t and Y_t behaves in a Ricardian or non-Ricardian manner. Variance decompositions for inflation in particular indicate whether debt shocks or interest shocks dominate price fluctuations.

While other studies like (Agha & Khan, 2006; Hussain, et al., 2020) emphasize fiscal dominance, (Shahid et al., 2017) using DSGE modeling showed that monetary policy shocks can temporarily affect inflation but remain ineffective without fiscal backing. These differences suggest that methodology matters: while ARDL and cointegration studies highlight long-run fiscal roots of inflation, regime-switching and DSGE approaches capture short-run policy interactions. This justifies the choice of Markov Switching incorporated in VAR in this thesis.

Chapter V: Empirical Results and Interpretation

As a first step, we summarize the descriptive statistics for all variables in the study (mean, standard deviation, minimum, maximum). Table 2 contains the descriptive stats after quarterly transformation of data by (Chow & Lin, 1971) method.

Table 2: Descriptive Statistics after Quarterly Transformation

Variable	Mean	Std. Dev.	Min	Max
GDP Growth Rate	1.01	0.54	-0.424	2.24
Growth in Total Debt	1.458	0.835	-0.821	3.81
Inflation Rate	9.59	6.097	1.637	34.48
Reverse Repo Rate	12.106	4.181	6.25	23.0
Nominal GDP (billion)	5717.597	6271.847	389.558	27598.02
Tax Revenue(billion)	539.221	609.858	32.839	2645.14
Govt Exp(billion)	1055.038	1232.968	66.677	5344.55
Tax to GDP Ratio	2.245	0.2	1.887	2.74
Govt Expenditure to GDP Ratio	4.20	0.576	3.09	5.14
Total Public Debt	3718.001	4527.65	210.20	18138.77
Debt to GDP Ratio	14.74	2.11	10.59	19.42
Real GDP	5933.27	2184.34	2856.9	10025
Output Gap	0.032	1.302	-3.33	2.92
Exchange Rate	87.66	60.19	22.24	291.16

The GDP growth rate averages 1.01% with a standard deviation of 0.54, ranging from -0.42% to 2.24%. This indicates relatively stable growth with only modest fluctuations. Growth in total debt is higher, averaging 1.46% with an SD of 0.83, and varies between -0.82% and 3.81%, showing that debt generally rises but sometimes contracts.

Inflation is much more volatile, averaging 9.6% with an SD of 6.1, and ranging from 1.64% to 34.5%. This wide spread reflects Pakistan's history of both low inflation periods and episodes of very high inflation. The reverse repo rate averages 12.1% with an SD of 4.2, moving between 6.25% and 23%, which indicates significant but controlled shifts in policy rates over time.

Nominal GDP averages PKR 5717 billion with a very large SD of 6272, ranging from 390 to nearly 27,600 billion, showing sustained long-run growth. Real GDP, at an average of 5933 billion (SD 2184), ranges from 2857 to 10,025, also reflecting steady expansion but with less extreme variability.

Fiscal aggregates in absolute terms are large and variable: tax revenue averages PKR 539 billion (SD 610, min 33, max 2645) and government expenditure averages PKR 1055 billion (SD 1233, min 67, max 5345). However, when expressed relative to GDP, these are much more stable: the tax-to-GDP ratio averages 2.25% (SD 0.20) and government expenditure-to-GDP averages 4.2% (SD 0.58).

Public debt averages PKR 3718 billion with a large SD of 4528, ranging from 210 to over 18,000, indicating a rising debt burden. Yet, the debt-to-GDP ratio is more contained, averaging 14.7% (SD 2.1) within a range of 10.6%–19.4%.

The output gap is close to zero on average (0.03) with moderate variation (SD 1.30), fluctuating between -3.3 and 2.9, consistent with normal cyclical swings. Finally, the exchange rate averages PKR 87.7 per USD with high variability (SD 60.2), ranging widely from 22.2 to 291.2, capturing both stable phases and sharp devaluations.

This chapter presents the empirical evidence on Pakistan's macroeconomic dynamics, estimated through a series of Vector Autoregressive (VAR) models. The focus is on understanding the implications of public debt, monetary policy stance, and monetary-fiscal coordination regime for inflation. Regime-shift indicator is central to this analysis: the θ_t , capturing the presence of macroeconomic coordination in the macroeconomic policy framework (Leeper, 1991). In the first

section the results of the Markov Switching for identification of fiscal and monetary policies are discussed. In the second section, the results of VAR models are discussed.

5.1. Policy Regimes

5.1.1. Fiscal Policy

To estimate the Markov Switching model for estimating active and passive fiscal policy regimes we used t_t (tax revenues to GDP ratio) as dependent variable and b_{t-1} , g_t and y_t^* as independent variables. All the variables are stationary at first difference $I\sim(1)$ except output gap, output gap is stationary at level $I\sim(0)$.

Table 3: Markov Switching Model of Fiscal Policy

Variable	Regime 1	Regime 2
	Estimate (Std. Error)	Estimate (Std. Error)
Intercept (S)	-0.0180*** (0.0033)	0.0016 (0.0049)
lag_debt_to_GDP (S)	-0.0414** (0.0127)	0.0542** (0.0183)
gov_exp_ratio (S)	0.4106*** (0.0372)	0.1366** (0.0505)
Output_Gap (S)	0.0091** (0.0030)	-0.0211*** (0.0047)

Note: Standard errors in parentheses. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Table 3 reports the regime-dependent estimates. For Regime 1, the coefficient on the lagged debt-to-GDP ratio is -0.0414 (statistically significant at the 0.1% level), meaning that a higher debt burden lowers the tax-to-GDP ratio by about 0.04 percentage points. This negative sign implies that fiscal policy does not respond to higher debt by adjusting taxes, as would be expected in a non-Ricardian regime where sustainability of debt is not guaranteed by tax adjustment.

In contrast, in Regime 2 the estimated coefficient of lagged debt-to-GDP ratio is 0.0542 (statistically significant at the 1% level), suggesting that the higher value of debt-to-GDP ratio increases the tax-to-GDP ratio by 0.05. Such positive adjustment is consistent with the Ricardian

fiscal policy that counters debt accumulation through boosting tax revenue, in Ricardian regime government ensures debt stabilization by adjusting primary balance budget.

$$P^F = \begin{bmatrix} 0.93 & 0.07 \\ 0.06 & 0.94 \end{bmatrix}$$

The estimated probability transition matrix for fiscal policy indicates that if fiscal policy is in Regime 1, there is a 93% probability it will still be in the same regime in the following period and a 7% probability of moving to Regime 2. On the other hand, if the economy is in Regime 2, there is a 94% probability that it will remain there and just a 6% that it will move back to Regime 1. This suggests that once a fiscal policy regime is in place, it tends to persist over time with only a small probability of switching.

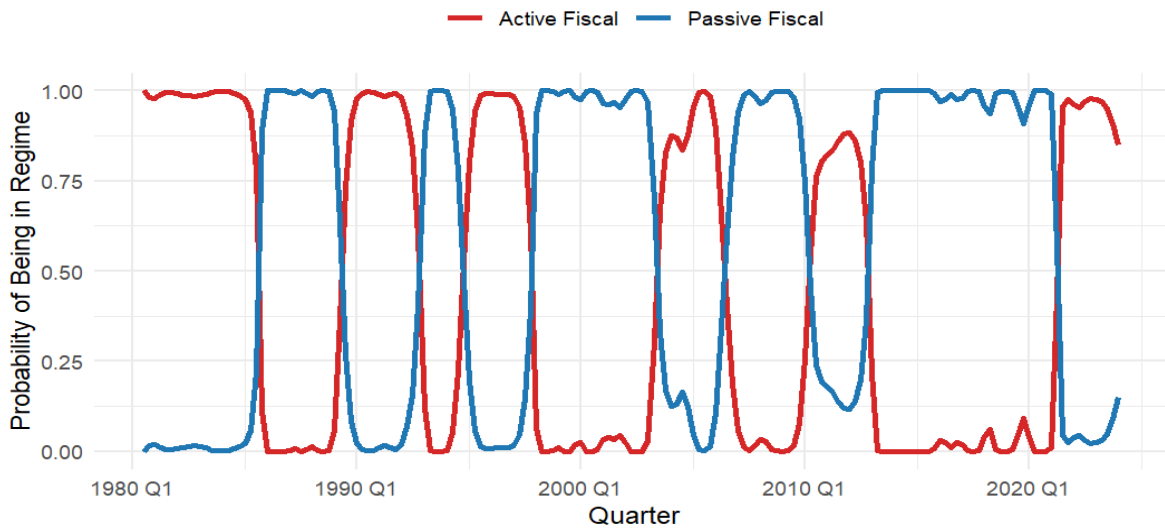


Figure 2: Smoothed Regime Probabilities of Fiscal Policy

5.1.2. Monetary Policy

To estimate the Markov Switching model for estimating active and passive monetary policy regimes we used reverse repo rate as dependent variable as tool of monetary policy that responds to π_t , y_t^* and er_t as independent variables. To estimate the model, all variables are used at $I \sim (0)$, because these are the rate of change, to estimate the meaningful monetary regime for analysis we used $I \sim (0)$.

Table 4: Markov Switching Model of Monetary Policy

Variable	Regime 1	Regime 2
	Estimate (Std. Error)	Estimate (Std. Error)
Intercept (S)	10.91*** (0.49)	4.63*** (0.37)
Inflation_rate (S)	0.68*** (0.047)	0.35*** (0.04)
Output_gap (S)	-0.29 (0.18)	-0.38* (0.15)
ex (S)	-0.04*** (0.0046)	0.03*** (0.004)

Note: Standard errors in parentheses. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Table 4 reports the regime-dependent estimates. For Regime 1, the coefficient on inflation is 0.68 (statistically significant at the 0.1% level), suggests that the central bank increases the policy interest rate by 0.68 percentage points when inflation rises by one percentage point. This indicates a comparatively stronger inflation response in Regime 1 than in Regime 2. The output gap coefficient is -0.29 , which means monetary policy is not as responsive to output gap as to inflation pressures in this regime, as would be expected with a more aggressive anti-inflationary policy. Although the monetary policy in Pakistan even in active regime does not follow the Tylor rule requirement that the nominal interest rate rise more than one-for-one with inflation to stabilize the price level see (Malik & Ahmed, 2010).

In contrast, in Regime 2 the estimated coefficient of inflation is 0.35 (statistically significant at the 0.1% level), suggesting that the monetary policy responds to inflation by increasing policy rate but about half less than the regime 1. In regime 2 monetary policy also assigns more weightage to output gap, regime 2 is identified as passive monetary policy regime.

$$P^M = \begin{bmatrix} 0.97 & 0.03 \\ 0.04 & 0.96 \end{bmatrix}$$

The estimated probability transition matrix indicates that if monetary policy is in Regime 1, there is a 97% probability it will still be in the same regime in the following period and a 3% probability

of moving to Regime 2. On the other hand, if the economy is in Regime 2, there is a 96% probability that it will remain there and just a 4% that it will move back to Regime 1. This suggests that once a monetary policy enters the regime, it tends to persist over time with only a small probability of switching.

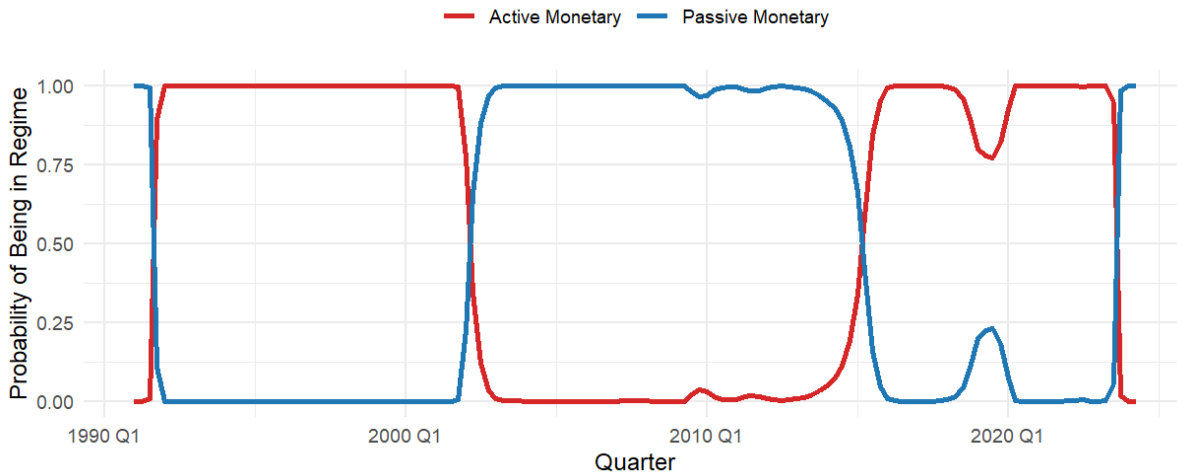


Figure 3: Smoothed Regime Probabilities of Monetary Policy

Regime Identification through Markov Switching model monetary policy is more dominant relative to fiscal policy in the case of Pakistan. Our results are consistent with (Shah, Ali, & Ziad, 2021), they used max-min and min-max criteria for Pakistan the same results were observed in Indonesia (Kuncoro & Sebayang, 2013).

5.2. Baseline VAR

In the baseline VAR model, the order of the variables in the model is d_t, Y_t, π_t, r_t . The baseline model does not include the θ_t . We select the optimal lag length for this model using SIC and using lag length of 2.

5.2.1. Dynamic Impulse Response Functions

Impulse response functions from the VAR with growth in total public debt reveal asymmetric shock transmission, d_t shocks have a contractionary effect on Y_t in line with debt overhang, crowding out channels and increased macroeconomic uncertainty. Furthermore, debt shocks increase interest rates as well as inflation levels confirming the active monetary regime and increase in general price level to ensure government solvency.

The response of Y_t to debt shock is initially negative and significant and reaches its most negative point after 7 periods and dissipates after 12 periods. This is consistent with (Soyres, Reina Kawai, & Wang, 2022) that higher initial debt amplifies negative impact of debt on GDP. Optimal growth at moderate debt-to-GDP which in case of Pakistan FRDL Act sets a public debt-to-GDP ceiling of 60 percent but around half of sample period Pakistan debt exceeds the ceiling of 60 percent, excessive debt reduces growth (Reyes-Tagle & Muñoz, 2023). The response of Y_t to π_t shock is insignificant but positive that gradually builds and peaks around 7th period and dissipates after 9th period. A positive inflation shock activates the Lucas supply mechanism; firms misinterpret the increase in general price level as relative increase in prices that incentivize the producers to increase supply. Output and inflation can have the same direction (Lucas, 1972).

Shocks to r_t decline GDP growth rate and impact reaches the most negative point at period 5 and then gradually dies out around 12 period. The result aligns with monetary theory that monetary policy influence growth in short and medium terms (Mishkin, 2011). This leads to the conclusion that interest rates have a significant negative impact on growth. This means that growth pursues its usual behavior in consistency with economic theory. This is also aligned with the findings of (Zahid, 2018; Shah et al., 2021; Choudhri et al., 2015). Therefore, GDP first responds negatively to interest rate shocks but gradually recovers as the economy advances toward stabilization following the early disturbances. This indicates that contractionary monetary policy, especially in the short term, has dampening effect on Pakistan's economy.

One standard deviation shock in d_t generates positive response of inflation that is statistically significant that gradually increases and reaches peak at after 7 periods then dies out after 12th period. This implies that fiscal policy also a main determinant of inflation in Pakistan. Results are consistent with the FTPL theory and empirical studies in Pakistan see (Agha & Khan, 2006; Shahid, Qayyum, & Malik, 2017; Ahmed et al, 2014). One standard deviation shock in GDP growth initially has negative impact on inflation, reached peak in 3 periods and then start increasing, response of inflation to GDP growth shock is insignificant but the direction aligns with the economic theory. These results are consistent from the supply side theory that higher growth increase supply that decrease inflation, and this dynamic aligns with the short-run Phillips curve from the demand side, whereby fluctuations in real economic activity impart lagged effects on the inflation rate.

Shock to the interest rate has a positive effect on inflation in initial phases but around period 6, the effect crosses back towards zero and turns negative. Inflation falls below zero and remains negative until Period 10. This means the interest rate shock eventually reduces inflation, which is consistent with standard monetary theory. The initial rise aligns with the studies of (Sims, 1992; Barth & Ramey, 2001) and (Javed & Munir, 2010; Irfan et al., 2025) in case of Pakistan, they argued that the country suffers from the price puzzle phenomenon, which reduces the effectiveness of monetary policy in containing inflation. However, in theory, a rise in interest rates should result in higher bank lending rates. There would be less demand for private investment overall because it is believed to be interest rate sensitive, which would lower the economy's aggregate demand. Now, if this move is based on lagging output demand, it will generally reduce inflation, even though it will require some lags.

GDP growth rate shocks to growth rate of public debt is positive though not significant and is at peak around 5 quarters then decline and turn negative after 8 quarters. The initial rise in the debt burden because the increase in GDP growth is from the aggregate demand side due to fiscal injection the government normally finances deficits through borrowing leading to increased debt servicing costs as well as less productive investment. The same is also evident in the studies of (Ahmed & Miller, 2000; Chaudary, 2018), in case of Pakistan. One standard deviation shock to inflation initially decreases the growth in total debt and reached trough in 3rd period and then turns positive till 12th quarter though the response is insignificant. Results align with the theory that inflation erodes the real value of debt; government has to pay lower real value of interest payments but in the long run the response of monetary policy to inflation increases the cost of future debt servicing. The shock in interest rate initially has a positive impact on growth of total public debt then goes negative after 6 periods, increase in interest rate increase the cost of debt serving. Results align with empirical studies in case of Pakistan see (Shah, Ali, & Ziad, 2021). Responses of growth

Ordered IRFs: Responses of GDP Growth and Inflation Rate to Cholesky One S.D. Shocks ± 2 S.E.

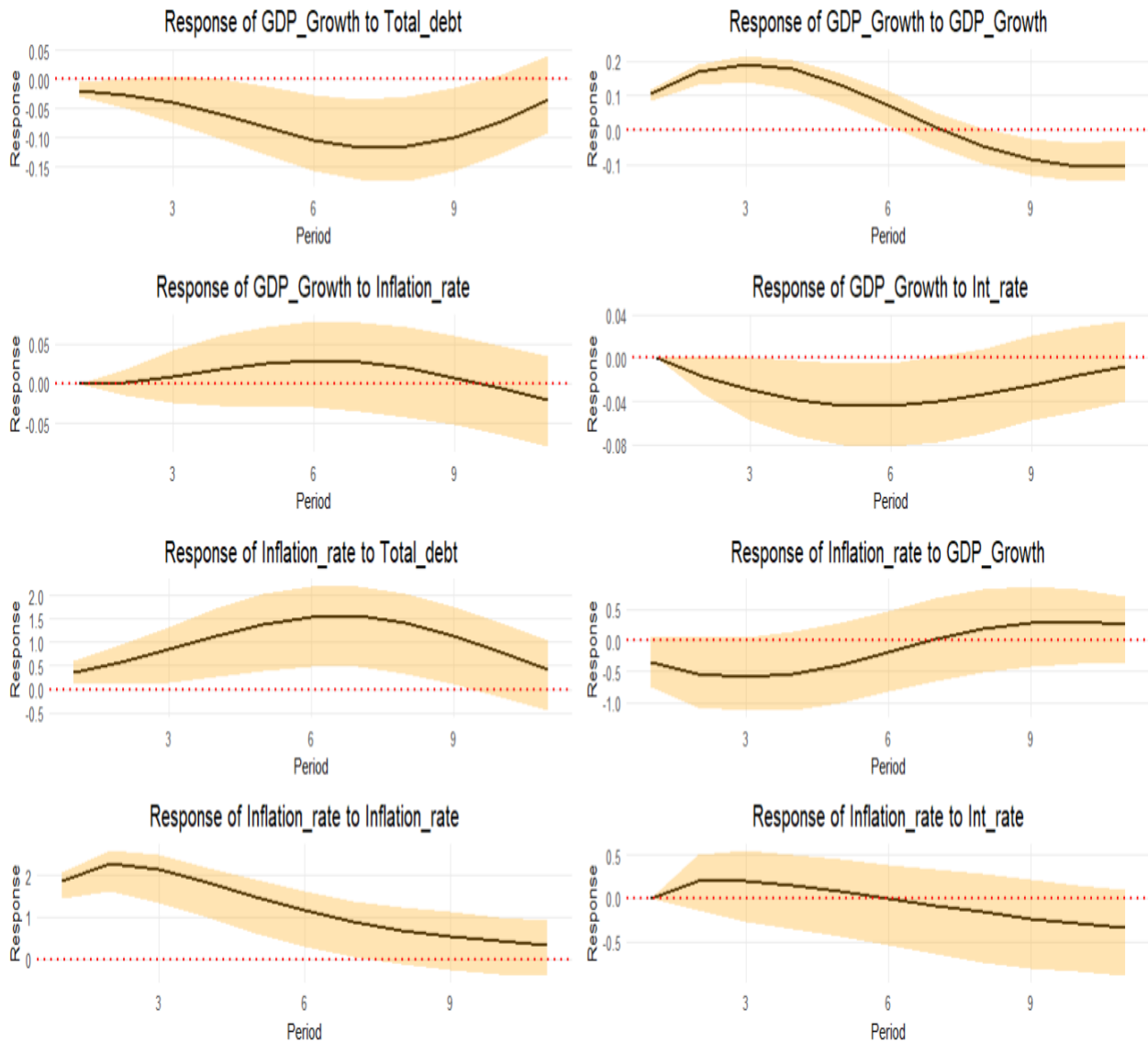


Figure 4: IRF Responses of GDP Growth Rate and Inflation Rate to Shocks

in total public to one standard deviation shocks in GDP growth rate, inflation rate and interest rate are given in appendix in Figure 6.

Monetary policy respond to debt shock is positive and significant, reaches peak in after 8 quarters and then start declining and doesn't die in 12 quarters. GDP growth shock initially has negative impact on interest rate, followed by a rise as demand side pressures mount, affirming the Taylor type rule dynamics. Inflation shocks generate pro-cyclical responses in interest rate, shows inflation-targeting behavior of monetary policy consistent with (Ali, 2020). Responses of interest

rate to one standard deviation shocks growth in total debt, GDP growth rate, inflation rate are given in appendix in Figure 6.

The impulse response results indicate that Pakistan's economy responds to debt, inflation, and interest rate shocks in directions consistent with economic theory and prior evidence. A high level of public debt hurts GDP growth through overhang and crowding out and increases inflation and interest rates as the government attempts to achieve solvency. Monetary policy stance to curb inflation slows growth in the near term but eventually reduces inflation, although a short-run price puzzle exists. GDP growth and inflation shocks do interact as predicted along supply-side and demand-side channels. The overall conclusions highlight the interaction of fiscal and monetary policies on Pakistan's macroeconomic stability. Results emphasize the importance of prudent debt management.

5.2.2. Variance Decomposition Table

Variance decomposition findings show that the growth in total debt has strong autoregressive behavior, with over 97 percent of its variance explained by its own shock even after 10 horizons. This implies that the public debt held by government in Pakistan is highly self sustaining and less than 3 percent is explained by GDP growth, inflation and interest rate combined. Such persistence indicates underlying structural issues in Pakistan's fiscal framework, including borrowing to finance budget deficits and the absence of fiscal reforms.

GDP growth own shock initially accounts for a large percentage of 97 percent variation in first horizon, but this effect diminishes over time. In the 10th horizon, the share of total debt in GDP growth shocks increases to 28.5%, illustrating a typical debt overhang effect, in which increasing debt restricts economic growth. This result is consistent with empirical research (Imran, 2016), that high debt deters investment due to crowding out and lowers overall economic activity in developing economies such as Pakistan.

The decomposition of inflation variance shows that in the short run, inflation is governed primarily by its own shock around 93 percent at horizon 1, but in the long run, the role of total debt becomes much larger, with a share of almost 36% at horizon 10. The finding emphasizes the inflationary implication of fiscal deficits, increase in public debt possibly spurs aggregate demand due to wealth effect of non-Ricardian fiscal regime. The contribution of the interest rate to inflation variation also moderately increases over time, to only 0.8 % at horizon 10. Over 10 horizons d_t

and π_t shocks matter most for explaining the unpredictability in π_t , shock in r_t explains a very little of inflation.

Lastly, variation in interest rates itself becomes increasingly sensitive to external factors over the course of the time period. It is explained by its own shocks for around 82% initially, but by the 10th quarter, this reduces to merely 28.1%. Rather, inflation accounts for 30.2% and debt accounts for 39% of the variation in interest rates. The variation in interest rate due to public debt has an impact on public debt through interest payments that can further spur inflation.

Table 5: FEVD From Baseline VAR

Horizon	Variable	Own Shock	d_t	Y_t	π_t	r_t
1	d_t	100.0	—	0.0	0.0	0.0
	Y_t	96.9	3.1	—	0.0	0.0
	π_t	92.8	3.8	3.5	—	0.0
	r_t	81.9	0.0	0.1	18.1	—
5	d_t	98.96	—	0.85	0.05	0.14
	Y_t	87.2	8.93	—	0.71	3.15
	π_t	76.6	18.1	4.9	—	0.4
	r_t	52.7	18.0	0.6	28.7	—
10	d_t	97.53	—	1.32	0.92	0.23
	Y_t	65.8	28.5	—	1.3	4.3
	π_t	59.4	35.9	3.9	—	0.8
	r_t	28.1	39.0	2.7	30.2	—

Lastly, variation in interest rates itself becomes increasingly sensitive to external factors over the course of the time period. It is explained by its own shocks for around 82% initially, but by the 10th quarter, this reduces to merely 28.1%. Rather, inflation accounts for 30.2% and debt accounts

for 39% of the variation in interest rates. The variation in interest rate due to public debt has an impact on public debt through interest payments that can further spur inflation.

The variance decomposition results validate the key macroeconomic dynamics in line with the FTPL. The high persistence of debt, explained almost entirely by its own shocks, suggests fiscal dominance where debt sustainability is achieved through inflation rather than fiscal adjustments. The increasing impact of debt on GDP growth suggests a debt overhang effect, reflecting a non-Ricardian fiscal stance that dampens economic activity. Inflation responds to fiscal shocks, indicating that the price level adjusts to ensure an intertemporal budget balance in the absence of fiscal discipline. Secondly, the growing share of interest rate variation explained by inflation and debt rather than its own shocks signals the impact of fiscal policy on monetary policy.

5.3. VAR With Coordination Dummy

Our second VAR model includes θ_t , the order of the variables in the model is $\theta_t, d_t, Y_t, \pi_t, r_t$. We select the optimal lag length for this model using SIC and using lag length of 2.

5.3.1. Dynamic Impulse Response Functions

Responses of Macroeconomic Variables to Coordinated Policies

θ_t in our model is a dummy variable. Times when the macroeconomic policies are coordinated according to Leeper's notion of regimes that yield a determinate equilibrium, either the fiscal policy is active (non-Ricardian) and does not adjust the taxes or expenditures to stabilize debt while the monetary policy is passive and does not respond to an inflation hike aggressively, or the fiscal policy is passive (Ricardian), responding to debt levels by adjusting taxes and expenditures while the monetary policy is active and aggressively responds to inflation, are set to 1; otherwise, it is zero when both policies are active or passive. When the macroeconomic policies are coordinated, the economy observes stability. In response to coordination, the GDP growth rate has an insignificant but positive response and dies out after 12 quarters. The inflation rate has a significant negative response to coordination, reaches a trough after 6 quarters, and then remains negative but does not turn positive even after 12 quarters. The response of the growth rate in total debt is also negative, though not significant, aligning with the theory that during times of coordination, the fiscal policy stabilizes debt or the monetary policy stays passive and does not burden the fiscal policy with higher debt servicing costs, thereby lowering fiscal deficits. The

response of monetary policy to coordination is also negative as the economy observes macroeconomic stability that keeps the nominal interest rate low. Our results are in line with (Arby & Hanif, 2010) in Pakistan and international literature (Tabellini, 1986; Dahan, 1998; Dixit & Lambertini, 2001).

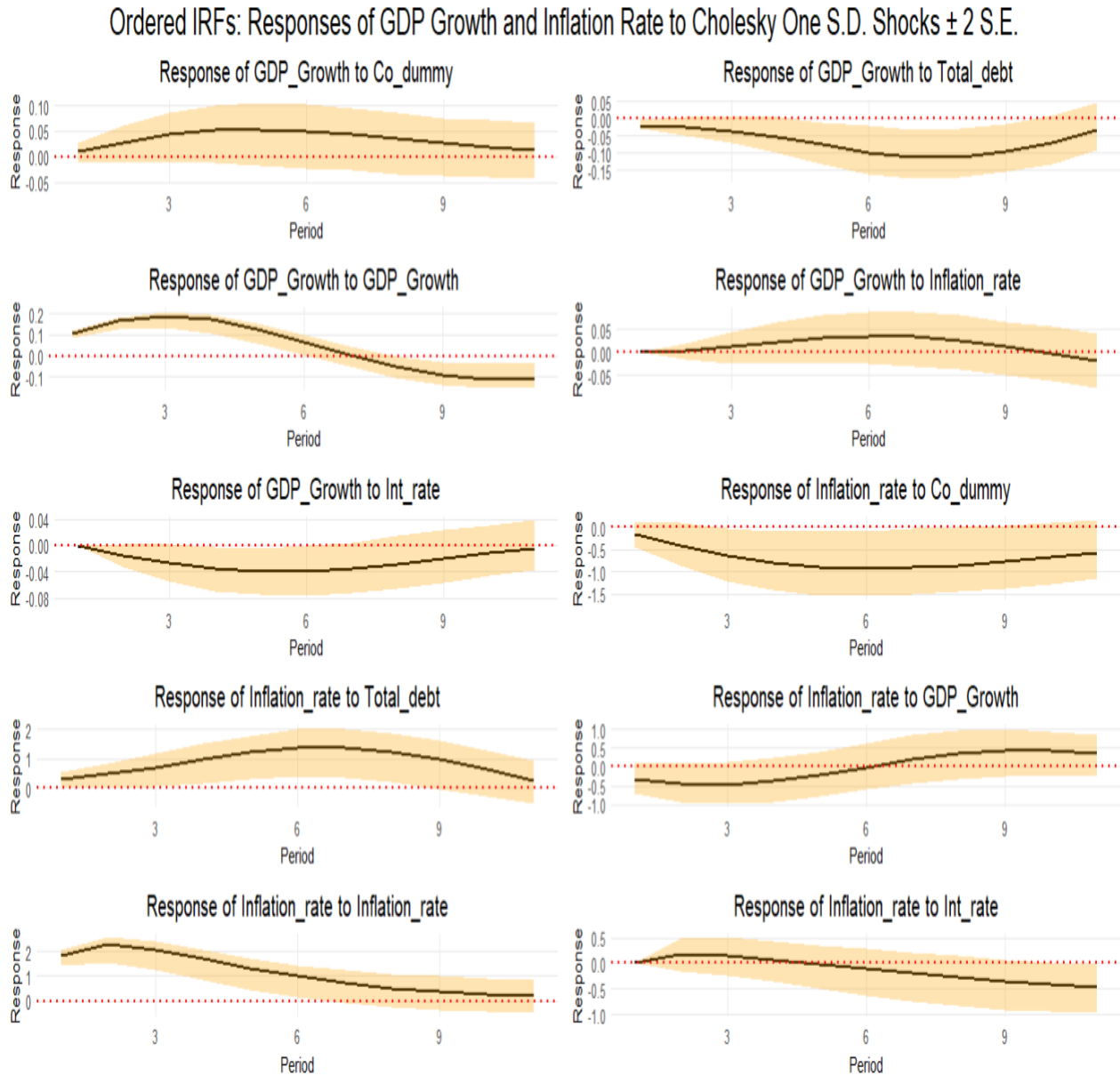


Figure 5: IRF Responses of GDP Growth Rate and Inflation Rate to Shocks With θ_t

The response of GDP growth to debt shock is initially negative and significant and reaches its most negative point after 7 quarters and stays negative till 12th periods. This is consistent with (Soyres, Reina Kawai, & Wang, 2022) that higher initial debt amplifies negative impact of debt on GDP.

Optimal growth at moderate debt-to-GDP which in case of FRDL Act sets a public debt-to-GDP ceiling of 60, excessive debt reduces growth (Reyes-Tagle & Muñoz, 2023). The response of GDP growth to inflation shock is insignificant but positive that gradually builds and peaks around 7th period and dissipates after 9th period. A positive inflation shock cause confusion in firms that took the increase in general price level as relative increase in prices, producers increase supply. Output and inflation can have the same direction (Lucas, 1972).

Shocks to interest rate decline GDP growth rate and impact reaches the most negative point at period 5 and then gradually dies out around 12 period, the response is significant till quarter 6. The result aligns with monetary theory that monetary policy influence growth in short and medium terms (Mishkin, 2011). This leads to the conclusion that interest rates have a significant negative impact on growth. This means that growth pursues its usual behavior in consistency with economic theory. This is also aligned with the findings of (Zahid, 2018; Shah et al., 2021; Choudhri et al., 2015). Therefore, GDP first responds negatively to interest rate shocks but gradually recovers as the economy advances toward stabilization following the early disturbances. This indicates that contractionary monetary policy, especially in the short term, has negative impact of Y_t .

One standard deviation shock in growth in total public debt generates positive response of inflation that is statistically significant that gradually increases and reaches peak at after 7 periods then dies out after 12th period. This implies that fiscal policy determines inflation in Pakistan. Results are consistent with the FTPL theory and empirical studies in Pakistan see (Agha & Khan, 2006; Shahid, Qayyum, & Malik, 2017; Ahmed et al, 2014). One standard deviation shock in Y_t initially has negative impact on inflation, reached lowest point in 3 periods and then start increasing, response of inflation to GDP growth shock is insignificant but the direction aligns with the economic theory.

Shock to the interest rate has a positive effect on inflation in initial phases but when Co_dummy added to the model it declines and turns negative in 4 quarters, shows early effect of interest rate in curbing inflation then models without coordination dummy. This means the interest rate shock eventually reduces inflation, which is consistent with standard monetary theory. The initial rise aligns with the studies of (Sims, 1992; Barth & Ramey, 2001) and (Javed & Munir, 2010; Irfan et al., 2025,) in case of Pakistan, they argued that the country suffers from the price puzzle phenomenon, which reduces the effectiveness of monetary policy in containing inflation.

However, in theory, a rise in interest rates should result in higher bank lending rates. There would be less demand for private investment overall because it is believed to be interest rate sensitive, which would lower the economy's aggregate demand. Now, if this move is based on lagging output demand, it will generally reduce inflation, even though it will require some lags.

GDP growth shocks to growth in public debt is positive though not significant and is at peak around 5 quarters then decline and turn negative after 8 quarters. The initial rise in the debt burden is due to the increase in GDP growth is from the aggregate demand side due to fiscal expansion the government normally finances deficits through borrowing leading to increased debt servicing costs as well as less productive investment. The same is also evident in the studies of (Ahmed & Miller, 2000; Chaudary, 2018), in case of Pakistan. One standard deviation shock to inflation initially decreases the growth in total debt and reached trough around 4th and 5th period and then turns positive till 12th quarter though the response is insignificant. Results align with the theory that inflation erodes the real value of debt; government has to pay lower real value of interest payments but in the long run the response of monetary policy to inflation increases the cost of future debt servicing. The shock in interest rate initially has a positive impact on growth of total public debt then goes negative before 6 periods due to coordination among macroeconomic policies. IRF response are given in appendix Figure 7.

Monetary policy respond to debt shock is positive and significant, reaches peak in after 8 quarters and then start declining and doesn't die in 12 quarters. GDP growth shock initially has negative impact on interest rate, followed by a rise as demand side pressures mount, affirming the Taylor type rule dynamics. Inflation shocks generate pro-cyclical responses in interest rate, show inflation-targeting behavior of monetary policy consistent with (Ali, 2020). IRF response of r_t are given in appendix Figure 7.

These results confirm that when fiscal and monetary policies in Pakistan are coordinated, according to Leeper's equilibrium conditions, the economy does better in terms of higher stability: debt growth is decelerated, inflation rate is reduced, and interest rates remain lower. The impulse responses confirm the debt overhang, debt burdens dampen growth, while inflation and interest rate shocks behave broadly as conventional macroeconomic theory. predicts. The evidence is consistent with the belief that policy coordination, fiscal discipline, and a credible monetary reaction are essential to maintaining growth and keeping inflation in check in Pakistan's economy.

5.3.2. Variance Decomposition Table

Table 6: FEVD from VAR with θ_t

Horizon	Variable	Own Shock	θ_t	d_t	Y_t	π_t	r_t
1	θ_t	100.0	—	0.0	0.0	0.0	0.0
	d_t	99.87	0.13	—	0.0	0.0	0.0
	Y_t	96.5	0.94	2.56	—	0.0	0.0
	π_t	93.36	0.75	2.92	2.97	—	0.0
	r_t	80.91	1.59	0.01	0.05	17.44	—
5	θ_t	98.95	—	0.06	0.48	0.22	0.30
	d_t	93.80	4.00	—	1.89	0.26	0.05
	Y_t	83.43	5.74	7.14	—	1.12	2.57
	π_t	74.52	8.62	13.59	3.02	—	0.25
	r_t	50.55	6.42	15.81	0.35	26.87	—
10	θ_t	94.51	—	0.23	2.78	0.94	1.53
	d_t	88.36	7.87	—	2.74	0.63	0.40
	Y_t	63.42	6.37	24.83	—	2.06	3.31
	π_t	53.47	15.00	26.76	3.51	—	1.26
	r_t	25.98	9.85	33.35	4.47	26.35	—

θ_t is an exogenous institutional setting simple policy switch. In the first horizon all its movement, 100 percent, is driven by itself. By the tenth quarter, 5.5 percent comes from spillovers from θ_t , d_t , Y_t , π_t , and r_t . Now let's turn to total debt. In the very first horizon after a debt shock, almost 99.9 percent of variance is explained by its own shock. In the 10th horizon, and debt's self-drive explains about 88.4 percent of its variance, while θ_t accounts for 7.9 percent, Y_t for 2.7 percent, and the rest is split among π_t , and r_t .

When we look at Y_t , the pattern is similar but a bit more mixed. In the first horizon, about 96.5 percent growth is explained by own shock, with roughly 0.9 percent coming from θ_t and 2.6

percent from debt. By the 10th horizon, Y_t is only about 63.4 percent explained by its own shock; d_t surges to 24.8 percent, θ_t to 6.4 percent, π_t 2.1 percent, and r_t 3.3 percent.

Inflation starts off almost entirely self-driven as well. In the 1st horizon, 93.4 percent of an inflation shock comes from inflation itself, with the remaining 6.6 percent split among θ_t 0.75 percent, debt 2.9 percent, and growth 2.97 percent. By the 10th horizon, just 53.5 percent of inflation shocks are self-generated, debt's role grows to 26.8 percent, θ_t to 15.0 percent, GDP growth to 3.5 percent, and interest rate to 1.3 percent higher than the model without θ_t .

Finally, interest rate initially driven by own shock mainly by about 81 percent, with inflation contributing 17.4 percent and θ_t , d_t , and Y_t barely registering. By the 10th horizon, only about 26 percent of interest rate is explained by own shock, debt jumps to 33.4 percent, inflation to 26.3 percent, θ_t to 9.8 percent, and Y_t to 4.5 percent. This implies that monetary policy reacts to both fiscal shocks and inflation rate.

The comparison between the baseline VAR model and the model incorporating the coordination dummy θ_t reveals that macroeconomic outcomes improve when fiscal and monetary policies are coordinated. In the baseline model, shocks to debt significantly reduce GDP growth rate and increase inflation and interest rates, confirming debt overhang and fiscal dominance consistent with the FTPL. However, when θ_t is introduced, the impulse responses show that coordinated policy regimes reduce inflation, slow debt accumulation, and stabilize interest rates. Though GDP growth rate still responds negatively to debt and interest rate shocks in both models, the inclusion of θ_t results in more muted and stable responses, indicating improved macroeconomic stability. Variance decomposition further shows that θ_t accounts for a growing share of variance in inflation and interest rates over time, reducing the dominance of own shocks and reflecting the stabilizing influence of coordinated policies. Overall, the model with θ_t highlights the benefits of policy coordination in enhancing economic resilience and controlling inflation and debt dynamics in Pakistan.

5.4. Responses from ϕ_t

Post 2022 reforms in SBP Act generate theoretically intuitive results. ϕ_t initially generates positive response of d_t for the first three quarters and then start declining and turns negative after 5 quarters. The possible reason for declining in d_t is IMF conditionality of curtaining fiscal deficits and

government effort to increase the primary balance. ϕ_t generates the negative response of Y_t , reaches trough around 6 quarters and then start increasing but stays negative for 10 quarters. The response of π_t to ϕ_t is counterintuitive, ϕ_t generates positive response in inflation, post 2022 reform the primary objective of the SBP is price stability, but it appears it does the opposite because in the sample after the amendment policies do not coordinate in most of the quarters, and both policies stayed active for 6 quarters out of 10. Pakistan experienced persistent high inflation episodes post 2022 reforms. ϕ_t generates positive response in r_t , that is expected, as the reforms grant more autonomy to SBP and monetary policy can move independently. See IRF responses of $d_t, Y_t, \pi_t, \text{ and } r_t$ to ϕ_t in appendix Figure 8.

Chapter VI: Policy Recommendations & Conclusion

6.1. Policy Recommendations

The findings underscore that Pakistan's authorities must prioritize monetary fiscal coordination for price stability. Empirical evidence shows inflation has been driven largely by fiscal imbalances (debt-financed deficits). In practice, this means that raising interest rates without fiscal consolidation will do little to control inflation. Policymakers should therefore pursue fiscal consolidation, through tax reforms, subsidy rationalization, and expenditure cuts, so that tight monetary policy can function as intended. In particular, the government should avoid excess borrowing to finance large budget deficits, since the study finds that debt-financed fiscal expansions trigger higher inflation and contribute to debt overhang. By contrast, when fiscal policy responds to rising debt with higher revenues or lower spending, inflationary pressures moderate and monetary policy can anchor expectations. In short, credible fiscal discipline is a precondition for effective inflation control.

Institutionally, the SBP's autonomy can be safeguarded only in tandem with fiscal responsibility. Recent legal reforms have strengthened de-jure SBP's independence and established an inflation-targeting framework, which is a welcome development. However, our results suggest that even a fully independent central bank cannot stabilize prices under fiscal dominance. Therefore, the monetary authority's mandate should be complemented by a formal coordination mechanism. For instance, reviving the MFPCB could help align inflation targets with budgetary rules or there should be tacit arrangement between monetary and fiscal policy to share policy and targets to align policy objectives. In practice, this means the SBP would tighten policy only when government fiscal plans are on a sustainable path. The analysis shows that in periods of coordinated policy, inflation falls significantly, and stability improves. Policymakers should thus institutionalize procedures such as joint policy reviews to lock in this alignment.

Finally, fiscal sustainability and debt dynamics demand urgent attention. Pakistan's public debt remains high and highly persistent, which feeds inflation and drags on growth. Variance decomposition shows that debt shocks explain a growing share of long-run inflation variability, and that excessive debt induces a classic overhang that depresses investment. To address this, the government should adhere to strict debt ceilings and transparently manage deficits. Enforcement of the FRDL Act, keeping debt-to-GDP below the 60% ceiling, must be ensured. Structural reforms

are essential. By restoring fiscal balance and preventing unsustainable borrowing, these measures will support the SBP's inflation target and ensure that monetary policy shocks have their intended effect.

6.2. Conclusion

This research integrates theory and empirical evidence to show that the regime context of monetary and fiscal policy is decisive for Pakistan's inflation and growth outcomes. Theoretically, following the FTPL, price stability requires that government debt be backed by credible surpluses. This implies that only two regime configurations are determinate: either a passive fiscal (Ricardian) policy with active monetary policy, or an active fiscal (non-Ricardian) policy with passive monetary policy. Pakistan's experience has often been one of active fiscal/passive monetary policy (fiscal dominance), in which case our VAR results confirm a classic FTPL result: inflation adjusts upward to stabilize debt.

Empirically, the study finds that fiscal dominance has dictated Pakistan's price dynamics. Persistent debt growth fuels inflation, while monetary tightening alone generates only a temporary price puzzle before eventually reducing inflation although the results are not significant. Simultaneously, high debt burdens create a growth drag (debt overhang). Crucially, when policy regimes are aligned (either monetary-active/fiscal-passive or the opposite), inflation falls and stability improves; conversely, misalignment maintains high inflation and weak growth. In other words, independent rate hikes are ineffective under non-Ricardian fiscal conduct.

The analysis also highlights the role of central bank independence. While SBP's legal autonomy and inflation-targeting mandate are necessary pillars of modern policy, they are not sufficient. Our findings echo that a central bank can only maintain price stability if it is supported by a sustainable fiscal framework. In Pakistan's context the lesson is clear, central bank led anti-inflation efforts will fail without prudent fiscal management. Thus, the broader implication is that macroeconomic policymaking must enforce coherent rules and institutions, aligning fiscal and monetary objectives, enforcing debt limits, and preserving SBP's credibility to achieve the twin goals of price stability and growth.

This study mainly looks at how demand side factors, such as government spending through debt financing and monetary tightening, affect inflation in Pakistan. However, it does not cover some important areas that future research could explore. One limitation is that it does not include supply

side factors, like energy price changes, productivity levels, or structural issues in the economy, which can also influence inflation. Future studies could expand the framework to include these supply side pressures along with the demand side determinants and see how they affect price dynamics when interacting with monetary and fiscal policies. Another area worth exploring is the role of the exchange rate, which has historically been used in Pakistan as a tool to control inflation. Policymakers have often tried to keep the rupee artificially strong to make imports cheaper, but this approach has long-term costs for competitiveness and inflation stability and put pressure on current account. Future research could therefore study how exchange rate management and supply side factors together shape inflation.

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Appendix

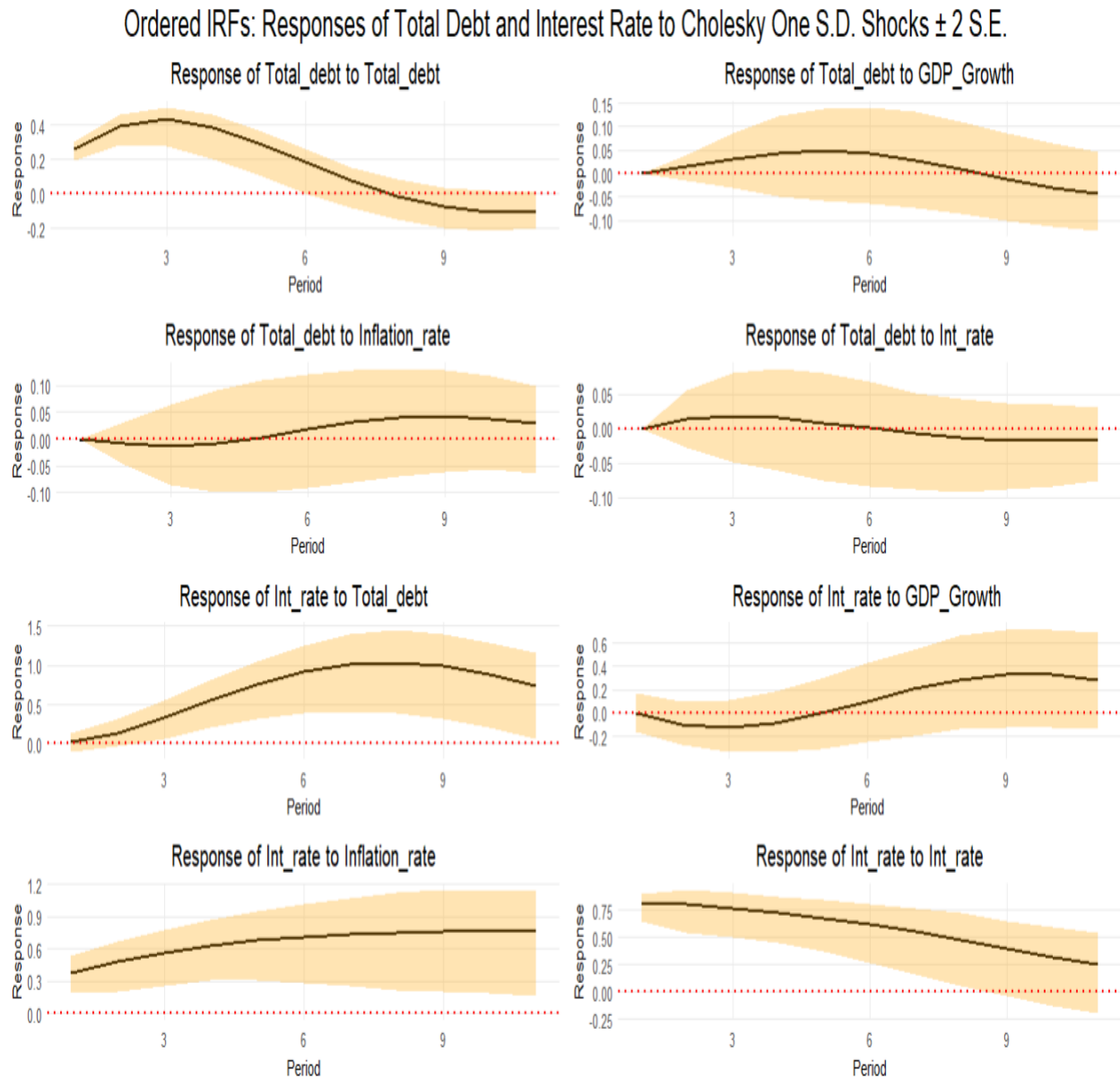


Figure 6: IRF Responses of Growth Rate of Public Debt and Interest Rate to Shocks

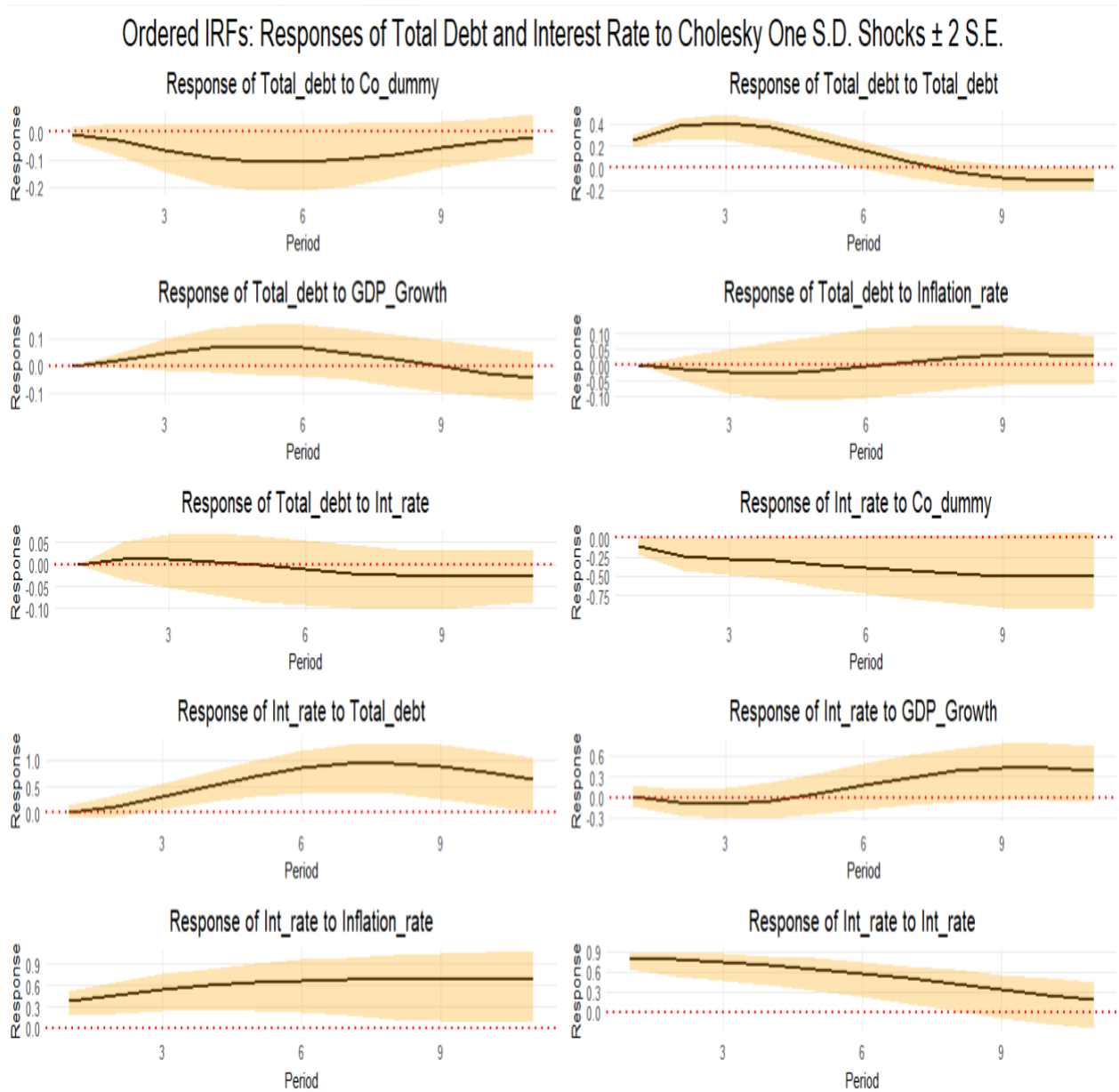


Figure 7: IRF Responses of Growth Rate of Public Debt and Interest Rate to Shocks With θ_t

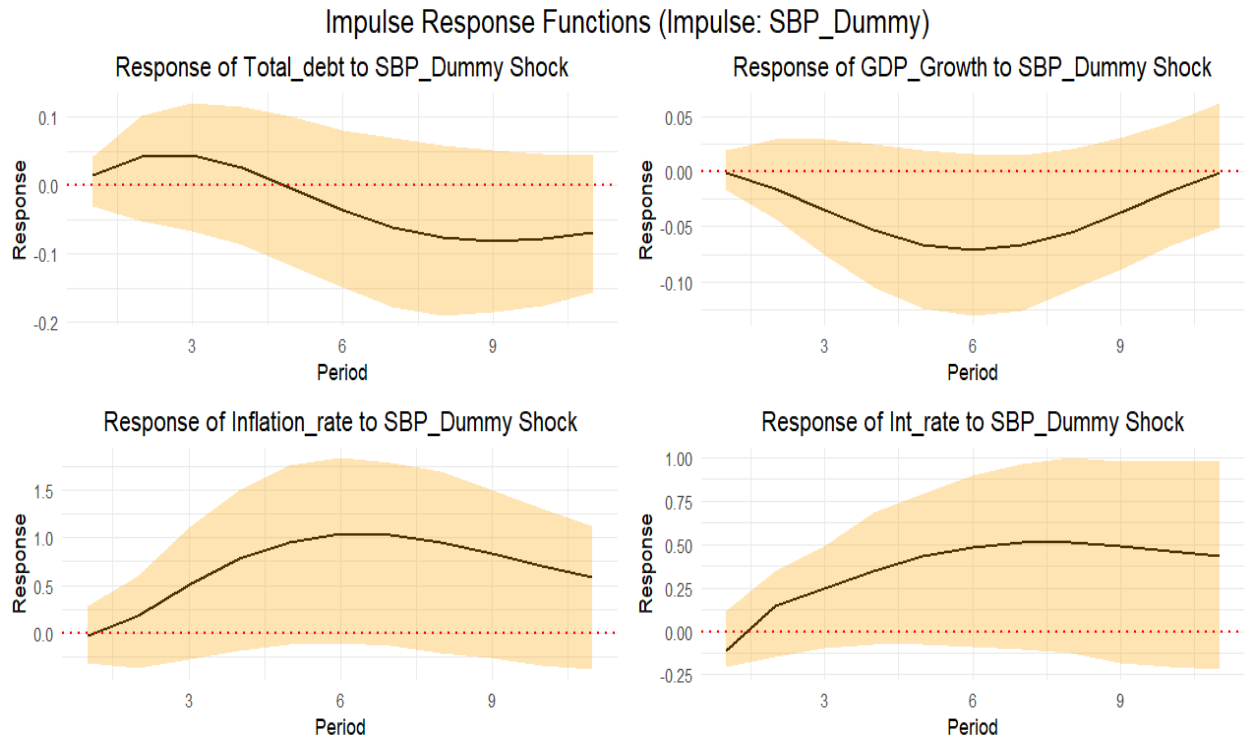


Figure 8: IRF Responses of d_t , g_t , Y_t and r_t to ϕ_t

Stability Test

[1] 0.92740476 0.92740476 0.91177419 0.91177419 0.80660328 0.80660328 0.31395254

[8] 0.05212296

Check if all eigenvalues lie inside unit circle

[1] TRUE