ROLE OF POLICY COORDINATION ON EXCHANGE RATE FLUCTUATION OF PAKISTAN

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Dedicated

To my beloved Parents and Family

whose unwavering support, countless sacrifices, and infinite love have been my foundation and inspiration. Their steadfast faith and gentle guidance illuminated my path through every challenge. This work stands as a tribute to their enduring strength and belief in me, a reflection of the love that carried me to the finish line.

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Table of Contents

Abstract

The study explores the extent to which coordination of monetary and fiscal policy has helped to reduce exchange rate volatility in Pakistan between 1980Q1–2024Q4, using quarterly macroeconomic data. Building on the Mundell–Fleming model and Dornbusch's exchange rate overshooting theory, the paper examines the role of interest rates, money supply, government spending, inflation, and foreign shocks in driving exchange rate dynamics, particularly the inflationary pressures and low growth outcomes associated with policy misalignment. Employing a Vector Autoregressive (VAR) model, along with unit root tests, Johansen and Juselius' cointegration analysis, and impulse response functions, the results show strong interdependencies: expansionary monetary policy fuels depreciation via liquidity expansion, while fiscal expansion initially strengthens the exchange rate but in the long run aggravates external imbalances. Coordination, modeled through a dummy variable, is found to stabilize inflation and output fluctuations, while U.S. interest rates emerge as key external shocks amplifying domestic vulnerabilities. The findings highlight that stability in Pakistan's exchange rate requires more than institutional alignment of monetary and fiscal goals. Policy recommendations include strengthening institutional coordination through a joint SBP–fiscal authority committee; adopting a flexible and forward-looking monetary policy framework with inflation targeting; pursuing disciplined and counter-cyclical fiscal policy to ensure sustainability; reducing external vulnerabilities through export diversification, import management, and reserve accumulation; and addressing structural constraints by improving productivity, infrastructure, and energy supply. Further, the SBP should manage the exchange rate through a credible managed float regime with targeted interventions, while advancing macroeconomic data systems and econometric modeling capacity. Finally, expanding financial inclusion and reinforcing regulatory frameworks can improve monetary transmission, reduce cash dependence, and enhance stability. On balance, coordinated and comprehensive reforms rather than fragmented measures are crucial for exchange rate resilience, investor confidence, and sustainable long-term growth.

Keywords: Monetary and Fiscal policy coordination, Johansen and Juselius (1990), Vector Auto-regression.

List of Figures

List of Tables

List of Abbreviations

BOT	Balance of Trade
CA	Current Account
CB	Central Bank
Cor	Coordination
CPI	Consumer Price Index
DD	Demand Deposits
EFF	Extended Fund Facility
ER	Exchange Rate
FCI	Foreign Capital Inflow
FDI	Foreign Direct Investment
FP	Fiscal policy
FR	Foreign Reserves
G	Government expenditure
GDP	Gross Domestic Product
IFS	International Financial Statistics
IRFs	Impulse Response Functions
LHS	Left Hand Side
LR	Long Run
MP	Monetary Policy
Ms	Money Supply
P	Domestic price
P*	Foreign Price
PBS	Pakistan Bureau of Statistics

PCI	Per Capita Income
RER	Real Exchange Rate
REER	Real Effective Exchange Rate
RHS	Right Hand Side
r	Interest rate
r*	Foreign Interest rate
SBP	State Bank of Pakistan
SFD	Saudi Fund for Development
SR	Short Run
TD	Time Deposits
TO	Trade Openness
TOT	Terms of Trade
UIP	Uncovered Interest Rate Parity
VAT	Value Added Tax
VAR	Vector Autoregressive
WDI	World Development Indicator
Y	Domestic Income
Y*	Foreign Income

Chapter 01

INTRODUCTION

1.1 Introduction

The exchange rate plays an important role in achieving better economic growth because if the exchange rate is stable, it reduces uncertainty and increases investment by providing confidence to investors in doing business, which in turn increases exports and employment in the country, ultimately boosting economic growth. While instability is harmful to the economic growth of the country, if the exchange rate appreciates, exports become expensive relative to imports, which restricts economic growth and development in the country (Zamir et al., 2017). Moreover, in the South African Development Community, there is an overvaluation of REER, which results in limited financial markets, and the study suggests there is a dire need for more policy coordination for economic and financial sustainability (Zerihun et al., 2016). Hence, to achieve exchange rate stability, effective coordination between monetary and fiscal policy is essential.

However, challenges arise as official bodies often design and implement monetary and fiscal policies independently, each focusing on distinct objectives. Fiscal policy aims to promote growth stability, while monetary policy prioritizes exchange rate stability, interest rate management, and price stability (Afzal, 2011).

It is also noted that if one policy is adopted independently, it will put pressure on other policies as well if the central bank adopts a contractionary monetary policy it will affect the fiscal side negatively as contraction monetary policy will increase interest rate which ultimately reduces private expenditure or investment and will affect negatively economic growth (Rao, 2019) and if

government use expansionary fiscal policy which increases the demand and ultimately inflation will rise, which will put pressure on central bank to tight monetary policy which will raise interest rate and then economic growth will reduce (Laurens and Piedra,1998) (Andlib et al., 2012).

Hence, coordination of monetary and fiscal policy is important as coordination make easier for policymakers to achieve these objectives in an efficient manner, without efficient coordination of monetary and fiscal policies result in exchange rate depreciation and many economist believed that depreciation of exchange rate is good for the economic growth of the country , as due to depreciation of exchange rate exports increase which increase employment and ultimately results in economic growth of the country (Shaheen, 2013) but in case of Pakistan depreciation of exchange rate has negative impact on economic growth, as due to depreciation, prices of imports increase and there increases inflation in the country as well, which ultimately reduce purchasing power of the people and result in excuse supply of the goods in the country (Afzal, 2011) (Laurens and Piedra ,1998) as the depreciation of the exchange rate has a negative impact on economic growth policymakers, as well as political powers, make the exchange rate overvalued, as during election periods, the government increases the value of currency or appreciates the exchange rate to get a vote (Akhtar, 2019) and to keep the exchange rate overvalued state bank intervene into foreign exchange rate market and through billions of dollars which is not only a loss of foreign exchange reserves but also has negative impact on BOP and economic growth (Rao, 2019) as due to overvaluation exports become expensive, which reduce its demand and ultimately its completion in international markets and due to reduction in demand for goods, there will be a reduction in employment in the manufacturing sector in the domestic country as well (Hamid and Mir, 2017).

Furthermore, the coordination of fiscal and monetary policies changes depending on the regime of exchange rates. In a fixed-rate regime, fiscal policy works best when capital mobility is perfect; in

a flexible-rate regime, monetary policy works best when capital mobility is imperfect; and in a mixed-rate regime, fiscal and monetary policies work together well (El-Refaie, 2001) Similarly, Pakistan has gone through multiple regimes for its exchange rate; initially, it was fixed; in 1982, it switched to a managed floating rate; and finally, in 2000, it switched to a flexible rate; however, the Pakistani currency remains inefficient (Ahmed, 2009).

It is also equally important to know which MP and FP should be adopted during a flexible exchange rate, in this respect Algozhina (2016) study shows that in the case of flexible ER, there should be an MP that targets inflation, and as far as FP is concerned, countercyclical FP should be adopted. The result also reveals that these policies will bring stability to the prices and output of the overall economy during flexible ER.

To achieve stability in the exchange rate, coordination of monetary policy and fiscal policy is required, and policymakers should adopt those measures that ensure stability in the exchange rate as stability of the exchange rate is also helpful for investors, and policymakers as well, and it also brings economic development, as if the exchange rate is stable is will not only reduce business uncertainty and helps the investors but also helps policymakers in formulating policies in a better way.

1.2 Problem statement

Because imports become more expensive as a result of depreciation, production costs and domestic prices rise. Additionally, people's purchasing power decreases as a result of price increases, which in turn reduces demand for exports and their completion in international markets. This vicious cycle hinders economic growth (Shaheen, 2013, Zia and Mahmood, 2013).

1.3 Objectives

- To analyze the impact of MP and FP on exchange rate by using Mundell-Fleming model and Dornbusch's exchange rate overshooting model.

1.4 Research questions

- How coordination of monetary and fiscal policy helps in controlling exchange rate

1.5 Significance of the study

The topicality of the research is in the fact that it aimed to address one of the most ancient issues of the Pakistani economy, i.e. the exchange rate variability. In developing economies like Pakistan, the central banks have a way of working; monetary policy is always geared towards achieving price stability, the exchange rate is maintained with the money of the government, and taxes are planned to be used to stimulate the economy in terms of growth and employment (Afzal, 2011). Unless this is coordinated, such policies can have a counterproductive effect and send mixed signals in the economy and cause the exchange rate to become volatile. If CB implements a contractionary MP to control inflation, but the government follows suit with an expansionary FP, inflation will increase which will result in depreciation of the currency (ER). While, on the other hand, if the CB and government work together to implement a contractionary FP, ER will remain stable and ER will not decrease.

There are several reasons why this study is important. It provides first of all, a comprehensive empirical analysis of the impacts of the monetary policy, fiscal policy, and a combination of both on the behavior of the exchange rate of Pakistan in a long-term period (1980Q1–2024Q4). The research offers the evidence of long-run and short-run relations between such variables as: money supply, interest rate, government spending, output and inflation using the newest econometric techniques such as: the Johansen cointegration test, VAR modeling, and impulse response functions. This enhances the value of macroeconomic interrelation in a country where deepening of the exchange rate has been a widespread problem.

Second, the research also contributes to the body of knowledge in that it introduces the impact of external shocks, more particularly, the U.S. interest rate and inflation, in the explanation of the exchange rate volatility in Pakistan. The susceptibility of Pakistan to foreign financial and trade environments is a flaming issue in the economy, which is increasingly becoming globalized. The results emphasize the fact that the domestic stabilization efforts are normally undermined by the external factors; hence, the alignment of the policy measures and the strategically planned action of tackling the issues is all the more significant.

Third, the policy relevance of this study is high. The study shows that the institutionalized policy coordination is not unique to a theoretical concept but also has an empirical implication. By providing a coordination variable (COR) in the empirical model, the study can determine that policy coordination also has implications, which are measured at the exchange rate stability levels, inflation control levels and output performance levels. This provides evidence-based consent to the practices of such reforms as the establishment of an integrated monetary-fiscal policy council between the State Bank of Pakistan (SBP) and the Ministry of Finance.

Finally, the findings of this study have significant implications for policymakers, researchers, and development practitioners. To policymakers, the study provides them with a practical recommendation on how to design homogeneous fiscal and monetary systems to ensure a reduction in volatility. It will assist the researchers in improving the literature on the determination of the exchange rate in the emerging economies through the revelation of the significance of coordination. The findings to the international institutions and the development partners help in developing a better picture of the structural issues facing Pakistan and therefore can be utilized to mold the aid efforts.

Chapter 02

LITERATURE REVIEW

2.1 Introduction

The stability of ER is important for any economy's development but many factors affect ER, in this context this literature review incorporates MP variables like interest rate Ms, inflation, FP variables like government expenditure, government debt, and other variables which includes foreign capital inflows, foreign reserves, TOT (terms of trade), TO (trade opens) and many others which significantly affect ER nationally and internationally as well.

2.2 Literature related to theoretical models

According to the economic theory of Mundell(1962) and Fleming(1962)model, expansionary fiscal policy appreciates domestic currency, as when government expenditure increases through debt financing, it increases the domestic interest rate, which increases capital inflows and ultimately domestic currency appreciates (Khouri, 2002). An expansionary monetary policy will depreciate the domestic currency, as when the central bank adopts the expansionary monetary policy by increasing Ms, the increase in Ms will increase spending and will decrease the interest rate which results in capital outflows and the domestic currency depreciates (Mankiw, 2010).

The literature shows different results of fiscal policy on the exchange rate, as (Castro and Fernandez, 2013) and (Cebi and Culha, 2014) show the positive impact of fiscal shocks on RER appreciation, and due to the appreciation of currency, exports become expensive, which results in a deficit of CA, hence supporting the Mundell and Fleming theory. But (Giorgio et al., 2018) show the negative impact of government spending on RER as government spending increases, RER

depreciates as the increase in government spending increases productivity and reduces cost, which ultimately reduces inflation and interest rate, resulting in ER depreciation.

The literature also supports that expansionary monetary policy will depreciate the domestic currency as (Kearns and Manners, 2018) reveal that with tight MP or an increase in the interest rate exchange rate appreciates, the research also shows that in determining the impact of MP on the exchange rate expectations also play a key role as if the expectation regarding MP shock is unanticipated then exchange rate appreciates more as compare to when MP shock is anticipated. Similarly, according to (Mathieson, 1977) when the money supply reduces which increases interest rate depends also on the expectations of people if expectations are rational then with reduction in money supply with increase in interest rate and currency appreciation but when expectations are semi rational and adaptive, the interest rate first increase sharply then reduce sharply and in case of adaptive expectations interest rate will not reduce. (Bhatti, 1997) Further shows that the NER (nominal exchange rate) of Pakistan is influenced by both present relative prices and future price expectations; hence, people's expectations are a significant factor in determining the exchange rate. Additionally, (Alberola et al., 2021) assert that fiscal regimes influence how monetary and fiscal policies affect the exchange rate. Expansionary fiscal or contractionary monetary policy causes the exchange rate to depreciate if investors think that future fiscal surplus will not be sufficient to cover the existing debt.

(Dornbusch, 1976a) developed a monetary model to explain how the exchange rate is determined by monetary variables. This model assumes that the demand and supply of money determine the exchange rate. The main premise of (Dornbusch's, 1976a) model is that changes in short-term monetary policy lead to an overshoot in the exchange rate as in short run prices are sticky. The model also states that there is a linear relationship between monetary variables and the exchange

rate. In the long run, when prices become more flexible, the exchange rate returns to its new equilibrium level. However, research disproves this theory. For example, (Chiarella, 1991) examined the effects of MP and FP on the exchange rate and found that both MP and FP significantly impact ER.

2.3 Literature related to Monetary policy variables

The depreciation of Pakistan's NER will be caused by monetary policy variables, specifically a deficit in CA. This happens when there is an excess of domestic credit, which encourages imports. Alternatively, when domestic prices rise relative to foreign prices, demand for imports also rises, and exports fall. In either case, the outcome is a deficit in CA and a depreciation of NER. While a rise in trade barriers causes NER depreciation due to higher import prices and lower export prices, research by (Raza et al., 2017) and (Zakaria et al., 2007) reveals that actual factors have a mixed effect on NER. The reduction of imports and the increase in demand for exports lead to an improvement in CA and an appreciation of NER (Zakaria et al., 2007).

An increase in foreign exchange reserves does not affect NER (Zakaria et al., 2007) because a rise in NER depreciates the Pakistani rupee or NER against its trading partners in Germany and Italy, but an increase in NER against Canada and the UK causes a depreciation of the Pakistani rupee. In a similar vein, (Afzal, 2010) looks at six Asian countries' currency rates and reserves to discover that, for Pakistan, reserves have a unidirectional causation connection with exchange rates. Furthermore, similar to how a rise in inflation and the money supply causes the Nigerian currency to depreciate, an increase in revenue causes the currency to appreciate, when it comes to the effect of MP on ER in other nations (Yaaba et al., 2012).

(Arshad and Nawaz, 2018) found that in the short run, capital inflows and currency appreciation are caused by an increase in domestic interest rates relative to foreign interest rates, but in the long run, when domestic interest rates increase relative to foreign ER, there is no change because Pakistan's financial markets don't interact internationally. Another monetary variable that affects ER is income, specifically the ratio of domestic to foreign income. This is because, as income increases, the demand for money increases, leading to an appreciation of currency. According to Khan (2010), there is a positive correlation between PCI of Pakistan and ER, meaning that as PCI rises, ER also rises, suggesting that PCI is an important factor in ER determination, alongside wealth disparity.

On the other hand, there are studies that suggest that long-term interest rates, rather than short-term ones, are the most important for determining Pakistan's NER. For example, (Aisha and Omer, 2020) looked at UIR as a means of determining the exchange rate, and they found that while interest rate differentials fluctuate in the short run (due to CB intervention), they shrink in the long run, allowing NER to be accurately determined and UIP to hold. Similarly, (Padake et al., 2016) show that LR monetary variables better explained ER variations, which is consistent with previous research showing a link between NER and LR factors like India's relative Ms and NER, relative interest rate, and relative output.

While interest rates have a positive effect on ER in the studies cited above, other studies have found the opposite to be true. For example, (Begum et al., 2020) and (Syed, 2011) found that interest rates, inflation, and foreign reserves all had a negative effect on Pakistan's real effective exchange rate (REER), while net foreign capital inflow (NFCI) and balance of trade (BOT) had a positive effect. Although both (Ali, 2016) and (Khan, 2010) find a positive association between interest rates and exchange rates, this relationship holds true in both the long and short term.

Additionally, there are other factors that contribute to the appreciation of ER. As highlighted by (Ali and Nazar, 2017), ER depreciates or the value of Pakistan's native currency rises in response to increases in foreign direct investment (FDI), trade openness (TO), foreign assistance, worker's remittances, and foreign capital inflows (FCI). Also, as (Zakaria and Ahmad, 2009) show, when the relative value of international prices rises above Pakistan's domestic price, Pakistan's ER rises as a consequence of an improvement in CA. Similarly, when productivity rises, ER rises as a result of an improvement in CA. (Calvo and Reinhart, 2002) found the susceptibility of emerging markets to US monetary policy.

2.4 Literature related to Fiscal policy variable

FP causes the ER to depreciate, while TO trade openness causes the ER of Nigeria to appreciate. (Nwosa, 2017) also shows that a rise in government debt and spending causes the ER to depreciate. Similarly, in the case of Pakistan, (Basit and Ansari, 2015) show that foreign investment is directly correlated with the exchange rate, as ER increases with an increase in foreign investment, while foreign debt is negatively correlated with the exchange rate, as ER depreciates with an increase in external debt. As a result, domestic prices rise, which raises the RER, which is the ratio of domestic and foreign prices (Freund and Gagnon, 2017).

Conversely, (Ahmed, 2009) reveals that the RER of Pakistan appreciates when government spending, TOT, and capital flows increase while RER depreciates when TO trade openness increases. Moreover, (Devereux and Purvis, 1990) reveal FP appreciates REER, the study used the overshooting model of Dornbusch as Dornbusch model mainly focuses on MP and their impact on ER but this study also suggested that FP also resulted in overshooting ER, the results of the study reveal that in the short run due to FP shock increase interest rate and ER appreciates but due to

appreciation of REER, exports become expensive which leads to decrease the demand of export and ultimately output reduce and in the long run.

Irrespective of MP and FP there are other variables that cause fluctuations in Pakistan's exchange rate which include fluctuations in foreign exchange reserves, real output, productivity, and inflation (Jabeen and Khan, 2014). Additionally, (Khan and Ali, 2015) also reveal that fluctuation in the prices of the stock markets of Pakistan also causes fluctuation in Pakistan ER. Similarly, (Ahmed et al., 2017) reveal that stock prices create significant fluctuations not only in exchange rate but also in gold prices and oil prices as well. Moreover, (Bakhsh and Khan, 2019) reveal that crude oil prices (OP) and gold prices (GP) significantly impact ER as when GP increase, ER depreciates as investors consider gold as a protective measure from uncertainty, so if any increase in GP increases the demand for gold and demand for domestic currency reduces which results in depreciation of ER and increase in OP increase the cost of production and ER depreciates as well, whereas, (Iqbal and Raziq, 2020) shows positive the relationship between crude oil prices and Pakistan ER as increase in OP leads to appreciation of ER.

2.5 Literature related to the coordination of MP and FP

Different studies show different results of the impact of MP and FP on ER some show ER depreciates or the value of domestic currency decreases with an increase in government spending or fiscal expansionary policy and some show ER appreciates or the value of domestic currency appreciates with expansionary FP as (Aretis and Sawyer, 2003) studies the impact of MP and FP on the exchange rate of Hungary and the results reveals that due to increase in interest rate foreign debt reduces which reduces capital inflows and hence ER depreciates or the value of domestic currency decrease and due to increase in government investment reduce the inflation and interest rate and increase overall productivity of the economy which ultimately result in ER appreciation

but when increase in government spending it increases inflation in the country which ultimately depreciates ER. In a similar vein, (Effiong et al., 2022) show that when government spending rises, the debt load rises as well, which lowers the value of the domestic currency and causes ER appreciation. Similarly, when government revenue rises, it lowers demand for borrowing, which causes the domestic currency to appreciate and ER to depreciate. The following studies, on the other hand, demonstrate the detrimental effects of fiscal expansionary policy on ER. (Guney, 2007) examines the relationship between monetary and fiscal policy and Turkey's real exchange rate, and the findings indicate that when the government implements expansionary fiscal policy, interest rates rise, attracting capital inflows and causing RER to appreciate. However, when MS rises, RER increases, but the effect of monetary policy on RER is negligible. While (Chinn, 1997) studies the impact of MP and FP on the RER of different international currencies, the results reveal that MP variables, such as interest rate and money supply, significantly impact RER, while FP variables, such as government expenditure and fiscal deficits, have a less significant impact, or the impact of FP is dominated by MP variables. (Siddiqui et al., 1996) reveal that both MP and real variables, such as government consumption, TOT terms of trade, TO trade openness, technological change, and NCI (net capital inflows), significantly impact RER, but when government spending increases on non-tradable goods, it increases income and the substitution effect and when the income effect is greater than the substitution effect, then RER appreciates.

Moreover, the impact of MP and FP in SR and LR differs, as (Zerihun et al., 2016) reveals that monetary policy significantly affect REER of South African Development Community in LR while, fiscal policy significantly affect REER in SR as FP has only immediate affect which remains only in SR, the study also reveals that trade policies also significantly affect ER both in LR and SR.

2.6 Comparison with the existing studies

The results of this thesis are generally consistent with the existing literature on the exchange rate determination and the policy coordination. The relevance of the monetary variables especially the money supply and interest rates is consistent with the findings of (Dornbusch, 1976a) and the further empirical research that confirms the fact that the monetary growth causes currency depreciation and inflationary pressures in the developing economies. Similar observation has also been reported in the case of Pakistan as (Hyder and Mahboob, 2006) have also found that excess money growth was reported to be one of the main reasons attributed to the depreciated exchange rate.

This is indicated by the fact that the fiscal spending is pro-cyclical, this has been confirmed by other past researchers such as (Abbas and Sgro, 2011) who observed that fiscal pro-cyclicality in Pakistan has tended to push the macroeconomic volatility rather than stabilizing it. The non-significance of the government spending at the long runs is as well consistent with (Hasan and Butt, 2008) who argued that the fiscal policy in Pakistan possess minimal independent powers due to structural deficit and debt overhang.

The findings on the external shocks, especially the significant impact of the U.S. inflation and interest rates on the exchange rate in Pakistan confirm the results of (Syed, 2011), who proved that the global interest rates changes have contractionary impacts on the small open economy of Pakistan. (Calvo and Reinhart, 2002) made similar conclusions in world literature and pointed to the susceptibility of the emerging markets to the U.S. monetary policy.

The policy coordination role, as seen in this thesis, is one of the worldly unexplored aspects of the situation in Pakistan but it is consistent with the findings of (Arestis and Sawyer, 2003) who

emphasized that uncoordinated policies are less effective in bringing about stability as compared to coordinated fiscal-monetary structures. The empirical evidence of these theoretical insights is that discussed coordinated policies can reduce volatility and increase investor confidence.

Generally, the fact that the results of this study are similar to the theoretical and empirical literature allows considering the strength of findings and the importance of integrated policy frameworks associated with the stability of the exchange rates in Pakistan

2.7 Conclusion

Various research have shown conflicting findings when it comes to the effects of FP on ER, and the majority of studies have shown that ER depreciates with expansionary MP due to a rise in the MS value of the currency, which causes ER depreciation. When government expenditure is up, some studies find that ER goes up in value, while others find the opposite to be true. Finally, research indicates that MP and FP have substantial global and domestic impacts on ER.

2.8 Research gap

Most of the existing literature on Pakistan's macroeconomic management has examined monetary policy and fiscal policy in isolation. Monetary policy studies have largely focused on the impact of money supply, interest rates, and inflation on exchange rate movements and price stability (e.g., Hyder and Mahboob, 2006). Similarly, fiscal policy research has analyzed the effects of government spending and taxation on economic growth and external balances (e.g., Abbas and Sgro, 2011; Hasan and Butt, 2008). Although these studies have offered insightful information, they have addressed the fiscal and monetary policies as independent tools instead of using them as related instruments of a larger policy system.

This distinction is troublesome since, in reality, fiscal and monetary policies are linked with each other at all times and usually produce opposite effects when they are employed separately. As an illustration, monetary tightening can be sabotaged by expansionary fiscal policy that is funded by borrowing to create inflationary pressures and depreciate the exchange rate. On the other hand, monetary policy (reduction of money supply) to control inflation can, in turn, neutralize the fiscal policy to stimulate growth, causing an inefficient monetary system and instability. Regardless of such practical realities, the impacts of policy coordination have had very minimal systematic concern in the case of Pakistan.

The second major gap in the literature concerns the limited treatment of external factors. Most domestic studies do not fully incorporate the role of U.S. interest rates, foreign inflation, and global shocks, which are especially critical for Pakistan as a small open economy with persistent current account deficits and dependence on external financing. This exclusion has contributed to inadequate explanation as to why the exchange rate in Pakistan is very volatile despite the seeming adherence to policy.

Chapter 03

METHODOLOGY, DATA AND VARIABLES

3.1 Research Strategy

This research uses a time-series econometric framework to empirically analyze the impact of monetary and fiscal policy variables on the evolution of the Pakistani currency rate. In order to capture both the short-run and long-run interactions, the study is organized into many steps. To start, we run unit root tests to make sure the variables are stationary and to find out what order to integrate them. These findings provide the groundwork for developing a strong model specification by determining the ideal lag duration using lag selection criteria. Then, we use the Johansen cointegration method to see if there are any fixed relationships between the exchange rate, fiscal policy variables (deficit, government spending, debt-to-GDP ratio), and monetary policy variables (interest rate, money supply, inflation targeting) in the long run. Lastly, to capture the dynamic short-run and long-run correlations among the variables, a Vector Autoregressive (VAR) model is estimated. The research is able to evaluate the separate impacts of fiscal and monetary policies on exchange rates as well as their possible interaction and coordination in preserving exchange rate stability because of this analytical approach.

3.2 Theoretical Framework

Mundell (1962) and Fleming (1962) model, which is the extension of the Keynesian model of IS-LM, has developed for exchange rate determination through balance of payment. For the purpose of determining the exchange rate using monetary variables, the monetary model of (Dornbusch, 1976a) has been refined; in these models, the demand for and supply of money are the two primary

factors. For the purpose of determining exchange rates, the model has been adapted from Glyfason and Helliwell (1982) to include both the goods market and the money market.

$$Y = E(Y, i) + G + CA(\frac{eP^*}{P}, Y, Y^*) \quad \text{(Goods market)} \qquad (3.1)$$

Equation (1) shows equilibrium in a good market, the LHS shows the total income and the RHS of the equation shows total expenditure, which consists of private and public consumption and current account (balance of trade).

$$Ms = L(Y, i) \qquad \text{(Money market)} \qquad (3.2)$$

$$\Delta f = CA\left(\frac{eP^*}{P}, Y, Y^*\right) + K(i, i^*) \qquad \text{(Balance of payment)} \qquad (3.3)$$

Equation (3) shows equilibrium in balance of payment.

Synthesis of the goods market and money market is given in equation (4):

$$e = f(Y, G, P^*, P, Y^*, M) \qquad (3.4)$$

3.3 Empirical Model

The literature shows that the exchange rate also depends on domestic and foreign interest rates, so r and r* are taken from the literature, and to incorporate the impact of coordination of monetary and fiscal policy, a dummy variable Cor has been used that will be estimated through (Abdel-Haleim, 2016), (Hina and Abbasi, 2021), (Arby and Hanif, 2010), to draw the Cor variable the following matrix is made,

Table 3.1: Matrix of Policy Coordination

Fiscal Policy	**Monetary Policy**	
	Contractionary	Expansionary
Contractionary	CC	CE
Expansionary	EC	EE

The study took data of two variable , government expenditure to show the impact of FP and interest rate variable to show the impact of MP, the data is taken from 1980Q1–2024Q4, 1 shows coordination and 0 shows no coordination of MP and FP , if both polices work in the same direction or if FP is adopted as expansionary fiscal policy then there is increase in government expenditure and MP is also adopted as expansionary MP then interest rate declines that shows coordination of both polices in that year, so by looking at data , Cor variable has been generated.

In the above matrix CC shows FP and MP both are adopted as contractionary, so at this point Cor is 1 and EE shows both MP and FP have been adopted as expansionary so Cor is 1, and for other two cases, CE and EC Cor is 0, as they show no coordination of MP and FP.

So the final equation will be as follow:

$$e = f(Y, G, P^*, P, Y^*, Ms, r, r^*, Cor) \qquad (3.5)$$

The relationship between the domestic income (Y) and the exchange rate is positive. When income rises, the demand for money in transactions and imports also rises. This leads to a trade balance deficit, which in turn causes the domestic interest rate to rise. To bring the trade balance to equilibrium, the interest rate increases, which increases capital inflows. However, as a result of the interest rate, demand for money decreases, which causes the domestic currency to depreciate.

Since an increase in the money supply lowers the domestic interest rate, which in turn raises private spending and domestic production, the domestic currency appreciates as a consequence of an

increase in the money supply. The money supply has a negative relationship with the exchange rate.

The relationship between the domestic interest rate (r) and the exchange rate is positive; a rise in the former causes a decline in the demand for local currency due to a decrease in its purchasing power. An increase in the foreign interest rate has a negative effect on the exchange rate because it lowers the demand for domestic currency. Since the money supply remains constant, this leads to a decrease in the domestic interest rate, which in turn boosts private spending and domestic production, which causes the domestic currency to appreciate. When fiscal and monetary policies are not in sync, the exchange rate falls; this is shown by the dummy variable Cor.

3.4 Linking Theoretical and Empirical Models

Based on these theoretical models, this paper combines the goods market, money market and the balance of payments in a single framework. It is possible to illustrate its synthesis as follows:

$$Y = C(Y - T) + I(r) + G + NX(e) \quad (3.6)$$

$$M/P = L(r, Y) \quad (3.7)$$

$$BP = f(r - r*, Y, e) \quad (3.8)$$

Y is income, r is the interest rate, G is government spending, M is money supply, e is the exchange rate, and r is the foreign interest rate.

In order to capture empirically the impact of policy coordination, a dummy variable (COR) is added. It takes the value 1 where the monetary and fiscal policies tend in the same direction (both either expansionary or contractionary), and 0 in case the policy changes in opposite directions (no coordination).

3.5. Empirical Model Specification

According to the above framework, the empirical model can be stated as:

$$ERt = f(Gt, Ms, rt, rt*, Yt, Pt, Pt*, CORt) \quad (3.9)$$

In its log-linearized form:

$$lnERt = \alpha 0 + \alpha 1 lnGt + \alpha 2 lnMs + \alpha 3 rt + \alpha 4 rt* + \alpha 5 lnYt + \alpha 6 lnPt + \alpha 7 lnPt* + \alpha 8 CORt + \varepsilon t \quad (3.10)$$

Where:

$\boldsymbol{ERt}$: Exchange rate (PKR per USD)

$\boldsymbol{Gt}$: Government expenditure (proxy for fiscal policy)

$\boldsymbol{Ms}$: Broad money supply (proxy for monetary policy)

$\boldsymbol{rt}$: Domestic interest rate

$\boldsymbol{rt}*$: Foreign (U.S.) interest rate

$\boldsymbol{Yt}$: Real GDP (domestic income)

$\boldsymbol{Pt}$: Domestic price level (CPI)

$\boldsymbol{Pt}*$: U.S. price level (foreign CPI)

$\boldsymbol{CORt}$: Policy coordination dummy

$\boldsymbol{\varepsilon t}$: Error term

3.6 Short-Run and Long-Run Identification

In the VAR system, the Johansen cointegration method is used to identify long-run equilibrium relationships between variables. A cointegrating vector suggests that non-stationary series co-move around over time, which means that there are stable long-run relationships, which is in line with economic theory. Such a long-run connection captures monetary and fiscal fundamental equilibrium exchange rate behavior.

After cointegrating, the model is re-parameterized into a Vector Error Correction Model (VECM) to impound short-run dynamics. IRFs further examine the impact of one-time policy shocks (monetary or fiscal) on exchange rate behavior in the later periods.

3.7 Data and Macroeconomic Variables

This research examines the influence of fiscal and monetary policy variables on the evolution of the Pakistani rupee exchange rate and the possible coordination effects between the two policy domains using quarterly time series data from 1980 to 2024. A variety of internal and external sources, such as the Pakistan Bureau of Statistics (PBS), the Ministry of Finance, the International Financial Statistics (IFS), and the State Bank of Pakistan (SBP) are consulted for the data.

3.7.1 Macroeconomic Variables

The exchange rate is to a great extent influenced by the movement of macro-variables. The movements of the exchange rates are not simply a consequence of the changes in the monetary and fiscal policies, but the indicator of the health of the U.S. economy and the well-being of the

rest of the world. The analysis includes a limited number of crucial macroeconomic variables (local and global) to gain a more accurate insight into volatility and policy coordination.

Domestic Income (GDP)

The more people earn the more they purchase from a foreign nation - big structures or heavy machinery and equipment, in the case of Malaysia- to raise their capacity to manufacture other products and services to be consumed by the nation. This will result in a Fall in the exchange rate. This mechanism is referred to as the Mundell Fleming framework. Understanding of how successful policy coordination is in stabilizing currency movements is also altered by changes in output.

Government Expenditure (GOVT EXP)

Currently, the government can increase demand by spending more in an effort to jump-start an economy that is slowing or has at least hit a plateau, and thereby may strain the inflation, leading to difficulty in maintaining a currency at a long-run level. Conversely, exchange-rate problems are likely to be fixed through fiscal orthodoxy and counter cyclical expenditure.

Domestic and Foreign Price Levels (CPI and CPI US)

The price dispersion is a significant factor of the competitive characteristic of something and is a significant factor of testing Purchasing Power Parity (PPP). The relationship between inflation and exchange rate is such that the higher the price rate in the country the lower the exchange rate.

Interest Rates (Domestic and Foreign)

The concept of the Interests rate Parity (IRP) has its basis on the different rates. The variations also vary with the changes in the capital flows. The period of excessively high rates on domestic

will be related to the policy of stabilizing the currency. Low or negative differentials on the other hand tend to aggravate depreciation.

Money Supply (MS and LMS)

Money supply evidences the level at which the economy is growing. Its decadence (LMS) is more logarithmic yielding a more stable series to work with in econometric estimation. According to the financial theories of exchange rate determination, money supply increasing at a high rate in the past has led to inflationary pressures consequently leading to a stage of depreciation.

Log of Consumer Price Index (LCPI)

The CPI logarithmic transformation ensures that volatility is minimized, and further, the inflation movement can be econometrically modeled using more powerful models. Due to the slow changes in the expectations of inflation, LCPI is an ideal measure to view the long-term trends of inflation that have an impact on the value of the currency.

U.S. Income Level (GDP US)

Over time, the average foreign earnings as calculated using the U.S. GDP increased. This demonstrates that the world economy was expanding. Updates in U.S. income influence the amount of goods people desire to sell and purchase directly into the form of the exchange rate stability and Pakistan trade.

U.S. Interest Rates and Price Level

U.S. interest rate and U.S CPI can be used as two perspectives of viewing the impact of U.S. monetary policy on the economy. The two variables represent the external shock whereby the high U.S. interest rates in the past led to outflow of capital and depreciation of currencies in the

emerging markets. The exacerbating role of foreign interest rate variation on the exchange rate volatility in Pakistan is confirmed by the empirical results of this research.

The analysis takes the macro-economic variables, which couple with individual measures of policy, but examines the relationship between domestic fundamentals, and global shocks. The model involves GDP, government expenditure, inflation, interest rates and money supply besides foreign factors. It is in line with renowned theories of exchange rate determination such as Purchasing Power Parity (PPP), Interest Rate Parity (IRP) and monetary approach. This critiques complements the empirical study and supports the argument that exchange rate fluctuations need a concerted fiscal and monetary policy to control them.

Table 3.2: Explanation and variable sources

Variable	Explanation	Source
Exchange rate (e)	National currency Per USD, end of period rate	IFS
G	Government expenditure	Hanif et al. (2013), SBP Easy data
Ms	M2 (currency in circulation, TD, DD, residents foreign currency deposits and other deposits with SBP)	SBP
P	CPI of Pakistan	IFS
Y	Real GDP of Pakistan	Handbook of statistics, Hanif et al. (2013)
r	Money market rate	IFS, SBP Bulliten
P*	CPI of USA	IFS
Y*	Real GDP of USA	FRED
r*	Central bank policy rates percent per annum	FRED
GDP Deflator		WDI

3.8 Estimation Technique: The VAR Framework

The present study employs the Vector Autoregressive (VAR) framework as the primary econometric methodology to analyze the dynamic relationship between monetary and fiscal policy indicators and exchange rate stability in Pakistan. The VAR model originated with (Sims,1980), who developed a time series model, though it is commonly known as a widely used model, which enables all variables in the system to be considered endogenous, thus capturing the mutual interactions and feedback effects among the variables in the system. The VAR framework is flexible and data-driven in comparison to structural models, which have limiting a priori theoretical assumptions that are especially useful in investigating the dependence of macroeconomic variables, including exchange rates, interest rates, money supply, fiscal deficits, and government expenditure.

In its general form, an unrestricted $VAR(p)$ model with k endogenous variables can be expressed as:

$$Yt = A1Yt-1 + A2Yt-2 + \ldots\ldots + ApYt-p + U + \varepsilon t \quad (3.11)$$

where:

- Yt is a $k \times 1$ vector of endogenous variables at time Tt.
- Ai are $k \times k$ coefficient matrices for lag it.
- μ is a vector of intercept terms, and
- εt represents a vector of white noise error terms.

In this case, money supply (M2), interest rates, inflation (CPI) and the exchange rate (E) are the variables of interest. These have been the basics of the monetary policy analysis and they are very

crucial in the identification of the macroeconomic stability. Besides these, other fiscal policy indicators e.g. government spending, the debt to gross domestic product, the fiscal deficit will also be incorporated in the model. Together, such variables justify the two mechanisms through which the adjustment in the fiscal and monetary policy is conducted in the form of adjustment in the exchange rate. The incorporation of the two policy precincts facilitates a comprehensive analysis of whether the two fiscal and monetary authorities are collaborating to balance external imbalances or whether they sometimes engage in an action that makes the markets volatile. Such a large specification will make the model an excellent one to analyze the interaction between policy decisions and the exchange rate dynamics in the Pakistan setting.

The mentioned relevance of the Vector Autoregression (VAR) model to this study is rather topical, and this fact can be justified by several factors that make this model have strong methodological characteristics. Firstly, the VAR offers a systematic manner of studying the relationship between the long run and not only the short run dynamics between the variables. This distinction is paramount in the sense that the monetary and fiscal policies rarely affect the exchange rate to the full extent immediately they occur. Instead, they are felt after some time, and lagged reactions tend to characterize change in the currencies. The model of augmentation of money supply can prompt development of economic action in the first period, then may, in the second period, cause a weakening of the money by the expectation of inflation. Similarly, government expenditure will temporarily boost economic growth and will initiate the long-term fiscal sustainability problems that will destroy investor confidence and stability in the foreign exchange regime. It is important that such time-varying patterns are reflected, and the VAR framework is in the best position to address the same.

Second, the VAR model also makes the application of the Johansen co-integration test possible, as this, compared to other tests, helps determine whether there is a stable long-run relationship between the variables. All these factors, that is, exchange rates and fiscal variables, along with the monetary aggregates, are usually not stationary (I(1)), and therefore, testing the cointegration is a mandatory alternative to the spurious regressions. The Johansen test under the VAR framework aids in testing that these non-stationary series are co-moving in the long run, reflective of equilibrium linkages that are anchored by economic fundamentals. The fact that there are such cointegrating relations implies that although there are volatile effects in the short run, the system tends to stabilize around a fixed path and deviations are corrected with time.

Third, the model VAR would allow the extraction of Impulse Response Functions (IRFs) and model Variance Decomposition Analysis (VDA), which are potent instruments for comprehending the impact of shocks. The RFs enable sequential measurement of the exchange rate reaction to the temporary shocks of the monetary or fiscal policy instruments and hence report the extent of such a reaction, in addition to its lifetime. An example of this is that an increase in interest rate can stabilize the currency in the initial stages by generating capital inflows in the economy, but the IRFs would demonstrate how long the stabilizing process lasts before it diminishes. On the same note, VDA compares the percentage contribution in the variation of exchange rates to other sources of shock, hence explaining the difference between monetary and fiscal exchange rate variation. These characteristics supplement the empirical research and introduce an additional helpful insight into the policy efficacy.

Lastly, and most importantly, a very strategic feature of the VAR model is that it operates on all the variables as endogenous. Unlike structural models that require exogeneity assumptions, VAR does not have bias because it acknowledges that a macroeconomic environment like Pakistan can

only be characterized by a multi-directional flow of causations. To illustrate, although there is no doubt that monetary and fiscal policies have an impact on the exchange rate, the exchange rate also acts back on the policy decisions. A strong depreciation can provoke a compression of the monetary policy by varying interest rates, or lead to a shift in the fiscal expenditure to normalize foreign balances. With such mutual interdependencies allowed in the VA model, a more realistic, less rigid economic overview is presented.

CHAPTER 4

RESULTS AND DISCUSSION

In this section, we address the study's empirical results, which shed light on the connection between fiscal and monetary policies and the process of determining exchange rates. In order to summarize the data's major properties, descriptive statistics are used to start the analysis. After that, to prepare for more econometric modelling, unit root tests are performed to check whether the variables are stationary. This is followed by checking for a long-run equilibrium connection using the Johansen cointegration test. The chapter concludes with the findings of the Vector Autoregressive (VAR) model, which documents the ever-changing relationships between the exchange rate, fiscal and monetary policy variables, and other long-term factors.

4.1 Descriptive Statistics

Table 4.1 presents the descriptive statistics of the variables used in the study over the period 1980Q1–2024Q4. The results show that the exchange rate (EXR) averaged 72.86 PKR/USD with a wide variation, reflecting the persistent depreciation of the rupee over time. Pakistan’s GDP and government expenditure (GOVT EXP) indicate strong growth trends, though government expenditure is highly volatile, as shown by its large standard deviation and kurtosis. The domestic consumer price index (CPI) shows significant variation and right-skewness, consistent with episodes of inflationary pressures, whereas the US CPI and GDP remain relatively stable with near-normal distributions. Interest rates in Pakistan averaged 9.16%, peaking at 22.4%, indicating episodes of tight monetary policy, while US rates remained much lower on average (4.31%). Money supply (MS) demonstrates rapid expansion with very high dispersion, though its log transformation (LMS) provides more stable properties, similar to the log of CPI (LCPI). The

Jarque-Bera test confirms that most variables deviate from normality, highlighting the presence of structural shifts and shocks in the data, thereby justifying the need for time-series econometric techniques.

Table 4.1: Descriptive Statistics

Variable	*Mean*	*Median*	*Maximum*	*Minimum*	*Std. Dev.*	*Obs.*
EXR (exchange rate)	72.855	58.450	287.800	9.900	65.161	180
GDP (Y)(domestic income level)	37910.66	32057.5	76899	10588	15817.730	180
GOVT EXP (G)	744932.5	110201.3	6577673	2713	1198736	180
CPI (P) (domestic price level)	85.240	47.015	392.070	8.770	88.527	180
CPI US (P*) (foreign price level)	85.731	83.500	146.220	38.220	28.234	180
GDP US (Y*) (domestic income level)	1460741	1457586	23685287	7181743	4711808	180
IR (r domestic interest rate)	9.160	8.765	22.400	1.050	3.665	180
IR US (r* foreign interest rate)	4.318	4.290	19.100	0.070	3.822	180
MS	6360085	1780182	3581830	877608	8844374	180
LMS	14.457	14.392	17.395	11.382	1.789	180
LCPI	3.929	3.805	5.971	2.171	1.048	180

4.2 Unit Root Test

The results of the Augmented Dickey-Fuller (ADF) unit root test are shown in Table 4.2. The test was performed on both the level and first-difference forms of the variables. Both the I(1) and the I(0) orders of integration are shown in the findings. Interest rates in the US (IR US) and the rest of the world (IR) are zero-order integrated (I(0)) and thus stagnant at level. The other variables, on the other hand, reach stationarity upon first differencing and are thus integrated of order one, I(1). These variables include the log of money supply (LMS), log of consumer price index (LCPI), GDP, U.S. consumer price index (CPI US), log of U.S. GDP (LGDP US), log of government expenditure (LGEXP), and the exchange rate (EXR).

Table 4.2: Unit Root Test

Variable	*Level*		*First Difference*		*Decision*
	Intercept	Trend and Intercept	Intercept	Trend and Intercept	
IR (r)	-3.273** 0.017	-3.581** 0.034			I(0)
LMS	-1.117 0.708	-2.710 0.234	-3.694*** 0.005	-3.820** 0.017	I(1)
LCPI (LP)	0.868 0.994	-2.702 0.236	-4.357*** 0.0005	-4.494*** 0.002	I(1)
GDP (Y)	-0.352 0.980	-1.554 0.806	-6.020*** 0.000	-6.063*** 0.000	I(1)
CPI US (P*)	1.211 0.988	-1.561 0.804	-4.778*** 0.0001	-4.900*** 0.0003	I(1)
LGDP US (LY*)	-1.629 0.465	-1.727	-14.099*** 0.000	14.196*** 0.000	I(1)
EXR (ER)	0.071 0.962	-1.690 0.751	-11.968*** 0.000	-11.938*** 0.000	I(1)
IR US (r*)	-3.190** 0.022				I(0)
LGEXP (LG)	0.0035 0.959	-2.392 0.382	-16.056*** 0.000	-16.019*** 0.000	I(1)

Note: '*,**, and ***' represents significance level at 10, 5 and 1 percent respectively.

4.3 Lag Selection Criteria

For the VAR model, there are a number of factors that may be used to find the best lag duration. Numerous criteria have been used in this work, including the Log Likelihood (LogL), Likelihood

Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), and Hannan-Quinn Information Criterion (HQ). You can see the results in Table 4.3. The bulk of the selection criteria point to a lag time of 7 as the ideal. In particular, lag 7 is recommended by the LR, FPE, and AIC, although HQ prefers lag 5 and SC prefers lag 2. The best lag length for the current investigation is lag 7, since the AIC and FPE are generally thought to be better at reflecting the dynamic features of the VAR. So, to make sure the findings are consistent and robust, we will estimate the VAR model and impulse response functions using 7 lags.

Table 4.3: Lag Selection Criteria

Lag	***LogL***	***LR***	***FPE***	***AIC***	***SC***	***HQ***
0	181.265	NA	$6.47E-09$	-1.828	-1.389	-1.650
1	1036.347	1610.735	$4.73E-13$	-11.352	-10.254	-10.907
2	1181.570	263.427	$1.33E-13$	-12.622	$-10.866*$ [1]	-11.910
3	1265.974	147.216	$7.630E-14$	-13.185	-10.770	-12.205
4	1358.251	154.509	$4.000E-14$	-13.840	-10.765	-12.592
5	1417.620	95.267	$3.090E-14$	-14.111	-10.378	$-12.597*$
6	1458.168	62.236	$2.990E-14$	-14.164	-9.772	-12.382
7	1509.982	$65.658*$	$2.780e-14*$	$-14.267*$	-9.216	-12.218
8	1520.921	25.031	$3.560E-14$	-14.057	-8.347	-11.740

'*,**, and ***' represents significance level at 10, 5 and 1 percent respectively.

4.4 Johansen Cointegration test

To check whether model variables have a long-term stable non-stationary time series relationship, the Johansen cointegration test was used. Two important test statistics, the Trace statistic and the

[1] '*,**, and ***' represents significance level at 10, 5 and 1 percent respectively.

Maximum Eigenvalue statistic, form the basis of the test that finds the number of cointegrating equations. The findings point to a high probability of a cointegrating relationship, which means that the variables show long-term cointegrating behavior even when they are not stationary on their own.

4.5 Detailed Test Results

The lag interval was set to 1st differences (1 to 1), which means that the underlying Vector Autoregression (VAR) model employed one lag to remove the residuals.

Table 4.4: Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	*Eigenvalue*	*Trace Statistic*	*0.05 Critical Value*	*Prob.***
None *	0.265	117.687	95.753	0.000
At most 1 *	0.163	64.252	69.818	0.118
At most 2	0.115	34.316	47.856	0.472
At most 3	0.063	14.756	29.797	0.826
At most 4	0.031	5.212	15.494	0.803
At most 5	0.009	1.192	3.841	0.274

Note: ** indicates rejection of the hypothesis at the 0.05 level.

Table 4.5: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

$Hypothesized\ No.\ of\ CE(s)$	$Eigenvalue$	$Max - Eigen\ Statistic$	$0.05\ Critical\ Value$	$Prob.**$
None *	0.265	53.435	40.077	0.001
At most 1	0.163	29.935	33.876	0.133
At most 2	0.115	19.560	27.584	0.387
At most 3	0.063	9.543	21.131	0.833
At most 4	0.031	4.019	14.264	0.839
At most 5	0.009	1.192	3.841	0.274

Note: ** denotes rejection of the hypothesis at the 0.05 level.

4.6 Interpretation of the Results

The Trace test sequentially assesses the null hypothesis of r (r represents cointegration vector) cointegrating relations in contrast to the alternative hypothesis of k (full rank) cointegrating relations, with r ranging from 0 to k-1. The Trace statistic (117.690) for the null hypothesis (r=0) considerably exceeds the 5% critical threshold (95.75), while the p-value (0.0004) is below 0.05. This strongly suggests rejecting the null hypothesis of the absence of cointegrating equations. The Trace statistic (64.250) is inferior to the critical value (69.820) for the hypothesis of At most 1 (r<=1), and the p-value (0.1186) exceeds 0.05. Therefore, we do not exclude the null hypothesis

positing the presence of at most one cointegrating equation. The Trace Test indicates the presence of a singular cointegrating equation among the variables at the 5% significance level.

The Maximum Eigenvalue test evaluates the null hypothesis of r cointegrating relationships vs the alternative of r+1 relationships. The null hypothesis (r=0) is rejected as the Max-Eigen statistic (53.440) exceeds the critical threshold (40.080) with a p-value of 0.0008. We reject the null hypothesis of no cointegration. The Max-Eigen statistic (29.940) is less than its critical value (33.880), with a p-value of 0.1338 for the hypothesis of At most 1 (r<=1). We do not dismiss the null hypothesis that there is at most one cointegrating vector. The Max-Eigen Test concludes that there exists a singular cointegrating equation at the 5% significance level.

Both tests are in total agreement. They provide significant evidence for the existence of a unique cointegrating relationship among the variables in the system. This indicates that the individual variables are likely non-stationary (I(1)), yet their linear combination is stationary (I(0)), demonstrating the stability of the long-run equilibrium. A corrective mechanism will rectify any transient fluctuations in this equilibrium over time.

4.7 Normalized Cointegrating Coefficients

Table 4.6 displays the estimated long-term cointegrating equation. The coefficients are standardized on the first variable.

Table 4.6: Cointegrating Equation

$Variable$	$Coefficient$	$Stand.Error$	$t-Statistic$
LNEXP(-1)	1.000	N/A	N/A
LNMS(-1)	-0.927 ***	0.073	-12.633
LNG_EXP(-1)	0.100 **	0.045	2.212
LNIR(-1)	0.279 ***	0.038	7.265
LNY(-1)	-0.045 **	0.020	-2.256
LNP(-1)	-0.064 ***	0.021	-3.056
@TREND(01Q1)	0.003 ***	0.0005	7.480
C	-2.447	N/A	N/A

Note: '*,**, and ***' represents significance level at 10, 5 and 1 percent respectively.[2]

The normalized cointegrating equation can be written as:

$$EXR = 0.9277 * MS(-1) - 0.1000 * G_{EXP\,(-1)} - 0.279311 * IR * (-1) + 0.0452 * Y(-1) + 0.0645 * P * (-1) - 0.0038 * @TREND - 2.4476 \quad (7)$$

[2] '*,**, and ***' represents significance level at 10, 5 and 1 percent respectively.

A 1% rise in LNMS(-1) leads to a 0.93% depreciation in EXP over time (higher exchange rate). If everything else is constant, a 1% rise in LNIR(-1) will lead to a 0.28% increase in EXP over the long term (appreciates the exchange rate). The positive trend term (TREND) indicates that EXP has an inherent increasing tendency of around 0.38% per period, irrespective of other variables. The t-statistics show that the coefficients for LNMS(-1), LNG_EXP, LNIR(-1), LNY(-1) and LNP(-1) are statistically significant (|t-stat| > ~2).

4.8 Adjustment Coefficients

The coefficient of the speed of adjustment is demonstrated in the following matrix, which demonstrates the reaction of each variable to the non-long-run equilibrium (error correction term, ECT).

Table 4.7: Speed of adjustment coefficients

Variable	*Coefficient*
D(LNEXP)	-0.107
D(LNMS)	0.037
D(LNG_EXP)	-0.025
D(LNIR)	0.009
D(LNY)	0.015
D(LNP)	-0.034

The result of the model of error correction provides valuable information on the dynamics of the exchange rate adjustments and macro-economic principles underlying the rates. Among the most important deriving conclusions, the coefficient of the error correction term of the variable D(LNEXP) must be mentioned. D(LNEXP) has an estimated coefficient of -0.108 and this is significantly different. This has extensive consequences as the error correction term (ECT) happens to be the centre of focus which defines the rate of the fluctuations between the long term equilibrium. The negative nature is also not only desired, but it is the sign that the process of adjustment is convergent rather than divergent one. In other words, there is an inbuilt mechanism in the system to rectify issues aftershocks. The magnitude of the coefficient value which is -0.108

implies that the change in the exchange rate during the current period is more likely to wipe out a percentage of approximately 10.8 percent of the disequilibrium in the previous period. This implies that the approach to convergence to equilibrium although slow process is systematic and time long-lasting.

In economic terms, this implies that in case the exchange rate in the last period was above its long-term equilibrium, this correction mechanism will push the next period down and towards the equilibrium. On the same note, suppose that the exchange rate was undervalued during the proceeding period then the negative coefficient would guarantee an upward adjustment. With the help of the stability of the long-run relationship, the cointegration relationship between the variables under research is therefore robust.

Besides the correction of D(LNEXP), the coefficients of the other differenced variables namely D(LNMS), D(LNIR) and D (LNP) are critical in showing how the system regains equilibrium. The coefficients of adjustment pertaining to such variables show the role of money supply, interest rates as well as prices in restoring the long-term balance. The signs and magnitudes of these coefficients are particularly indicative in a way that it shows the parameters that are more sensitive in correcting disequilibrium errors. The example may be that when the particular coefficient in the absolute terms is large then this implies this particular variable is very powerful in relation to the process of rebalancing. Such a correlation between non fully stationary variables checks the stability of the long-run relationship, as well as makes such a relationship shock-resistant.

The long-run outcomes of the model indicate the relationship between the observed variables to be fixed in the long-run where monetary policy is a decisive factor in the exchange rate. Interestingly, the results demonstrate that the variables in the monetary policy have serious effects on the behavior of the exchange rate. However, unlike the traditional theoretical anticipations, the

money supply turns out to be a significant and rather paradoxical impact in relation to the value of the currency in relation to the foreign interest rates. The observed here empirical evidence shows, however, to suggest a more complex or skewed relationship, as, by normal monetary model, money should depreciate as the impact of a money supply increase. This may be due to the economic setup, instability of the economy institutions or effects of speculation in the foreign exchange markets.

The fiscal policy as the level of government expenditure appears to have no substantial long-run impact concerning the exchange rate. Low significance of government spending insulates that government spending may not be helpful in the determination of changes in the exchange rate in the long run in the model. This outcome can be merely a sign of the comparatively indirect transmission process by which the government expenditure can influence the level of exchange rates, or it can reflect an override of fiscal variables as the determinant of long-term external balances by to the force of monetary intervention.

The other shocking observation is the size of error correction term. It is of little consequence due to its small statistical significance and large value coupled with the fact that it is so correlated with the tendency of equilibrium to exist following any disturbance only increases the argument that the exchange rate system is strongly inclined to be in equilibrium because any disturbance that occurs. The existence of such resilience clearly holds significance to the policymaker because it is an implication that although short-run fluctuations have to be anticipated, the exchange rate will be put on the long-run path provided that the adjustment mechanism is never left to tend towards deviating distortions.

Finally, through the integration of the policy coordination dummy variable (CO), there is further enrichment of the analysis. The conclusion after the findings is that in cases where both the

monetary and fiscal authorities collaborate by actively coordinating the policies, the short run changes of the exchange rate are significantly reduced. Such a conclusion has grave policy consequences, in that it shows the spirit of coordinated macroeconomic policy. Since it is effective, coordination is not only useful in silencing unnecessary volatility in the exchange rate, but it is also useful in more broad economic stability, investor confidence, and sustainable growth. In this regard, the analysis demonstrates the significance of institutional cooperation, as well as the rationality of macroeconomic policies when ensuring the stability of the exchange rates in the case of the lack of any shocks, which can be both internal and external.

4.9 Diagnostic Checks

The lag length (1) and deterministic-trend are also important diagnostics in both this investigation and the specification. This is on the higher side of the Log-Likelihood (2754.244) indicating that the model fits. Strength of cointegration tests the long-run cointegration is strengthened by the cointegration of Trace and Max-Eigen tests at the same cointegrating vector.

4.10 VAR Model

The VAR estimates help us understand what goes on behind the scenes in Pakistan as exchange rate, monetary policy, and fiscal policy variables interact as revealed by our estimations between 1980 and 2023. The VAR framework is particularly the best-suited to this analysis since all the variables are taken to be potentially endogenous and thus is capable of exploring direct and indirect relationships. The outcomes of the estimation provide the interesting data about the coincidence of external shocks, domestic policy choices, the fundamentals of the economy, of Pakistan and the developmental rate of the Pakistani currency and the state of the economy as a whole which took place in the period under consideration.

One of the most outstanding is that of the lags in the determination of exchange rate. The analysis shows that the previous exchange rates values have a very high and statistically significant impact of determining the current state of an exchange rate. In this discovery, the dependence and persistence of fluctuation is demonstrated. In practice, this can only mean that in case of exchange rate at a direction, the impacts of that direction are expected to continue on other periods and therefore reversals are tedious and slow. This is an inertia that may be anchored on market expectations, non-responsiveness to shocks, or certain structural inflexibilities of the economy of Pakistan. What it means is that the impact of any shocks in the policy or other external disturbances does not get lost but is used in additional exchange rate conduct and hence the cause of even greater volatility.

The third important indicator that the VAR estimates will capture is the impact of the external inflationary pressures particularly the United States. As it is observed in the results, the local exchange rate is positively related and significantly responsive to the change in the U.S. This is a pointer that external price shocks are effectively transmitted to the Pakistan currency market with pressure being exerted on the local exchange rate. Increase in inflation in the United States alters the competitiveness of Pakistani goods to theirs, creates a disparity to the expectations of the investor and affects the circulation of capital. Such dependency is indicative of how feeble Pakistan is to the alterations of the macroeconomic environment around the world, since it relies both on international trade and international financial flows.

Moving to the fiscal policy variables, it has got some pro-cyclical characteristics. The earlier increase in GDP is also positive to government expenditure in that fiscal policy will increase as the economy is in boom and not a counter cyclical policy. Such a behavior can further increase instabilities since any increase in the fiscal policy during a high-growth period can lead to

overheating and any decrease in low-growth periods can lead to more severe recessions. More so, the financial nature of the shocks emerges as an important predictor of government spending and as such, the monetary and fiscal channel intersect in a very strong manner in Pakistan. This interdependence implies that the fiscal authority will tend to react to the monetary expansions by altering their expenditure levels, and once again connect the two realms of policy.

Significant results are also obtained using the growth equation of the VAR system. The significance of lagged values of GDP also points out that there exist momentum effects on economic growth. In other words, in the event of growth picking up, there is a propensity to sustain all this upwards momentum over a certain duration of time and the causes are likely to be investment cycles, consumption patterns and structural factors. In the meantime, money supply shocks have powerful and long-term impacts on GDP, which does not only contribute to the economic growth but also affects exchange rate stability. The two effects mean that expansionary monetary policy in Pakistan has long-run effects; it may result in increased growth but at the same time, it may have opposite effects of external balance by undermining exchange rate.

As far as the monetary policy is concerned, interest rate may be regarded as an accommodative measure. The past dynamic of the exchange rate is also a significant determinant of the interest rates, as the estimates suggest, along with the inflation. This is evidence to indicate that in the vast majority of cases, the central bank is likely to respond to currency appreciation and high prices by an interest rate policy as it attempts to cushion itself by fixing the situation. To the extent that volatility is restrained with the assistance of such responsiveness, it is also indicative of the difficulty facing the monetary authorities to find a balance between inflation and growth objectives.

Finally, the actual process of inflation is of particular interest. It is shown that Pakistan is very sensitive to both local and foreign shocks in terms of inflation. Lagged CPI value because it means that in case of an upscale in price, the upscales are likely to persist. Furthermore, once again, the U.S. inflation also appears as a major participant that external price shocks are directly translated to the domestic inflation. This reliance depicts how Pakistan economy is open and is susceptible to external price unpredictability that makes it difficult to control explosion around Pakistan.

Overall, the findings highlight three major conclusions: (i) the exchange rate in Pakistan is largely driven by both domestic monetary conditions and external price shocks, (ii) fiscal policy exerts indirect effects through its interaction with money supply and growth, and (iii) monetary and fiscal policies jointly shape exchange rate stability, confirming the presence of policy coordination (or lack thereof) in influencing macroeconomic stability.

Overall, the results confirm significant interdependencies among the variables, with strong evidence of persistence, feedback effects, and external influences shaping the macroeconomic environment. The high R-squared values across equations indicate a good model fit, suggesting that the chosen lag structure effectively captures the dynamics of the system.

4.11 Impulse Responses Analysis and Policy Review

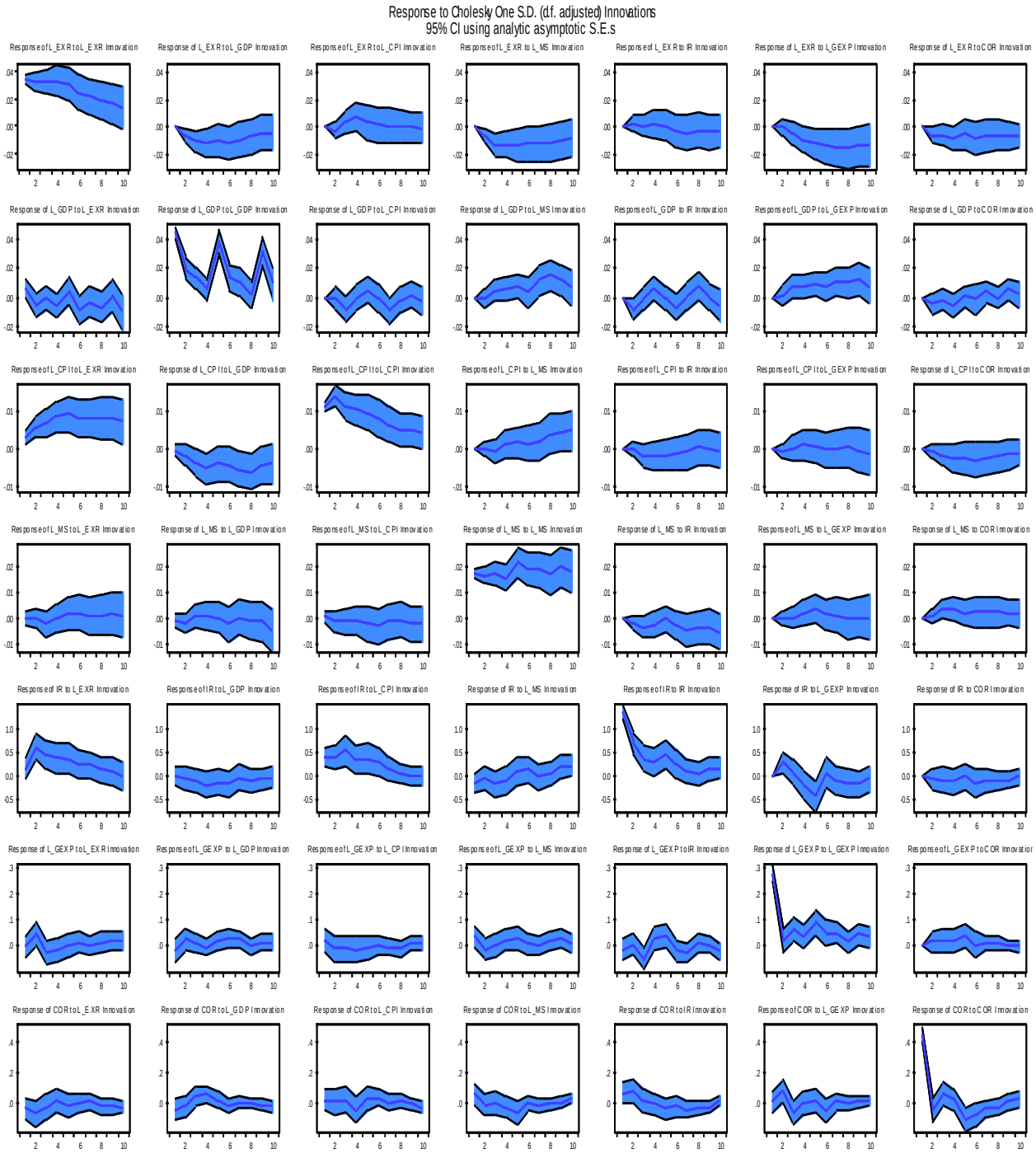

***Figure 4.1*: Impulse Response Functions**

The impulse response functions provide valuable insights into the dynamic interactions among exchange rate, monetary policy, fiscal policy, and output in Pakistan. A shock to the **exchange rate (e)**, interpreted as a depreciation of the domestic currency, generates inflationary pressures in the short run, as indicated by the positive and persistent response of the consumer price index (P). This aligns with the import dependence of Pakistan's economy, where depreciation raises import costs, which subsequently transmit into domestic prices. Output (Y) initially responds negatively, reflecting higher production costs and reduced aggregate demand, before gradually stabilizing. Interestingly, broad money (Ms) expands following a depreciation shock, possibly due to the State Bank's accommodative interventions, while fiscal expenditure (G) shows little immediate response, suggesting limited countercyclical fiscal adjustments in the short run.

A shock to **government expenditure (G)** exerts a positive effect on output (Y), validating the Keynesian transmission channel of fiscal multipliers. The response of the exchange rate is muted initially but turns depreciative in the medium term, reflecting higher demand pressures and possible crowding-out effects on private investment. Inflation (P) rises following the fiscal shock, consistent with demand-pull inflation, while the money supply (Ms) expands, indicating partial monetary accommodation of fiscal policy. The coordination variable (COR) improves temporarily, suggesting short-term alignment between fiscal expansion and monetary support, but the effect dissipates, hinting at weak long-run policy coherence.

When there is a shock to **broad money (Ms)**, the inflation (P) reacts positively and steadily, which is a classical quantity-theoretic relationship existing between money and prices. Output (Y) at first grows, which can be interpreted as short-run monetary stimulus however the effect does not last long implying that monetary expansion will not have a much impact on output in the long run. The rate of depreciation of the exchange rate (e) is slow and in line with the excess liquidity putting a

strain on the foreign reserves and foreign stability. Interestingly, the fiscal expenditure (G) does not experience considerable adjustments, and this represents insufficient fiscal-monetary synchronization in the reaction of the monetary shocks.

Inflation (P) shock has negative contractionary effect on real output (Y), which will indicate a decline in purchasing power and uncertainty-driven investment. The exchange rate (e) declines, which means external pressures caused by inflation, and monetary authorities react to this policy by increasing the interest rates (r), which is in line with the inflation-targeting policy. The monetary conditions are somewhat contracted with broad money (Ms) being contracted. The government spending (G) does not respond substantially, which indicates the pro-cyclical character of fiscal policy in Pakistan. The COR variable becomes weak, which indicates the lack of coordinated fiscal and monetary policies in times of inflation.

Shocks to **real GDP (Y)** imply a positive spillover to government expenditure (G) and broad money (Ms) that represents cyclical fiscal revenues as well as monetary accommodation in response to the growth of the output. The growth rates (P) increase at a low rate, which is in line with the demand-side features, and exchange rate (e) also rises at a low rate, which depicts to better investor confidence and external balances in growth spurt periods. The COR variable reinforces after the output shocks meaning that there is more agreement between monetary and fiscal policies during the expansion period.

Interest rate (r) shock has contractionary impacts on output (Y) which is in line with the standard monetary transmission mechanism. Inflation (P) declines and monetary conditions tighten, and broad money (Ms) declines, and the liquidity is absorbed. The short run behavior involving exchange rate (e) up appreciates the exchange rate, which is in line with interest rate-differential channels, which draw foreign inflows. The response of fiscal expenditure to monetary tightening

(G) is not an immediate response, and hence fiscal inertia. The COR variable is becoming weaker, which indicates that the restrictive monetary policy is not being complemented by the fiscal restraint.

External spillovers are significant with respect to shocks associated with the **foreign variables (Y, P, r)**. The positive shock to the US output (Y) stimulates the output of Pakistan with exchange rate linkages and an increase in US interest rates (r) deflicks the exchange rate (e) and causes a contractionary effect on output (Y), which is in line with capital outflows and increased external financing costs. There is a positive response of the inflation (P) to external price shocks (P*), which represents imported inflation. The COR variable attenuates in negative external shocks indicating that the policy coordination is inward-oriented and is less sensitive to external processes.

Lastly, **the coordination variable (COR)** is shock information which is very important. When COR is positive, which is seen to be an improvement in the coordination between the fiscal and the monetary policy, this improves the macroeconomic stability. The reaction of output (Y) is positive, whereas the inflation (P) is contained, which indicates the balancing policy position. The exchange rate (e) does not vary and broad money (Ms) does not vary as much. Notably, fiscal expenditure (G) and interest rate (r) react in a more compatible manner, highlighting the effectiveness of coordinated policies in creating the stabilization without causing too much trade-off. The Impulse responses are consistent with Pakistan historical policy pattern as the policy review is discussed below**,** the review is organized on the basis of the monetary policy and fiscal policy, external sector management as well as structural reforms but with particular emphasis on the role of policy coordination. Based on the empirical evidence of this paper, it critically analyzes the performance of the previous methods and defines the policy gaps that have led to volatility.

1. **Monetary Policy**

The monetary policy in Pakistan has in the past been reactive with much reliance on changes in the discount rate to check inflation and stabilize the exchange rate. Expansionary policies have in most cases been undertaken in order to stimulate growth at the expense of an increased rate of inflation and devaluation of currency. The findings of this paper verify that the over growth of money supply is closely linked to the depreciation of the exchange rates and inflationary pressures. Although interest rate changes have offered short-term stability, the changes have also made the cost of borrowing to be expensive and limited output growth. One of the weaknesses of the monetary policy has been lack of a forward looking structure. Inflation targeting and the practice of controlling the exchange rate by a managed float comes out as a significant reform measure in enhancing credibility and fixing the expectations anchor.

2. **Fiscal policy**

The fiscal policy has been pro-cyclical whereby its expenditure will be large during the boom periods but will be small in times of crisis. This has enhanced the economic rises and falls instead of lessening them. This paper concludes that despite its importance, government expenditure has not always contributed to a stable exchange rate as it is sustainable. The rise in fiscal deficits has conventionally undermined the actions of monetary tightening leading to external imbalances and currency devaluation. Pakistan fiscal system should be more disciplined with counter-cyclical expenditure planning, fiscal responsibility act and debt sustainability. These are the only reforms through which the fiscal policy can be implemented to complement the monetary measures in stabilizing the exchange rate.

3. **Policy Coordination**

In cases where the monetary and fiscal authorities are operating separately, their policies seem to contradict each other and they promote macroeconomic instability. As an illustration, tight monetary policies have been largely countered by expansionary fiscal policies, which have caused inflationary pressures and use of depreciated currencies. On the other hand, good coordination which was defined as the coordination variable (COR) was realized to have a significant negative effect on volatility, inflation stabilization, and better output growth. This puts the urgency of having an institutional mechanism of a joint monetary-fiscal policy committee where the State Bank of Pakistan (SBP) and the Ministry of Finance could coordinate their strategies and respond to economic shocks together.

4. **External Sector and Global Shocks**

Pakistan is highly open to the external events in its exchange rate. Domestic stabilization efforts have been continually thwarted by oil price shocks in the world, interest rate changes in the United States, and the inflation of imported goods. The conclusion of the present study supports the diminishing role of the U.S. interest rate increment on the output and balance of the exchange rate of Pakistan. To counter this weakness, Pakistan should diversify its exports, limit reliance on imported energy and savings of sufficient foreign exchange. Furthermore, direct and anticipated implementation of exchange rates administration through precise interventions by a managed floating regime can be used to absorb speculative attacks without disheartening market trust.

5. **Structural Reforms**

The lingering existence of the exchange rate instability cannot be fully addressed without addressing the structural inherent vices. This makes the productivity in Pakistan low due to the low infrastructure, widespread energy shortages, and low development of human capital. Such

constraints in supply cause the increase in the cost of production and subject the economy to exogenous shocks. In this paper, emphasis is made to state that monetary and fiscal coordination must be coupled with structural reforms that would make the long-term growth more competitive and promising. The energy sector, education, technology and reforms of the exchange rate should be invested in so as to create resilience on the exchange rate regime.

6. Policy Coordination and Stability Outlook

The overall trend brings out the fact that the exchange rate management of Pakistan is unable to accomplish in a sequence of unrelated moves. Long-term stability must be organized in a holistic and coordinated manner that includes fiscal restraint, active monetary policy, external protection of the industry and structural changes. Effective coordination between the SBP and the fiscal authorities can be used to ease inflationary tension, exchange rates stability and long-term economic growth. However, this kind of coordination lacks and therefore volatility is expected to persist particularly in cases where external shocks exist.

Chapter 05

CONCLUSION AND POLICY RECOMMENDATIONS

5.1 Conclusion

The study analyzes the impact of MP and FP on exchange rate by using the synthesis of goods and monetary market which has been taken from Glyfason and Helliwell, (1982) for exchange rate determination. Moreover, this research also analyzes how stable exchange rates are when fiscal and monetary policy are coordinated in Pakistan. The study used data from 1980Q1-2024Q4, applied Johansen cointegration test, and the Vector Autoregressive (VAR) model, results depicts that the coordination variable (COR) showed the paramount relevance of monetary-fiscal management. Good policy coordination related to higher exchange rate stability, reduced inflation, and better performance in output. Conversely, low coordination increased volatility especially when exacerbated through external shocks. The above evidence indicates clearly that the need to have organized policy responses to ensure a macroeconomic stability in Pakistan.

5.2 Policy recommendations

The following policy recommendations are made to bring macroeconomic stability, stabilize the exchange rate and facilitate long-run growth in Pakistan:

1. **Enhance Policy coordination**

This reflects that the coordination variable (COR) has a significant impact, showing that there should be increased coordination between the State Bank of Pakistan (SBP) and fiscal authorities. The government needs to develop an institutional system of coordination, like a joint monetary-fiscal policy committee, to align its goals and response to economic shocks. This committee may

periodically convene to review macroeconomic developments, deliberate on policy choices and coordinate a coordinated intervention to stabilize the exchange rate and inflation. The volatility of IRFs would be reduced particularly around the external shocks and the monetary and fiscal policies would be effective as a result of better coordination. The volatility of IRFs would be reduced particularly around the external shocks and the monetary and fiscal policies would be effective as a result of better coordination.

2. **Adopt a Flexible Monetary Policy Framework**

The fact that money supply (LNMS) is influential in the exchange rate and inflation is a solid argument as to why the SBP should take a more flexible and active monetary policy structure. Although the interest rates are sensitive to the exchange rate pressures and the inflation pressures, an anticipatory regime, like an inflation targeting but with exchange rate concerns, can contribute to anchor the expectations. The SBP is required to closely monitor the external price shocks (U.S. CPI) and counter it by moderating the monetary policy to suppress the imported inflation. It is also the key of controlling the increase in money supply so that it would not result in excessive liquidity and consequently to depreciation of the exchange rate and also spiraling inflation.

3. **Increase Fiscal Avenue**

The presence of such pro-cyclical behavior of government expenditure through its positive response to GDP growth implies that the expenditure should be more disciplined. The government ought to aim at counter-cyclical policies, meant to stabilize the economic cycles, including the accumulation of fiscal surpluses at the traditional maturity phases of the economic cycle to finance the recession phases. The attenuation of volatility in government expenditure has a high standard deviation, which assists in the stabilization of the economy. Fiscal planning over a medium-term

perspective and the pursuit of fiscal requirements, like debt-to-real GDP or deficit-to-real GDP, have the capacity to improve fiscal sustainability and minimizing exchange rate pressure.

Pakistan can gain a sounder macroeconomic stability, stabilize its exchange rate, and open the door to upward economic development by ensuring greater coordination, enhancing fiscal and monetary discipline, and overcoming structural weaknesses. The findings of the research reinforce the need to approach policy making in a comprehensive manner due to the interdependence of monetary, fiscal and externalities in the development path of Pakistan.

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