THREE ESSAYS ON MONETARY ECONOMICS: INTEREST RATE, CREDIT AND MONEY SUPPLY

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Dedicated to my Loving Parents

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ABSTRACT

The thesis is divided into three essays that examine the role of money, interest rates, and credit in Pakistan, an emerging and lower middle-income country. The Structural Vector Autoregressive (SVAR) paradigm is used to investigate the dynamic effects of monetary policy (MP) shocks on an economy. The novelty of our approach, however, is in the thorough investigation of contemporaneous causal relationships among variables, utilizing Directed Acyclic Graphs (DAG) to identify the SVAR model.

The first essay examines the effectiveness of various monetary transmission mechanisms (MTMs), such as the interest rate channel, money channel, exchange rate channel, credit channel, using monthly data from January 1996 to June 2018. The second essay investigates the impact of MP on various components of aggregate demand (AD), including private investment (PI), private consumption (PC), and government consumption expenditure (GC). Furthermore, the study uses yearly data from 1976 to 2019 to assess the impact of different components of AD on each other and other macroeconomic variables. The final essay investigates two key issues, i.e., the finance-growth nexus and the disaggregated analysis of credit. We are primarily concerned with the impact of excessive government borrowing from commercial banks on private-sector credit by using monthly data from June 2006 to June 2018.

The study observes that rising oil prices cause inflationary pressures in Pakistan, and the interest rate channel effectively controls inflation. Furthermore, the study concludes that a positive interest rate shock reduces PI and GC significantly. However, it has no effect on PC. A positive money supply shock, on the other hand, significantly increases PC, PI, and GC. Moreover, the study notes that the PI shock has no significant impact on any other AD component, but it aids in the reduction of inflationary pressure. The Positive PC shock, on the other hand, causes a significant increase in PI while having no effect on inflation. Additionally, the study finds no significant evidence that GC crowds out PI. However, we observe that excessive public sector borrowing significantly crowds out bank credit to the private sector. Moreover, our research supports the idea that financial development is driven by economic growth.

Keywords: Structural Vector Autoregressive models, Directed Acyclic Graphs, Money, Interest rates, Credit.

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LIST OF ABBREVIATIONS AND ACRONYMS

AD	Aggregate Demand
ADF	Augmented Dickey-Fuller
APC	Asset Price Channel
BCG	Bank Credit to Government
BE	Block Exogeneity
BLC	Bank Lending Channel
BSC	Balance Sheet Channel
CB	Central Bank
CNPS	Credit to Non-Productive Sector
CPI	Consumer Price Index
CPRVS	Credit to Private Sector
CPS	Credit to Productive Sector
CRC	Credit Channel
DAG	Directed Acyclic Graphs
DFH	Demand Following Hypothesis
DGP	Data Generating Process
EG	Economic Growth
EMICs	Emerging and Middle-Income Countries
ERC	Exchange Rate Channel
FD	Financial Development
FL	Financial Liberalization
FVD	Forecast Variance Decomposition
GC	Government Consumption
GCT	Granger causality test
GDP	Gross Domestic Product
IPI	Industrial Production Index

IRC	Interest Rate Channel
IRCS	Interest Rate Corridor System
JC	Johansen Cointegration
LCPRVS	Log of Credit to Private Sector
LREER	Log of Real Effective Exchange Rate
LSM	Large Scale Manufacturing
LTIR	Long Term Interest Rate
MC	Money Channel
MP	Monetary Policy
MS	Money Supply
MTM	Monetary Transmission Mechanism
NCC	Neoclassical Channels
NCCC	National Credit Consultative Council
NCM	New Consensus Macroeconomics
NIA	National Income Accounts
NNCC	Non-neoclassical Channels
NNS	New-Neoclassical Synthesis
NS	Neoclassical Synthesis
PC	Private Consumption
PI	Private Investment
PP	Phillips-Perron
PSCAC	Private Sector Credit Advisory committee
RBC	Real Business Cycle
RDR	Real Discount Rate
REER	Real Effective Exchange Rate
RLR	Real Lending Rate
SBP	State Bank of Pakistan
SLH	Supply Leading Hypothesis

STIR	Short Term Interest Rate
SVAR	Structural Vector Autoregressive
VAR	Vector Autoregressive
VECM	Vector Error Correction Model

CHAPTER 1

INTRODUCTION

1.1. Background and Motivation of the Study

Throughout the history of macroeconomics, money, interest rates, and credit have all been contentious issues. The current dissertation is an attempt to comprehend their role in Pakistan, an emerging and lower-middle-income country. Since the 1990s, Pakistan has experienced unsustainable economic growth (EG) with high inflationary episodes in comparison to neighboring countries such as Bangladesh and India, as illustrated in Figure 1.1.

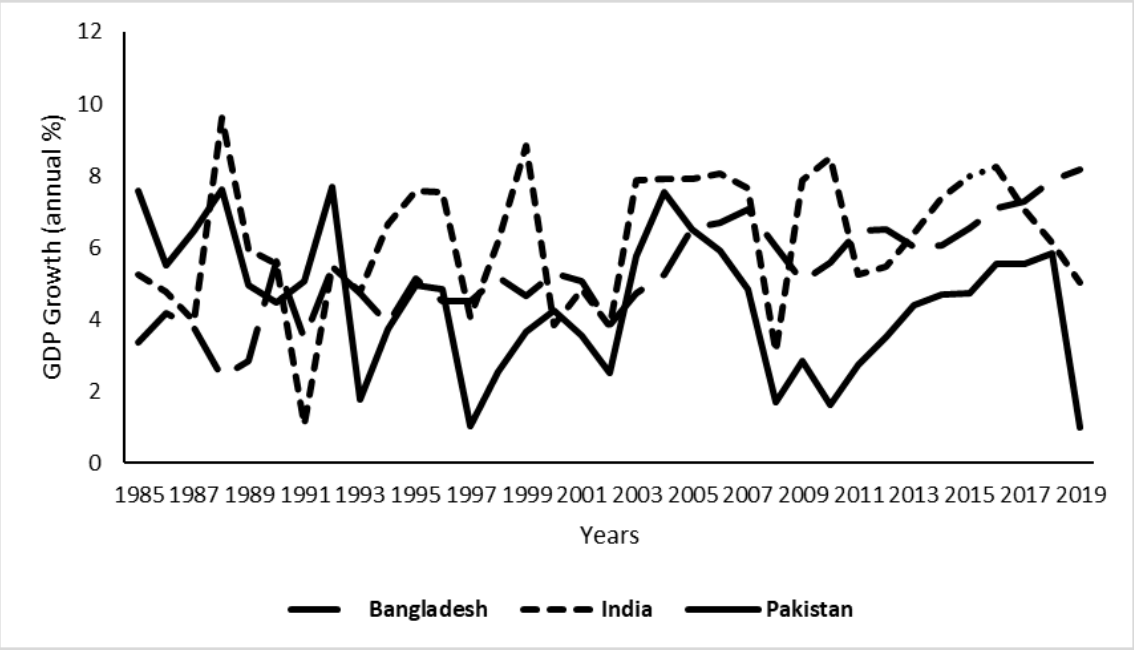


Figure *1.1* **GDP Growth rate of the Selected South Asian Countries**
Source: World Development Indicators

Pakistan's GDP growth rate was higher than that of Bangladesh and India in 1985, but it remained volatile over time. Pakistan has gone through several business cycles since 1993. Furthermore, Pakistan's GDP growth rate has remained low for most

of the time. Even Bangladesh, which gained independence in 1971, has outperformed Pakistan in recent years. Similarly, as illustrated in Figure 1.2, Pakistan has experienced high inflationary pressures, particularly from 2004 to 2014. Inflation remained under control from 2015 to 2018 but began to rise after that. One of the key goals of the SBP's strategic plan 2016-2020 is to "implement a flexible inflation targeting framework that balances price stability with economic growth." SBP met this target until 2018; since then, the inflation rate has risen significantly.

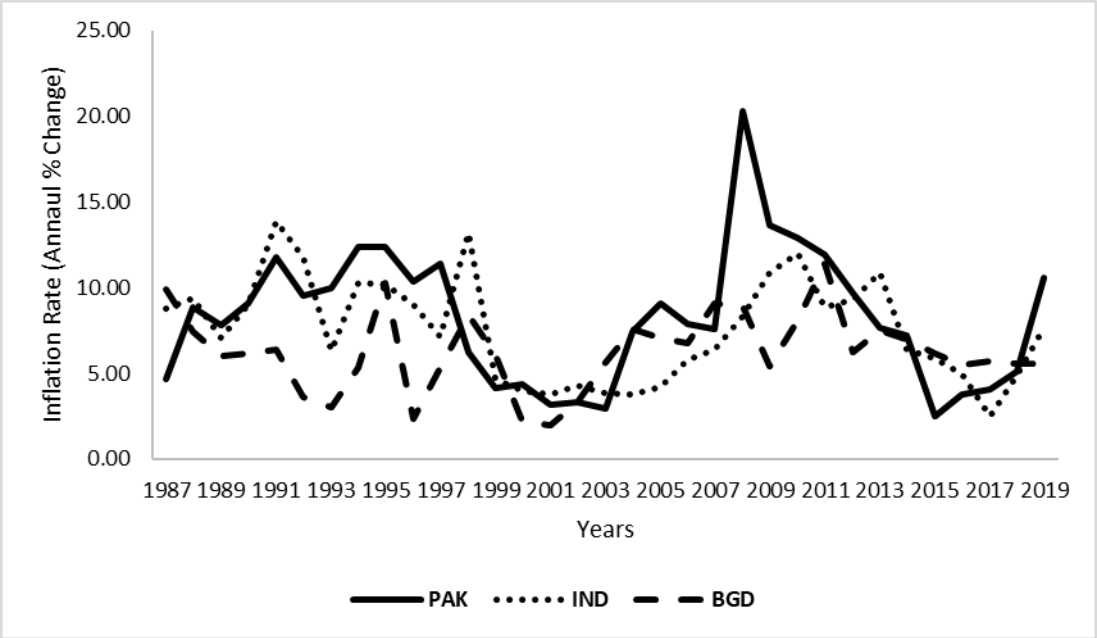


Figure 1.2 **Inflation rate (Consumer Prices, Annual %) of the Selected South Asian Countries**

Source: World Development Indicators

The reasons for high inflation and unsustainable EG are numerous. Sanctions imposed on Pakistan in 1998 in response to its first nuclear test, for example, have a negative impact on EG and price stability. Furthermore, the oil price shocks of 2008 and 2015 had a significant impact on EG and inflation. In 2008, the inflation rate was 20.29 percent, with the main reason for rising prices being an increase in international oil prices, which has a negative impact on EG. However, due to a drop in international oil prices in 2015, inflation remains low and economic activity accelerates. Because oil

is Pakistan's primary import, the inflation rate has dropped from 6.99 percent in 2014 to 2.53 percent in 2015. Similarly, excessive government borrowing from commercial banks may crowd out private investment. Governments are more inclined to spend on current expenditures, which primarily go towards debt financing, rather than on development projects and human capital.

The current study focuses on the role of MP in achieving sustainable EG and a stable inflation rate in the context of Pakistan. The role of the MP has been debated throughout the history of monetary and macroeconomics. Economists disagree on the efficacy of MP in achieving MP goals. The Neoclassical Synthesis (NS) of "sticky-price models," Monetarist, and New-Neoclassical Synthesis (NNS) all believe in the MP's ability to stimulate real economic activity. Real Business Cycle (RBC) theorists, on the other hand, believe that MP is ineffective. Furthermore, the economists disagree on the most effective monetary transmission mechanism (MTM).

The identification of Structure Vector Autoregressive (SVAR) models is another empirical issue. Following Sims (1980), SVAR models are extensively used in the monetary economics literature to investigate the impact of MP shocks on the economy and investigate the effectiveness of MTM. VAR models use impulse response functions (IRFs) and forecast error variance decompositions to trace the evolution of shocks in the system (FEVDs). Consider the VAR model in the lag operator:

$$\mathrm{B(L)X_t} = \mathrm{U_t}, \text{where } \mathrm{B(0)} = \mathrm{I} \qquad (1.1)$$

where B(L) ≡ B0 − B1L − B2L2…….. BpLp is the autoregressive lag polynomial. X_t is nx1 vector containing the current values of all the variables in the system. B(L) is the square matrix in the lag operator form, and U_t is the residual matrix. Although the VAR model is simple to estimate, problems occur when we conduct policy analysis

(Demiralp & Hoover, 2003). Consider the contemporaneous covariance matrix $E(UU')= \Sigma$, where E is the expectation operator, and Σ is not diagonal. The IRF depicts the impact of one standard deviation shock on a variable while keeping all else constant. Shocks are contemporaneously correlated because the covariance matrix is not diagonal. As a result, we cannot assume that the shock to other variables is constant, and this limitation makes it impossible to discern causal links between variables.

Sims (1980) suggested the structural vector autoregression (SVAR) model to overcome this challenge, which considers non-triangular matrices C, such that

$$E((C^{-1}.U_t)(C^{-1}.U_t)') = \psi \quad (1.2)$$

provided that at least n(n-1)/2 restrictions are imposed to identify the covariance matrix. Here ψ is diagonal (Hamilton, 1994). We can trace the impact of shocks in the given system using this specification. One way to estimate the SVAR model is to use the Cholesky decomposition (CD) to identify the variance-covariance matrix. CD utilizes Wold causal order, which means that the shock to X1 is transferred contemporaneously to X2, X3, Xn. Similarly, the shock to X2 is simultaneously transmitted to X3, X4, Xn, but it can only affect X1 with a lag and so on. The ordering of variables X1, X2, X3, …., Xn in this scenario is arbitrary and, in some cases, unrealistic. For example, X3 cannot cause X1 (Leamer, 1985). Sims (1986) and Bernanke (1986) suggest that theoretical restrictions may not necessarily be upper or lower triangular. This approach, however, is not without criticism. According to Demiralp and Hoover (2003), economists typically employ a priori knowledge to choose contemporaneous causal orders; there is no explicit empirical or statistical basis for this. Different restrictions result in different SVAR models (for the original VAR model), all of which are observationally equivalent. Given that each model has the same reduced form and likelihood function, which model should be chosen? Outside knowledge assists

researchers in selecting between the models, but where does this knowledge come from? Economic theory and institutional knowledge allow researchers to interpret correlations as causation in the SVAR models (Céspedes et al., 2015). In SVAR models, three sets of variables are considered; the information set, the policy instrument, and the variables whose values are unknown until the policy is implemented. (Fragetta & Melina, 2013). However, there is no unanimity in the content of the information set made available to the monetary authorities. One group of scholars contends that policymakers have enormous data estimates available on economic activities and prices, which provide a clear picture of the economy's health (Christiano et al., 1996; Fragetta & Melina, 2013). Others believe in the use of high-frequency data (Garratt et al., 2003; Kim & Roubini, 2000; Sims & Zha, 2006). For instance, Sims and Zha (2006) argue that only MS and prices are available to the central bank (CB) when deciding the MP, whereas data on output is available with a lag. Both approaches have reasonable arguments, making it difficult to decide which should be preferred. Furthermore, specific contemporaneous causal orderings are rarely discussed in economic theory.

Typically, economists use plausible stories to explain how one variable impact another at the same time. According to Demiralp and Hoover (2003):

> *"The problem with this approach is that sometimes equally plausible stories can be told for competing causal orderings… it is also ironic that a method that originated as a way of getting away from incredible identifying restrictions relies so heavily on hardly more credible stories to identify contemporaneous causal ordering".*

Demiralp and Hoover (2003) further claim that all exactly identified SVAR models are observationally equivalued and derived from the same VAR. On the other hand, although the over-identified SVAR models belong to an equivalent class, they are distinct from the just-identified SVAR and each other. As a result, data can be used to

determine the variables' contemporaneous causal relationships. Consider the following data generation process (DGP) to gain a better understanding of this:

$$C(L)X_t = E_t \tag{1.3}$$

Where E_t A vector of error terms and C(L) is a conformable matrix with the lag operator. The covariance matrix is diagonal, and C (0) is the lower triangular matrix, with one (1) on the main diagonal and zero (0) for some elements in the lower triangle. Furthermore, the error terms are independent. As a result, the SVAR model can be represented as:

$$C_0 X_t = \vartheta + \sum_{i=1}^{p} C_i X_{t-i} + E_t \tag{1.4}$$

If C_0 is invertible, the reduced form of equation 1.3 becomes:

$$X_t = \beta + \sum_{i=1}^{p} D_i X_{t-i} + \mu_t \tag{1.5}$$

Where, $\mu_t \sim N(0, \Sigma) and\ E(\mu_t, \mu'_s) = 0, \forall\ t \neq s$

In this case, μ_t is a reduced form of residuals, and β is a vector of constants. It is assumed that $\varepsilon_t \sim N(0, \Omega), where\ \Omega\ is\ diagonal.$ Furthermore, the following identities establish the relationship between equations 1.1 and 1.5:

$\beta = {C_0}^{-1}\vartheta$, $D_i = {C_0}^{-1}C_i$, $\mu_t = {C_0}^{-1}\varepsilon_t$, $\Sigma = {C_0}^{-1}E(\varepsilon_t, \varepsilon'_s)({C_0}^{-1})' = {C_0}^{-1}\Omega({C_0}^{-1})'$

It is worth noting that the structure of SVAR and the independence of ε_t, allow for independence, interdependence, and conditional independence among $u_{it.}$ However, multiple SVAR models can be obtained by employing different identification constraints, which may differ from the DGP. In the mid-1980s, the graph-theoretic (GT) technique becomes popular for determining the true causal relationship between variables (Lauritzen, 2001; Pearl, 2000a; Spirtes et al., 2000). GT approach is widely utilized in other disciplines but is uncommon in economics (Céspedes et al., 2015).

Awokuse and Bessler (2003) propose that the identification restrictions given by "Direct Acyclic Graphs" (DAG) may yield theoretically consistent IRFs, which play an important role in policy analysis. Arrows are used in DAG to connect causal variables to their effects, implying conditional independence or dependence between the variables. Moreover, we can describe the DGP graph by imposing constraints on the Covariance matrix.

The DAG analysis frequently use a PC algorithm (Spirtes et al., 2000) which begins with an undirected graph of the variables and then analyses the contemporaneous causal relationships among the variables in two stages. First, it removes edges between variables that have no significant partial correlation. Later, during the "orientation phase," it adheres to the adjacent and d-separation rules. If X and Y are connected and have an edge, they are adjacent. De-separation, on the other hand, states that a variable Z is said to de-separate X from Y, if and only if it blocks from X to Y. Consider the following example to grasp the concept of de-separation and conditional independence.

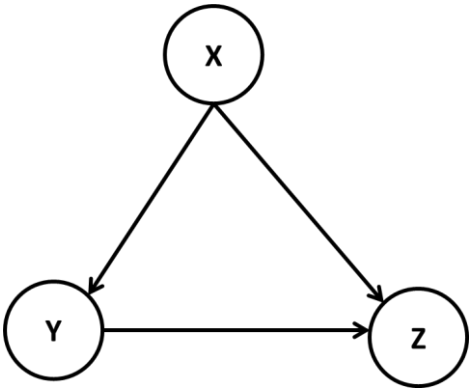


Figure 1.3 Direct Acyclic Graphs

Suppose there are three variables: X, Y, and Z. If there is a chain: X→ Y→ Z (X causes Y and Y causes Z); Y screens X from Z or we can say that X and Z are independent, conditional on (X⊥⊥ Z |Y). If Y blocks from X to Z, then Y de-separate X from Z. Similarly, if there is a fork: Y ←X→ Z, then X is the common cause of Y

and Z. This indicates that Y⊥⊥ Z |X. Furthermore, if there is an inverted fork X→ Z ← Y then Z is the unshielded collider on the path XZ Y[1]. This implies that X⊥⊥Y |Z.

Spirtes et al. (1993) design a PC algorithm in TETRED to integrate d-separation in DAG. The PC algorithm begins with an unconstrained set of associations between variables. Later, it removes variables' edges based on zero or partial conditional correlations. The detailed technique is covered in the second chapter.

The present study adds to the empirical literature by identifying the SVAR model using the causal search method-DAG. Our approach differs from the traditional SVAR identification approaches. Rather than depending exclusively on "economic theory" or "institutional knowledge," we accept David Hendry's ideology. According to David Hendry, empirical research serves a “constructive role” in understanding the dynamics of an economy. On the other hand, economic theory is frequently insufficient to guide the truth in most crucial economic problems (Mizon, 1995). In a nutshell, data should be used to discover the truth with little help from economic theory. Another intriguing aspect of this dissertation is its use of an encompassing methodology, albeit not in the strict sense, but in the sense that we cover and synthesize all previous results using a common framework and explain it from the perspective of the final models estimated in the study.

1.2. Overview of the Study

The present dissertation is divided into three essays. The first essay examines the effectiveness of the monetary transmission mechanism (MTM) in a small open economy. Nonetheless, economists acknowledge the importance of MP in the short run. However, there is some dispute in the MTM channels. Empirical research yields

[1] On the other hand, shielded collider has a direct link between X and Y.

inconsistent results. Some research, for example, concludes that IRC is effective in Pakistan (Agha et al., 2005; Munir & Qayyum, 2014), whereas others conclude that IRC is useless in curbing rising inflation (Javid & Munir, 2010; Rashid & Jehan, 2014; Shaheen, 2020). Similarly, some studies support CRC (Agha et al., 2005; Mukhtar & Younas, 2019). External variables are also addressed in recent literature as a contributing component that leads to changes in output and inflation (Khan & Ahmed, 2011; Nizamani et al., 2017).

We create an open economy SVAR model to address these concerns. The SVAR model is a common approach for analyzing the dynamic effects of MP shocks in an economy. In addition, we impose identifying restrictions based on DAG analysis. According to Awokuse and Bessler (2003), the identification constraints imposed by the DAG analysis may provide theoretically coherent IRFs that can play an essential role in policy analysis.

Furthermore, the study focuses on the effectiveness of the interest rate channel (IRC), credit channel (CRC), exchange rate channel (ERC) and money channel (MNC), utilizing monthly data from January 1996 to June 2018. Further, the study has also examined the impact of external shocks on different macroeconomic variables. Further how MP respond to the external shock. Another intriguing aspect of this study is the use of recently estimated data on the "industrial production index" (IPI) by Ejaz and Iqbal (2019). Because monthly GDP data for Pakistan is unavailable, IPI is utilized as a proxy. Previously, academics relied on the large-scale manufacturing (LSM) index as a proxy for IPI, even though LSM accounts for only 10% of GDP.

Finally, we employ the block exogeneity (BE) assumption. While researching the efficiency of MTM in Pakistan, a few studies took BE assumptions into account. In a small open economy, foreign factors (in our example, international oil prices) can

affect domestic variables simultaneously and with lags, according to the BE assumption. Domestic variables, on the other hand, cannot have an immediate or delayed effect on international variables. Because Pakistan is a small open economy, this assumption makes our analysis more plausible. The study concludes that rising oil prices are driving up inflation in Pakistan. Furthermore, the IRC is effective at controlling inflation. Moreover, the study does not witness any price or exchange rate (ER) puzzles. It confirms that the identifying restrictions proposed by the DAG are effective. Money, according to our findings, plays a role in increasing output in Pakistan. The CRC and ERC, on the other hand, are ineffectual at attaining MP objectives. It implies that monetary authorities can utilize interest rates to control inflation.

However, which policy is more effective in accelerating aggregate demand (AD) and its different components, such as private investment (PI), government consumption spending (GC), and private consumption (PC)? Is GC crowding out PC and PI? What is the impact of each component of AD on output and inflation? In the second essay, we investigate these issues using annual data from 1976 to 2019 and the SVAR-DAG approach. The study observes that MP is effective at stimulating output and inflation. Interest rates are more effective in combating inflation. MS, on the other hand, works well in the long run for AD.

Further, disaggregated analysis shows that the interest rate shock significantly affects investment in the short run, and the MS shock significantly increases PC in both the short run and the long run. In addition to this, the study notes that MS shock positively affects GC and PI in the long run. Furthermore, the study observes that a positive PC shock significantly increases PI. However, the effect of the PI shock on other components of AD is not considerable, but it helps limit inflation. There is no

strong evidence to support the hypothesis that GC crowds out PI. In contrast, structural impulse response functions (SIRF) demonstrate that GC crowds in PI. Nevertheless, the findings are trivial. Thus, more investigation is required.

The third essay re-examines the CRC using monthly data from June 2006 to June 2018. Furthermore, the study investigates the "Finance-Growth nexus" by using data on credit to the private sector (CPRVS) to assess financial development (FD) and IPI to measure EG. The study explores the crowding-out hypothesis, but from a different perspective. Rather than examining the influence of GC on PI, we examine the impact of excessive government borrowing from commercial banks on credit to the private sector (CPRVS) in Pakistan. The study also investigates how the economy responds to a positive shock to BCG and CPRVS.

Our findings support previous research indicating that the CRC is ineffective. Furthermore, the study confirms the demand following hypothesis, which claims that when the economy grows, FD happens. The study also lends credence to the crowding-out hypothesis, which holds that excessive government borrowing drives out commercial bank lending to the private sector. It also suggests that the government should reduce its reliance on commercial banks for financing in order to free up resources for the private sector, which could increase EG.

1.3.Organization of the Study

The present study is organized into five chapters. The second chapter deals with the effectiveness of the MTM. The third chapter examines the impact of MP on the aggregated and disaggregated analysis of AD. The fourth chapter is devoted to the disaggregated analysis of credit, and its impact on output and inflation. Finally, the fifth chapter concludes the study with suitable policy recommendations.

CHAPTER 2

ESSAY 1: REINVESTIGATION OF MONETARY TRANSMISSION MECHANISM: SVAR-DAG APPROACH

2.1. Introduction

The main goal of the MP is to uphold a stable price level, full employment and promote EG (via investments). However, the impact of money on real economic variables is always controversial. Prior to Keynes, economists believed in the classical dichotomy: money only affects prices and has no impact on the real sector. However, Keynes argues that money has both short-run and long-run real effects. Monetary policy can be used to create full employment and to stimulate growth by encouraging productive investment. Later, Chicago school economists dispute the theories of Keynes, and argue for the neutrality of money in the long run. Also, they argue that the short-run effectiveness of money is illusory – it might temporarily reduce unemployment, but this would be short-lived as the economy returns to its natural rate, together with an increase in the rate of inflation.

Following a successful attack on Keynesian ideas by the Chicago school, there was an attempt to revive Keynesian ideas in the Neoclassical Synthesis (NS) of "sticky-price models," Monetarists and New-Neoclassical Synthesis (NNS) believe in the effectiveness of the MP in stimulating real economic activities. On the other hand, the Chicago school views, which maintain the neutrality of money, are represented in the dominant approach to macro via Real Business Cycle (RBC) Models. RBC theorists believe in flexible prices, and the ineffectiveness of MP in stimulating economic activity. Currently, there seems to be a near consensus among economists that MP is

ineffective in the long run. However, its short-run effects on real economic activities are still under debate (Walsh, 2017). Especially when any economy is experiencing low growth and high inflation, MP and the channels of MTM require a thorough investigation.

Generally, MTM is based on the MP framework, the state of the economy, and the structure of the financial system. In the literature, different channels are discussed, which help in achieving stable inflation with sustainable EG. However, there is no agreement on which channel is effective in achieving the desired objectives of MP. Several channels operate simultaneously in the economy. Due to this complex nature, Bernanke and Gertler (1995) called MTM a "black box." Nevertheless, some key channels are the interest rate channel (IRC), exchange rate channel (ERC), asset price channel (APC), credit channel (CRC), etc. (Mishkin, 1996).

To investigate the effectiveness of the MP, and to test the impact of any shock on other variables like output and prices, SVAR models, pioneered by Sims (1980), are being extensively used in the literature. The prominent studies for advanced countries are Christiano et al. (1999) for the US, Kim and Roubini (2000) for G-7 countries, Peersman and Smets (2001) for the Euro area among others. However, for the emerging and middle-income countries (EMICs), MTM gained considerable attention since 2000, when EMICs start adopting market-oriented policies and structural and economic reforms. Some of the prominent studies based on EMICS are Afrin (2017); Ahmed and Islam (2004); Alam (2015); Forhad et al. (2017); Rahman (2015) for Bangladesh, Céspedes et al. (2008); Céspedes et al. (2015) for Brazil, Shokr et al. (2019) for Egypt, Barnett et al. (2016); Kubo (2009); Mohanty (2012) for India, Afandi (2005); Prabheesh and Rahman (2019); Subagyo and Witjaksono (2017) for Indonesia, Karim and Karim (2014); Raghavan et al. (2012); Zaidi and Fisher (2010) for Malaysia, Arwatchanakarn

(2017); Disyatat and Vongsinsirikul (2003) for Thailand, Pham and Sala (2020)for Vietnam, etc.

However, for Pakistan, the literature on MTM is in a nascent stage. Recently, some studies used the SVAR framework to observe Pakistan's MTM, like Agha et al. (2005); Hussain (2009); Javid and Munir (2010); Khan and Ahmed (2011); Munir and Qayyum (2014); Nizamani et al. (2017); Nizamani et al. (2016); Shaheen (2020), etc. However, there is no general agreement on which channel is more effective in accelerating output and stabilizing inflation in Pakistan. For instance, some studies observe that IRC is effective (Agha et al., 2005; Munir & Qayyum, 2014), while others observe the price puzzle[2] (Agha et al., 2005; Javid & Munir, 2010; Rashid & Jehan, 2014; Shaheen, 2020).

Another strand of the literature suggests that ERC is effective in Pakistan (Hussain, 2009). However, another group believes in the effectiveness of CRC (Agha et al., 2005; Mukhtar & Younas, 2019). On the other hand, Shaheen (2020) observes that broad money is effective in enhancing economic activity in the long run. In contrast, the reverse repo rate plays a significant role in controlling inflation in the long run and accelerating EG in the short run. Additionally, studies show that external factors also substantially impact output and prices (Khan & Ahmed, 2011; Nizamani et al., 2017).

Hence, there is no unanimous agreement on which channel of MTM is effective in Pakistan. Different studies reached different conclusions. Further, there are three possible reasons for getting contradictory results. First, the SVAR models either use

[2] It is generally believed that tight MP (increase in interest rates) lowers the inflation rate. However, when tight MP put inflationary pressures on an economy, this phenomenon is known as the price puzzle.

Cholesky decomposition or economic theory for identification. Different studies identify SVAR based on a different set of assumptions and hence reach different conclusions. To be more precise, SVAR's requires assumptions about contemporaneous causality, and different assumptions can lead to different results. Thus, it is crucial to investigate these causal assumptions, and that is precisely what the DAG methods allow us to do. Recently, the data-generating causal search algorithm has gained significant attention for identifying the SVAR models. However, no study so far adopts this technique to identify SVAR models to investigate the MTM in Pakistan. Secondly, most of the open economy SVAR models do not consider the "Block exogeneity" (BE) assumption[3]. Thirdly, high-frequency data on NIA are not available for Pakistan. For this reason, researchers rely on quarterly estimates on GDP either developed by Arby (2008); Hanif et al. (2013); Kemal and Arby (2004) or use different econometric methodologies to convert yearly data into high-frequency data (Rashid & Jehan, 2014).

Moreover, for monthly data on GDP, the industrial production index (IPI) is internationally used as a proxy for monthly GDP. Unfortunately, data on IPI is not available, and policymakers and researchers rely on the large-scale manufacturing index (LSM), which is part of total industrial production and only accounts for 10% of the GDP (Ejaz & Iqbal, 2019). Hence, different data proxies, along with varying schemes of identification without looking at the actual causal mechanism, may lead to a different conclusion.

[3] Block exogeneity assumption implies that: As Pakistan is a small open economy, it's important to assume that foreign variables can impact domestic variables, but domestic variables do not affect foreign variables either contemporaneously or with lag. Mostly studies do not properly implement this assumption, except a few. Further details are available in the literature review section.

Keeping in view the limitations of the previous studies, the main objective of this essay is to analyze the effectiveness of the different channels of MTM by using an advanced approach called “SVAR-DAG”, with a special focus on the IRC, ERC, CRC, MC, and OPC of the MTM.

To be more specific, the study intends to investigate the following questions.

1. Is the IRC effective in stimulating EG and curbing inflationary pressure in Pakistan?
2. Is the CRC effective in Pakistan?
3. Does the ERC effectively accelerate output and control inflation in Pakistan?
4. Does a positive monetary aggregates shock accelerate output and lead to inflationary pressures in Pakistan?
5. What is the impact of the oil price shock on the other macroeconomic variables?
6. How does monetary policy respond to the oil price shock?

The present essay contributes to the empirical literature on three fronts. Firstly, a small open economy SVAR model is formulated with BE assumptions by following Cushman and Zha (1995). Secondly, instead of using Cholesky decomposition or economic theory to identify the SVAR model, we use a data-oriented procedure, i.e., "Directed Acyclic Graphs" (DAG), developed by Spirtes et al. (1993). It uses the residual covariance matrix of the reduced-form vector autoregressive (VAR) model as an input. It applies the Peter-Clark (PC) algorithm to find contemporaneous restrictions to identify the SVAR model. Another distinguishing feature of the present study is the use of the latest data on the "Industrial Production Index" (IPI), estimated by Ejaz and Iqbal (2019).

Pakistan is experiencing high episodes of inflation, domestic and external debt, and budget deficit, with low EG along with a fragile economic and political structure, weak financial markets, and discretionary policies by the SBP. In this scenario, it is essential to understand how SBP can stabilize the economy. Moreover, which channel is effective in transmitting the effects of MP to achieve the desired objectives? The present study observes that a positive oil price shock leads to inflation, and contractionary MP (increase in RDR) is effective in controlling inflation. Moreover, our identification schemes work well, and the study does not observe any price or ER puzzles. The study also observes that the IRC is ineffective at stimulating output. Whereas monetary aggregates play a minor role in accelerating output. On the other hand, CRC and ERC are ineffective at achieving MP goals.

The present essay is organized as follows. The next section presents the stylized facts about the MP of Pakistan. A theoretical and empirical review of the literature is discussed in the third section. The fourth section deals with methodology, whereas in the fifth section, empirical results are discussed, and the last section concludes the study.

2.2.Overview of the Pakistan Monetary Policy

The main objective of the MP of Pakistan is to promote EG and stabilize prices. The government of Pakistan sets real GDP growth and inflation targets, whereas SBP sets policy rates to achieve its objectives. Pakistan has experienced many changes in its MP stance, according to evolving theoretical conceptions of the role of monetary policy, as well as structural developments within the country and dynamic changes in the global market. During earlier times, monetarist ideology remained dominant in MP decisions. Policymakers believe in the Phillips curve, a stable relationship between inflation and monetary aggregates. Hence, to control inflation and to smooth economic

fluctuations, the SBP uses a constant money growth rule. To achieve the desired objective, SBP uses M2 as an "intermediate target" and M0 as an "operational target."

Later, structural changes, financial innovations, and advancements in financial technologies weakened the relationship between money and inflation (Moinuddin, 2007). Due to these structural issues and the breakdown of the money and inflation relationship, SBP gradually moved from monetary aggregates to an eclectic approach. Before the1990s, MP played a minimal role. It provides subsidized loans to the priority sectors of the economy. SBP announced credit plans under the National Credit Consultative Council (NCCC) (Naqvi, 2018). However, in the early 90s, the government introduced many "financial reforms." Some are as follows:

1. More autonomy for SBP and reduced government role,
2. Privatization of commercial banks,
3. The establishment of domestic bond markets,
4. Introduction of bonds in the international market,
5. Maintenance of substantial foreign exchange reserves,
6. Elimination of direct intervention in the market
7. Allow market forces to manage the money and credit system (Hanif, 2014).

In 1992, SBP introduced the auction of 6-month treasury bills and introduced a 3-day Repo facility to provide liquidity to commercial banks. The reverse repo rate was used as a policy instrument at that time. Commercial banks are allowed to extend credit following indicative annual targets of monetary aggregates based on government set targets under the NCCC. Later on, SBP introduced a new system based on the credit-deposit ratio, which defines credit limits for commercial banks. Furthermore, in 1995, SBP took another step towards financial liberalization (FL) by introducing monetary aggregates as annual targets for credit extension and abolishing the credit-deposit ratio.

Another critical step towards FL is to leave ER in the foreign exchange market since May 1999 and develop primary and secondary markets for government securities (both medium to long-term securities).

Later on, in 2006, the SBP used short-term interest rates (STIR) to control inflation. Further, SBP abandoned credit planning and replaced NCCC with the "Private Sector Credit Advisory Committee" to ensure the accessibility of credit to major sectors, especially the agriculture and industrial sectors. In 2009, SBP introduced an interest rate corridor system (IRCS) to ensure that the "overnight money market repo rate" moves within the corridor[4]. Further, SBP uses open market operations to restrict the market repo rate to remain in the corridor. Moreover, SBP stopped targeting M2 growth in 2010. Now, various instruments are utilized to signal the MP stance, such as the discount rate, cash reserve requirement, statutory liquid ratio, and the provision of subsidized loans to priority sectors (Hanif, 2014).

SBP announces MP every alternate month. To make MP closer to international practices. In November 2015, Parliament amended the SBP Act 1956 to set up a committee of 9 members[5] to formulate, support, and recommend MP. SBP's strategic plan for 2016-2020 is to implement a flexible inflation targeting framework that balances price stability with EG.

[4] Here, the SBP repo rate is considered as the floor and the reverse repo rate (discount rate) as the ceiling.

[5] SBP monetary policy members consist of three SBP senior executives, three SBP board members, and three external experts.

2.3.Literature Review

The literature review is divided into two parts. The first part deals with the theoretical review of the literature and the second part comprises empirical evidence on the MTM with particular reference to Pakistan.

2.3.1. Theoretical Review of Literature

The effectiveness of MP remains a controversial and disputed issue in macroeconomics. Disagreement arises not only about the efficacy of MP but also about the effectiveness of different channels of MTM. In this section, we briefly review the role of MP in the different schools of thought, along with the critical channels of MTM.

2.3.1.1.Role of MP in Key Macroeconomic School of Thoughts

Generally, monetary economists believe that MP is ineffective in the long run[6]. However, for the short-run effectiveness of MP, there are two views. The first group of economists believes in the effectiveness of MP in stimulating economic activities and stabilizing prices (Monetarist, Neoclassical Synthesis (N-S), and New Neoclassical Synthesis (NNS)). Whereas the second group of economists believes in the ineffectiveness of MP (RBC models). In this section, we have briefly reviewed both groups.

2.3.1.1.1. The Neoclassical Synthesis

Neoclassical Synthesis (NS) is an amalgamation of Keynesian and neoclassical views. It is also known as the New-Keynesian model, as it took the ideas of Keynes and synthesized them with the neoclassical models. Paul Samuelson was among the

[6] However, Keynes believes that money matters, both in the short run as well as in the long run.

pioneers. The NS remained dominant in the 1950s-60s[7]. The standard IS-LM model is the contribution of the NS provided by Hicks. The standard IS-LM model assumes sticky prices and wages. An increase in the money supply (MS) shifts the LM curve rightward, while it does not affect the IS curve. Hence, interest rates decrease to stabilize the economy; as a result, output accelerates.

On the other hand, the IS curve links interest rates and output. An increase in aggregate demand shifts the IS curve rightward to stabilize the economy. As a result, the interest rates decrease and output increases. In the background of the ISLM model, prices are assumed to be constant. However, in reality, prices fluctuate. Hence, the high inflation episodes of the 1970s question the applicability of the ISLM model. Consequently, the Phillips curve became the central part of MP analysis.

The Philips curve[8] relates prices to the unemployment level. NS believes that MP can control inflation. However, it can lead to instability in *financial intermediary-dependent* sectors like households and small firms. Hence, NS argues that MP can control inflation and play a supporting role along with fiscal policy. Further, direct credit controls play an essential role as compared to interest rates in stimulating EG. However, NS dominated mainstream economics through the 1950s and 1960s. Nevertheless, in the 1970s, the economic recession created the phenomenon of stagflation, which contradicts NS predictions. However, it conforms with Chicago School ideas due to Friedman and led to an eclipse of NS and the rise of the Monetarist Views of the Chicago School.

[7] Samuelson's Economics (1955 edition) presents the early idea of N-S. In its later edition of 1967, it presents the mature synthesis.

[8] Phillips Curve states that there is an inverse relationship between unemployment and inflation rate.

2.3.1.1.2. Monetarism paradigm

The Philips curve came under severe criticism in the 1970s. The two main reasons for the breakdown of the Philips curve relationship are the (i) high inflation episode- which subsequently ended the Bretton Woods system, and (ii) oil price shock of 1973. The breakdown of the stable unemployment-inflation trade-off gives room for "monetarism" to emerge. Friedman and Schwartz (1963) came up with the idea of a positive relationship between money and EG. Later on, Friedman (1968) and Tobin (1970) provide empirical evidence that money does play a significant role in stimulating output.

Monetarists believe that an increase in MS causes inflation. Hence, to control MS, the CB should use reserve requirements. The Monetarist ideology is entirely different from NS. NS believes that CRC should be used through interest rates to stimulate output and to control inflation. Whereas monetarists believe in the use of monetary aggregates to control inflation and output. For a long time, the CB emphasized monetary aggregates as a policy tool.

However, in the late 1970s, the second rise in oil prices questioned the relationship between money and inflation. Hence, in the early 80s, the monetarist idea of using MS as an intermediate target was abandoned[9]. Moreover, CB realized that MS is now endogenously created by the commercial banks and is not in the control of CB. As a result, MS was abandoned as a target, and the interest rate is used as an alternate instrument by MP.

[9] It was the experience of Paul Volker, who tried to implement MS rules as a target and failed.

2.3.1.1.3. Real Business Cycle School

The failure of monetarist policies gave room to the real business cycle (RBC) school. The RBC model postulates that the economy is always at its natural level of output. Any exogenous shock, for instance, technological shock, if it is above average, leads to a boom, and if it is below average, leads to a recession. Hence, in the RBC model, there is no role for monetary or fiscal policy.

Sims (1980) asserts that the interest rate has strong predictive power as compared to money. The study observes that M1 explains 37% of the variation in IPI on a two-year horizon. However, when it includes the interest rate in the model, the predictive power of M1 decreases, and only explains 4% of the variation in IPI. Sims (1980) concludes that interest rates absorb the explanatory power of M1, and hence are a good predictor of output. The same results are also found by Litterman and Weiss (1983) and Sims (1992), among others. This supports the Chicago school idea of neutrality of money, and the ineffectiveness of conventional monetary policy based on targeting the money supply.

2.3.1.1.4. New neoclassical synthesis and New Consensus Macroeconomics

The high inflation episodes of the 1970s led to a shift in the MP's stance from monetary aggregates to interest rates to target inflation. This shift reflects the fact that macroeconomics has now moved towards "New Consensus Macroeconomics" (NCM) since 1990. NCM is deeply rooted in NNS. NNS combines the ideas of Keynesian philosophy (microeconomic foundations by using prices and output decisions), elements of RBC models, and Classical ideology (decisions on consumption, labor supply, and investment). Further, it also recognizes the monetarist view of the effectiveness of MP in the short run. NNS assumes that prices are sticky. Hence,

aggregate demand (AD) determines real economic activity in the short run. (Goodfriend & King, 1997).

Similarly, NCM assumes that MP affects the real side of the economy through the steady price adjustment. However, there is little empirical support for the trade-off between inflation and EG in the long run. Price stability is crucial for the efficiency of MTM. Lastly, NCM is based on rational expectations, which requires the transparency of MP. NCM and monetarists both agree on the effectiveness of MP in the short run and their ineffectiveness in the long run. However, they disagree about the instrument of MP. The NCM suggests that the interest rate should be used as an instrument to adjust the economy. In contrast, monetarists argue that monetary aggregates should be MP instruments.

2.3.1.2.Transmission Mechanism of Monetary Policy

The MTM models how MP instruments affect macroeconomic variables like real output, prices, and the employment level of an economy (Mishkin, 1996; Taylor, 1995). Theoretically, there are several possible channels for MTM. However, the most popular channels in the literature are IRC, ERC, APC, and CRC (Mishkin, 1996). These channels of MTM are categorized in different ways. For instance, Taylor (1995) divides channels into two categories. The first is "financial market prices", which consists of STIR, bond yield, and ER. Whereas the second is "financial market quantities". It contains MS, credit supply, government bond supply, and foreign-denominated assets. Another categorization of MTM is presented by Boivin et al. (2010). Boivin et al. (2010) characterize channels into two broad categories based on market conditions, i.e., (i) neoclassical channels (NCC) with a perfect market and (ii) non-neoclassical channels (NNCC) with an imperfect financial market.

NCC includes ERC and IRC that build on consumption, investment, and trade models. Moreover, it also includes Tobin Q theory, wealth effect, and intertemporal substitution. Whereas the NNCC mainly deals with the credit views of MP. It includes government interventions in the credit market. The NNCC refers to the credit view, which includes primarily bank lending and balance sheet channels, which affects firms and households. Moreover, the role of government intervention in credit supply is also a key concern for NNCC. Besides these channels, some economists also propagate the role of the expectation channel in understanding MTM. (Ball & Croushore, 1995; Roberts, 1998; Svensson, 1999). Perera and Wickramanayake (2013) argue that these channels are not mutually exclusive, as the overall impact of MP integrates the influence of a variety of channels. Further, the effectiveness of these channels also depends on the economic and financial system of the economy.

Generally, economists agree that MP affect output and prices in the short run. However, there is no agreement on which channel is effective in transmitting the impact on the economy. The present study intends to investigate the effectiveness of the IRC, ERC, CRC, MC, and OPC in accelerating output and controlling inflation in Pakistan. Subsequent sections briefly review these channels.

2.3.1.2.1. Interest Rate Channel

The Interest Rate Channel (IRC) is the standard Keynesian interest rate view of MP and its impact on the economy. In tight MP, CB decreases MS[10]. As a result, the real interest rate increases, which makes capital more costly, and hence investment decreases, which further reduces aggregate demand (AD) and output in the economy.

[10] Nowadays, most of the money supply is endogenously produced. According to the Bank of England, 90% of the MS is created by commercial banks. So, this concept of an increase in money supply by the CB loses its importance. So now, tight monetary policy simply implies an increase in policy rates.

Later on, Taylor (1995) at the "Symposium of monetary transmission mechanism" argues that the interest rate is the critical channel for understanding the MTM. He argues that when the CB raises STIR, the long-term interest rate (LTIR) also increases due to the combination of sticky prices and rational expectations. An increase in real interest rates decreases business fixed investment, inventory investment, residential housing investment, and consumer expenditure on durable goods, which negatively affects AD.

2.3.1.2.2. Credit Channel

Bernanke and Gertler (1995) assert that the IRC lacks empirical validity. It is challenging to identify interest rate effects in terms of the cost of capital. Due to a lack of practical support, Bernanke and Gertler (1995) present the credit channel (CRC) of MTM. CRC works through the bank lending channel (BLC) and the balance sheet channel (BSC). Banks play an essential role, especially in providing funds for small firms that do not have access to full information. In contrast, large firms can get funds from the stock and bond markets, even without utilizing the banking channels.

According to the CRC, changes in MP on one hand, affect firms' ability to borrow money, while, on the other hand, they affect banks' ability to lend money. Two main factors determine the strength of the CRC. The first is the degree to which the CB allows commercial banks to lend money, and the second is the borrowers' dependence on commercial banks for loans. The contractionary MP decreases bank reserves and deposits. As a result, bank loans are also reduced, and firms fail to get the desired loan for investment. Hence, investment and output decrease.

2.3.1.2.3. Exchange Rate Channel

When the CB adopts a contractionary MP (increases interest rates), the domestic currency appreciates and is more attractive as compared to foreign currency deposits. Due to currency appreciation, domestic goods become expensive for foreigners, and foreign goods become cheaper for locals. As a result, exports decreased, and imports increased. Hence, net exports and output decrease.

2.3.1.3.External Shocks: Oil Prices

The rapid increase in oil prices negatively affects oil-importing countries. As oil is the primary import of Pakistan, it not only affects consumers either by the rise in energy bills or by the increase in the prices of food items, transportation, etc., but it also hurts investors by increasing the cost of production. As a result, the price level increased, and AD decreased. Hence, it led to a rise in inflation and a fall in output. To fight the recession, the CB can use the MP tool to minimize the negative impact of oil price shocks. For instance, The CB decreased interest rates to control the cost push inflation and to promote employment and economic growth. On the other hand, if the CB increases interest rates, it may further increase inflation.

2.3.2. Empirical Review of Literature

SVAR models are commonly used in the literature to explore the impact of MP on various macroeconomic variables, following the seminal work of Sims (1980). However, to date, economists do not agree on which channel is effective in stimulating EG with a stable inflation rate. In this section, our focus is on the:

1. Review of empirical studies on Pakistan
2. Reasons for getting contradictory results
3. To propose a way forward.

Since the 1990s, Pakistan has experienced substantial shifts in the MP and financial system. However, empirical studies on the effectiveness of MTM are few in number (Shaheen, 2020). Existing studies mainly use VAR or SVAR models. Moreover, to identify the SVAR model, either Cholesky decomposition or economic theory are used and hence lead to different policy recommendations. For instance, Agha et al. (2005) estimate the close economy SVAR model using recursive Cholesky decomposition and conclude that IRC and CRC play a significant role in stimulating EG and controlling inflation. Moreover, the study observes a price puzzle[11].

Similarly, Alam and Waheed (2006) investigate the MTM at the sectoral level and note that different sectors respond differently to monetary shocks. Later on, Khan (2008b) investigates the impact of a real demand shock (measured as a shock to the interest rate) and a nominal shock (measured as a shock to monetary aggregates and ER) on output and inflation using the SVAR approach. The study suggests that real demand shocks strongly impact output as compared to nominal shocks in the short run. However, nominal shocks play a dominant role in explaining the variation in inflation. On the other hand, Hussain (2009) observes that the ERC is more effective at controlling inflation and shrinking the output gap, as compared to the IRC, CRC, and government expenditure.

In contrast to earlier studies, Javid and Munir (2010) observe price and ER puzzles while estimating the SVAR model for Pakistan. The study notes that contractionary MP led to an increase in inflation over a 48-month horizon, which implies that MP is not effective in controlling inflation. Moreover, the study notes that MP shocks instantaneously accelerate output and deaccelerate later and do not play a

[11] An increase in interest rates leads to an increase in inflation.

dominant role in explaining EG fluctuations. In this situation, the high-interest rate discourages private investment, which further worsens the situation. Hence, tight MP is not the only solution to control inflation.

Moreover, Khan and Ahmed (2011) observe the impact of the global food and oil price shock on macroeconomic variables using SVAR methodology on data from Jan 1990 to July 2011. The study employs generalized impulse response functions and observed that an oil price shock puts negative pressure on industrial production and appreciates the real effective exchange rate (REER). Moreover, interest rates and inflation respond positively to both oil price and food price shocks. However, all the responses to the oil price shocks are insignificant except for the REER. Nevertheless, one serious limitation of Javid and Munir (2010) and Khan and Ahmed (2011) is that both studies did not consider block exogeneity assumption while employing the SVAR approach.

Chaudhary et al. (2012) employ co-integration and causality methods and assert that credit to the private sector, real ER, and the budget deficit are significant contributors to real EG fluctuations. Similarly, Rashid and Jehan (2014) examines the impact of MP shocks (measured as STIR and M2) on output, inflation, and ER. The study employs ECM and cointegration techniques on the quarterly data of the Pakistan economy covering from 1980 to 2009. The study concludes that IRC plays a significant role in stimulating EG. However, monetary aggregates play a substantial role in stabilizing prices and ER as compared to IRC. The study also observes the price puzzle, whether it is an open economy or a closed economy model[12]. Moreover, it also notes

[12] Price puzzle means an increase in interest rates leads to an increase in inflation rate.

that a positive MS shock first leads to ER appreciation, followed by depreciation, and hence confirms the overshooting hypothesis.

On the other hand, Munir and Qayyum (2014) estimate the Factor Augmented VAR model by collecting data on 115 variables from Jan1992 to Dec 2010. The study notes that the interest rate is more effective in controlling inflation in Pakistan. Moreover, there is no price or liquidity puzzle. Similarly, Nawaz and Ahmed (2015) observe that MP is not effective in lowering the output gap. However, it is useful in reducing inflation, hence no price puzzle exists. Moreover, the study notes that MP take 6 to 18 months to reduce demand pressures.

On the contrary, Ahmad et al. (2016) argue that monetary aggregates are significantly associated with output either measured as GDP or LSM at quarterly frequency. However, if we use annual data, then monetary aggregates significantly lead to inflation as compared to output. Moreover, the relationship between monetary aggregates, output, and inflation improved substantially after 2000. Nevertheless, the study also observes the price puzzle.

As Pakistan is a small open economy, domestic factors cannot influence external factors either contemporaneously or with lag. This point is considered by Nizamani et al. (2016), who constructed a small open economy SVAR model and observed that IRC is effective in the short run, and CRC is effective in both the short and long run. Moreover, the study argues that SBP should use IRC to control inflation and CRC to stimulate output in the long run. On the other hand, Mangla and Hyder (2017) and Nizamani et al. (2017) observe that the oil price shock creates inflationary pressure and deaccelerates EG. Further, the study notes that the oil price shock leads to a rise in interest rates and depreciates the real exchange rate.

Mangla and Hyder (2017) also note that in response to the inflationary shock, the policy rate adjusts upward, and the ER depreciates. Similarly, in response to the ER shock, the policy rate increased. Similarly, Mukhtar and Youns (2019) also confirm the significance of external factors. Further, the study notes that the share price channel and the BLC also play a role in stimulating output. However, IRC is ineffective at stimulating output and also leads to a price puzzle, although their results are not significant.

Recently, Shaheen (2020) argues that the broad money supply plays a significant role in stimulating output for a long time as compared to interest rates, especially in an "easy credit regime". In contrast, the interest rate plays a significant role in stabilizing inflationary pressure in the economy. Moreover, Shaheen (2020) also observes the price puzzle when it takes credit as a threshold. Hence, the study suggests two different policies to achieve the goal of lower inflation at a sustainable output level.

Furthermore, if we take a quick glance at the studies in various nations, we can see that there are varied perspectives on the effectiveness of MTM. Kim and Roubini (2000) use a non-recursive SVAR model and observe the significant effects of MP on output, prices, and ER in Canada, France, Germany, Italy, Japan, and the UK. A similar argument was made by Zaidi and Fisher (2010) in Malaysia. Asides from that Ono (2013) notes that MS significantly impacts real output during boom and recession periods.

Unlike IRC, Kubo (2009) observes that monetary aggregate adjustment plays a significant role in India. Moreover, Ecevit and Kayhan (2011) note that ERC is ineffective in Turkey. Ahmed and Islam (2004) and Younus (2004) observe weak support for the bank lending and ER channels in Bangladesh during the period 1979Q3-2005Q2. While Younus (2004) observes that both channels are ineffective in

Bangladesh by using the VAR model. Alam (2015) notes that an unexpected increase in interest rates leads to a decrease in output and an increase in inflation along with ER appreciation. Hence, the price puzzle exists. Moreover, Afrin (2017) constructs an open economy SVAR model and observes that bank credit, ER, and world rice prices significantly impact EG and inflation. On the other hand, Hossain and Ibon (2020) construct a small open economy SVAR model for Bangladesh and note weak support for the effectiveness of MTM in Bangladesh and conclude that the MP is less effective in stabilizing prices and enhancing economic activity. Similarly, Hachicha and Lee (2009) and Abdel-Baki (2010) observe that IRC is insignificant n Egypt. On the other hand Shokr et al. (2019) use the non-recursive open economy SVAR model and observe that interest rates, money supply, foreign output, and oil prices have significant impact on output, inflation, and ER. Moreover, foreign interest rates significantly affect domestic output and inflation.

2.3.3. Reasons for Conflicting Results and the way Forward

One of the reasons for getting the contradictory results is the identification restrictions imposed by the earlier studies to identify the SVAR model. Generally, in literature, placing constraints is either based on "economic theory" or on "institutional knowledge." Hence, this allows researchers to interpret correlations as causation in the SVAR models (Céspedes et al., 2015). While employing VAR, three sets of variables are available. First is the "information set". It contains those variables which are known to the monetary authorities while taking policy decisions. The second is "policy instrument," and the third includes those variables whose value is known after the policy is implemented (Fragetta & Melina, 2013). However, there is no unanimous agreement on the content of the information set available to the monetary authorities.

Nevertheless, empirical studies can be divided into two groups. The first group, following the "workhorse approach," believes that besides published data, policymakers have a large number of data estimates available on economic activities and prices, which provide them with a clear indication of the health of the economy (Christiano et al., 1996). Hence, it is believed that, among other variables, the CB also contemporaneously observes the estimates of output and prices while making MP decisions. On the other hand, the second group of research named "alternative approach" believes in the inclusion of only high-frequency data in the information set (Garratt et al., 2003; Kim & Roubini, 2000; Sims & Zha, 2006). For instance, Sims and Zha (2006) believe that only MS and prices are contemporaneously available to CB while making MP decisions. In contrast, the output is known to the monetary authorities with a lag. Both approaches provide reasonable arguments, hence, it is challenging to decide which method should be preferred. Fragetta and Melina (2013) argue that it's difficult to impose "a priori short-run identifying restrictions."

Recently, graphical models, especially those grounded in Direct Acyclic Graphs (DAGs), have gained considerable attention for inferring causal relationships. For instance, see Lauritzen (2001); Pearl (2000a); Spirtes et al. (2000) for reference. These techniques are extensively used in other fields, but rare in the economic discipline (Céspedes et al., 2015). In SVAR models, to identify contemporaneous causal order, Swanson and Granger (1997) first used graphical models. Later on, Bessler and Lee (2002) used DAG and ECM to investigate the contemporaneous and lag relationships in the US data. Moreover, Demiralp and Hoover (2003) used TETRAD software to evaluate the Peter-Clark (PC) algorithm in a Monte Carlo study. The study notes that the PC algorithm is useful in analyzing the contemporaneous causal order of SVAR models. Later on, Awokuse and Bessler (2003), Moneta (2004) for the US economy,

Céspedes et al. (2008); Céspedes et al. (2015) for Brazil use DAG to find overidentifying restrictions for the SVAR model. Fragetta and Melina (2013), among others, use the Graph-Theoretic Approach to see the contemporary relationship between the variables. For Pakistan, in the monetary literature, Asghar and Jahandad (2010) use DAG analysis to find a causal relationship between money income and prices. Besides its growing significance, this approach is entirely ignored by the researchers in Pakistan. Hence, the current study adds to the literature by applying DAG analysis to identify the SVAR model and analyze the efficacy of several MTMs.

2.4. Methodology

VAR models introduced by Sims (1980) gained considerable attention for analyzing the dynamic impact of random disturbances. The present study employs different methodological procedures introduced over time to estimate SVAR models to investigate the effectiveness of MTM in Pakistan. First, the study uses a non-recursive structure by following Bernanke (1986); Blanchard and Watson (1986); Sims (1986), among others. Second, the study imposes a block exogeneity assumption to estimate the SVAR model by following Cushman and Zha (1997); Dungey and Pagan (2000); Nizamani et al. (2017). Thirdly, to identify the SVAR model, we use DAG analysis by following Bessler and Yang (2003); Céspedes et al. (2008); Demiralp and Hoover (2003); Fragetta and Melina (2013); Park and Oh (2017); Pearl (2000b); Spirtes et al. (2000); Swanson and Granger (1997) among others.

2.4.1. Structural Vector Autoregressive Model

As we already discussed in chapter one, the SVAR model can be represented as:

$$C_0 X_t = \vartheta + \sum_{i=1}^{p} C_i X_{t-i} + \varepsilon_t \qquad (1.4)$$

If C_0 is invertible, the reduced form of equation 4 becomes:

$$X_t = \beta + \sum_{i=1}^{p} D_i X_{t-i} + \mu_t \quad (1.5)$$

Where, $\mu_t \sim N(0, \Sigma) and\ E(\mu_t, \mu'_s) = 0, \forall\ t \neq s$

Here, μ_t is a reduced form of residuals, and β is a vector of constants. Further, it is assumed that $\varepsilon_t \sim N(0, \Omega)$, where Ω is diagonal. The following identities establish the relationship between equation 1.1 and 1.2:

$\beta = {C_0}^{-1}\vartheta$, $D_i = {C_0}^{-1}C_i$, $\mu_t = {C_0}^{-1}\varepsilon_t$, $\Sigma = {C_0}^{-1}E(\varepsilon_t, \varepsilon'_s)({C_0}^{-1})' = {C_0}^{-1}\Omega({C_0}^{-1})'$

Where X_t is a vector of seven variables, i.e.

$$X_t = [LOP\ LIPI\ LINF\ LCPRVS\ LM2\ RDR\ LREER]' \quad (2.1)$$

Here, LOP is the oil price, measured as the Dubai Fateh crude oil price. LIPI is the industrial production index, LINF is the inflation rate. LCPRVS is credit to the private sector; it includes bank credit to firms and households (HH). LM2 is a broad MS; it comprises currency in circulation, other deposits with SBP, demand, and time deposits with scheduled banks. Similarly, RDR is an interest rate measured as a real discount rate, and LREER is the real effective exchange rate. It captures the value of the domestic currency against the basket of all trading partners' currencies[13] .

The present study collects data on LIPI from the study of Ejaz and Iqbal (2019)[14]. Data on the LOP is collected from the Index Mundi website[15]. The data on the inflation rate is collected from the website of the Pakistan Bureau of Statistics (PBS) and miscellaneous reports of SBP. Similarly, data on LCPRVS and LM2 is collected

[13] It's important to note that a decrease in REER implies the depreciation of local currency against other currencies, whereas an increase in REER implies the appreciation of local currency against other currencies included in the basket.

[14] The present study uses newly estimated data on IPI by Ejaz and Iqbal (2019). However, previous studies relied on the large-scale manufacturing (LSM) index as a proxy of IPI, due to data unavailability.

[15] Data is extracted from https://www.indexmundi.com/commodities/?commodity=crude-oil-dubai&months=360

from the SBP website and its various reports. Moreover, the data on RDR and LREER is collected from the International Financial Statistics (IFS) database. However, to recover structural parameters from reduced form, we need to impose additional restrictions on C_0 matrix. The rule of thumb is the free parameters cannot be greater than n(n-1)/2. Moreover, if n is less than n(n-1)/2, then the model is over-identified.

2.4.2. Directed Acyclic Graphs (DAG)

Observational data alone is insufficient to gauge the causal relationships among the variables unless one knows the DGP. For this reason, causal restrictions imposed on the C_0 matrix to identify SVAR are based on a priori restrictions (either governed by economic theory or arbitrarily) (Céspedes et al., 2008). However, in the mid-1980s, scholars started making efforts to use "causal inference techniques" based on "directed acyclic graphs" (DAGs) to infer causality.

Using DAG analysis to find a contemporaneous causal relationship in the field of economics and finance is now gaining importance, but not very extensively used (Park & Oh, 2017). To fill this gap, the present study uses the DAG process. The basic idea behind the DAG process is to use arrows to show the contemporaneous causal relationship between the variables under investigation.

1. Suppose X and Y are two variables. If there is no edge between X and Y, this implies that no causal relationship exists between them.
2. If there is an undirected edge between X and Y (X—Y), this suggests that they have nonzero covariance, given that there is no causal relationship between them.
3. If there is a directed edge from X to Y (X→Y), this implies X causes Y.

4. If there is a bidirectional edge between X and Y (X↔Y), this implies that both simultaneously cause each other.

The study uses the Peter-Clark (PC) algorithm in the TETRAD V program to execute the DAG process. The algorithm follows the following steps.

1. It starts with an undirected graph with an edge connecting variables but no causal direction.
2. First, it looks for correlation between each pair of variables and removes edges that don't have any.
3. In the second phase, it looks for conditional correlation on the remaining edges. This is accomplished by making each pair conditional on the third variable. It is referred to as "first-order partial correlation" (ρ_1). PC algorithm eliminates edges with a value of zero ρ_1.
4. In the third step, the PC algorithm tests second-order partial correlation ρ_2, and so on. Similarly, for N variables, the process is repeated until N-2 order conditional correlation is reached.
5. PC algorithm uses Fisher's z statistics to test estimated sample correlations and conditional correlations against zero, which can be presented as:

$$z[\rho(i,j|k)n] = \left[\frac{1}{2}\sqrt{(n - |k| - 3)}\right] x\ ln\left\{\frac{|1+\rho(i,j|k)|}{|1-\rho(i,j|k)|}\right\} \qquad (2.2)$$

In this case, n denotes the number of observations used to find correlations. $\rho(i,j|k)$ and $r(i,j|k)$ are the population and sample correlations between $i\ and\ j$ series, conditional on k. Moreover, |k| denotes the number of variables in k (that we condition on). If i, j, and k are normally distributed, then $z[\rho(i,j|k)n] - z[r(i,j|k)n]$also follows a normal distribution (Ji & Fan, 2016).

2.5.Estimation Results

The present study uses data from Jan 1996 to June 2018 to capture the period of FL. Moreover, all variables are in log form except RDR. Furthermore, to capture the effects of seasonality and structural shifts. The study introduces eleven seasonal dummies and three structural dummies while estimating the unrestricted VAR model[16].

While estimating the VAR model, the first issue is to check the stationarity of each variable. For this purpose, we employ the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests. The results are available in Table 2.1. The unit root test shows that all variables are the first difference stationary, which is the necessary condition for proceeding with the non-recursive SVAR model. Different lag length criterion suggests different lags. For instance, SC and HQ advocate to include one lag, AIC and FPE suggest having two lags, LR suggests including 13 lags as shown in Table 2.2.

Table 2.1 Results of Unit Root Test

Variable	Level		First Difference		Order of Integration	
	ADF	PP	ADF	PP	ADF	PP
LOP	-1.477 (-0.544)	-1.167 (0.690)	-13.728 (0.000)	-13.556 (0.000)	I(1)	I(1)
LIPI	0.572 (0.989)	-0.768 (0.826)	-5.647 (0.000)	-37.255 (0.000)	I(1)	I(1)
LINF	-1.561 (0.501)	-2.492 (0.118)	-8.251 (0.000)	-16.030 (0.000)	I(1)	I(1)
LM2	-1.154 (0.695)	-3.137 (0.099)	-3.563 (0.007)	-20.385 (0.000)	I(1)	I(1)
LCPRVS	-1.036 (0.741)	-1.701 (0.430)	-2.159 (0.222)	-14.859 (0.000)	I(1)	I(1)
LREER	-1.933 (0.317)	-1.710 (0.425)	-13.396 (0.000)	-14.309 (0.000)	I(1)	I(1)
RDR	-1.823 (0.369)	-3.190 (0.088)	-8.373 (0.000)	-18.038 (0.000)	I(1)	I(1)

Note: The table reports the result of the ADF and PP test at levels and first difference for all variables. Whereas the P- values are reported in the parenthesis.

[16] Three dummies are introduced to capture the structural breaks. First, Pakistan conducted its first nuclear test in 1998, which resulted in sanctions and low growth. Second dummy captures the financial crises and the oil price shock of 2008. Third dummy captures the oil price shock of 2015. Further, the study notes that these dummies remain significant in the unrestricted VAR.

Table 2.2 Lag Length Criterion

Lag	LogL**	LR	FPE	AIC	SC	HQ
0	-172.937	NA	0.000	2.059	3.458	2.621
1	3164.648	6131.268	0.000	-22.301	-20.249*	-21.477*
2	3227.238	111.735	4.4e-19*	-22.402*	-19.696	-21.315
3	3273.972	81.006	0.000	-22.385	-19.026	-21.036
4	3316.585	71.653	0.000	-22.338	-18.326	-20.727
5	3349.524	53.678	0.000	-22.219	-17.554	-20.346
6	3385.144	56.200	0.000	-22.120	-16.802	-19.984
7	3421.552	55.556	0.000	-22.026	-16.056	-19.629
8	3460.289	57.101	0.000	-21.950	-15.327	-19.290
9	3490.430	42.868	0.000	-21.811	-14.534	-18.889
10	3534.563	60.479	0.000	-21.775	-13.845	-18.590
11	3607.305	95.911	0.000	-21.950	-13.368	-18.504
12	3666.925	75.518	0.000	-22.029	-12.793	-18.320
13	3758.440	111.174*	0.000	-22.344	-12.455	-18.373
14	3792.539	39.655	0.000	-22.234	-11.692	-18.000
15	3826.888	38.166	0.000	-22.125	-10.930	-17.630
16	3865.318	40.708	0.000	-22.047	-10.199	-17.289

Note: * indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

However, the study observes that residuals are not normally distributed with 13 lags. Whereas 16 lags satisfy all the diagnostics. The residuals are normally distributed, and there is no autocorrelation, as shown in Table 2.3 and Table 2.4. Moreover, the estimated model is stable. All roots are less than one as reported in Table 2.5.

Table 2.3 Results of Normality Test

Test		**Test Statistics**
Normality Test	Skewness	8.530 (0.288)
	Kurtosis	10.644 (0.155)
	Jarque-Bera	19.173 (0.158)
Heteroskedasticity Test		6739.838 (0.255)

Note: P values are available in the parenthesis

Table 2.4 Results of Serial Correlation Test

Lag	LRE* stat	Df	Prob.	Rao F-stat	Df	Prob.
1	29.548	49	0.987	0.595	(49, 664.4)	0.988
2	70.563	49	0.024	1.465	(49, 664.4)	0.024
3	39.646	49	0.828	0.804	(49, 664.4)	0.828
4	63.857	49	0.075	1.319	(49, 664.4)	0.076
5	46.168	49	0.589	0.941	(49, 664.4)	0.589
6	46.067	49	0.593	0.939	(49, 664.4)	0.594
7	66.487	49	0.049	1.376	(49, 664.4)	0.049
8	53.478	49	0.306	1.096	(49, 664.4)	0.307
9	41.628	49	0.764	0.846	(49, 664.4)	0.764
10	49.159	49	0.467	1.004	(49, 664.4)	0.468
11	93.190	49	0.000	1.967	(49, 664.4)	0.000
12	46.782	49	0.564	0.954	(49, 664.4)	0.564
13	51.140	49	0.390	1.046	(49, 664.4)	0.391
14	46.934	49	0.557	0.957	(49, 664.4)	0.558
15	48.273	49	0.503	0.986	(49, 664.4)	0.503
16	35.818	49	0.920	0.725	(49, 664.4)	0.920

Table 2.5 VAR Stability Condition

Root	Modulus	Root	Modulus	Root	Modulus
0.998834	0.998834	-0.175320 - 0.925491i	0.94195	-0.278067 + 0.857254i	0.901224
0.983406 - 0.034213i	0.984001	-0.175320 + 0.925491i	0.94195	-0.438218 - 0.768562i	0.884716
0.983406 + 0.034213i	0.984001	0.692907 + 0.637295i	0.941417	-0.438218 + 0.768562i	0.884716
0.956988 - 0.204463i	0.978586	0.692907 - 0.637295i	0.941417	-0.724212 + 0.502003i	0.881186
0.956988 + 0.204463i	0.978586	0.203813 + 0.917916i	0.940271	-0.724212 - 0.502003i	0.881186
0.837680 - 0.502927i	0.977058	0.203813 - 0.917916i	0.940271	0.794448 + 0.366571i	0.874941
0.837680 + 0.502927i	0.977058	0.263040 + 0.902266i	0.939827	0.794448 - 0.366571i	0.874941
0.973374 - 0.063765i	0.975461	0.263040 - 0.902266i	0.939827	-0.871614 - 0.066591i	0.874154
0.973374 + 0.063765i	0.975461	-0.503089 - 0.792186i	0.938433	-0.871614 + 0.066591i	0.874154
-0.546260 + 0.801391i	0.96986	-0.503089 + 0.792186i	0.938433	0.532204 + 0.687369i	0.86932
-0.546260 - 0.801391i	0.96986	-0.907451 + 0.225024i	0.934935	0.532204 - 0.687369i	0.86932
0.345577 - 0.902243i	0.96616	-0.907451 - 0.225024i	0.934935	-0.583236 + 0.641381i	0.866911

0.345577 + 0.902243i	0.96616	-0.037993 + 0.933657i	0.93443	-0.583236 - 0.641381i	0.866911
0.950797 + 0.151222i	0.962748	-0.037993 - 0.933657i	0.93443	-0.729902 - 0.440388i	0.852466
0.950797 - 0.151222i	0.962748	0.638924 - 0.680242i	0.933249	-0.729902 + 0.440388i	0.852466
-0.669876 - 0.691226i	0.962563	0.638924 + 0.680242i	0.933249	0.402950 + 0.739833i	0.84245
-0.669876 + 0.691226i	0.962563	-0.819171 + 0.442181i	0.930895	0.402950 - 0.739833i	0.84245
0.922736 - 0.267681i	0.960778	-0.819171 - 0.442181i	0.930895	-0.810669 - 0.183767i	0.831237
0.922736 + 0.267681i	0.960778	-0.124589 + 0.921604i	0.929987	-0.810669 + 0.183767i	0.831237
-0.436436 - 0.855652i	0.960529	-0.124589 - 0.921604i	0.929987	0.164448 - 0.786748i	0.803751
-0.436436 + 0.855652i	0.960529	-0.857425 + 0.343782i	0.923777	0.164448 + 0.786748i	0.803751
-0.223695 + 0.933123i	0.959562	-0.857425 - 0.343782i	0.923777	-0.79273	0.792732
-0.223695 - 0.933123i	0.959562	0.880210 + 0.275149i	0.922213	0.633320 - 0.450377i	0.777131
0.95948	0.95948	0.880210 - 0.275149i	0.922213	0.633320 + 0.450377i	0.777131
-0.778897 - 0.556805i	0.957451	-0.325977 + 0.861855i	0.921442	-0.716068 + 0.268194i	0.764645
-0.778897 + 0.556805i	0.957451	-0.325977 - 0.861855i	0.921442	-0.716068 - 0.268194i	0.764645
0.947280 - 0.123394i	0.955283	0.737417 + 0.548235i	0.918883	0.689630 + 0.269869i	0.740554
0.947280 + 0.123394i	0.955283	0.737417 - 0.548235i	0.918883	0.689630 - 0.269869i	0.740554
0.474118 + 0.828489i	0.954559	0.017590 + 0.917549i	0.917718	0.047506 + 0.731922i	0.733462
0.474118 - 0.828489i	0.954559	0.017590 - 0.917549i	0.917718	0.047506 - 0.731922i	0.733462
0.756987 - 0.576997i	0.951817	-0.91737	0.917367	-0.422238 + 0.424658i	0.598848
0.756987 + 0.576997i	0.951817	0.373740 - 0.835606i	0.915379	-0.422238 - 0.424658i	0.598848
0.155144 + 0.931993i	0.944818	0.373740 + 0.835606i	0.915379	0.397774 + 0.193692i	0.442426
0.155144 - 0.931993i	0.944818	0.535197 - 0.742488i	0.915273	0.397774 - 0.193692i	0.442426
0.819291 + 0.470129i	0.944595	0.535197 + 0.742488i	0.915273	-0.31557	0.315566
0.819291 - 0.470129i	0.944595	-0.661116 + 0.622735i	0.908225	-0.16776	0.167757
-0.939772 + 0.074107i	0.94269	-0.661116 - 0.622735i	0.908225		
-0.939772 - 0.074107i	0.94269	-0.278067 - 0.857254i	0.901224		

Since all variables are I (1), there are two possible options. The first is to take all variables at the first difference. However, the drawback to using this approach is the

loss of information that the series contains. The second option is to estimate the model at a level. We opt for the second option, by following Aslanidi (2007); Kim and Roubini (2000). Moreover, the inclusion of lags in the VAR makes residuals stationary, but still, there is a possibility of getting spurious results. To ensure the reliability of results, the study estimates the Johansen cointegration (JC) test to confirm the long-run relationship among the variables. The results of the JC test are available in Table 2.6. It contains both Trace and Maximum Eigenvalue test results. The trace test indicates that six cointegrating equations exist. In contrast, the maximum eigenvalue test indicates that three cointegrating equations exist at a 0.05 level of significance. Hence, we can estimate VAR at the level with I (1) series.

Table 2.6 Results of Johansen Cointegration Test

No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**	Max-Eigen Statistic	0.05 Critical Value	Prob.**
r=0	0.192	201.057	125.615	0.000	57.463	46.231	0.002
r≤1	0.155	143.594	95.754	0.000	45.598	40.078	0.011
r≤2	0.122	97.995	69.819	0.000	35.049	33.877	0.036
r≤3	0.091	62.946	47.856	0.001	25.895	27.584	0.081
r≤4	0.076	37.051	29.797	0.006	21.441	21.132	0.045
r≤5	0.050	15.610	15.495	0.048	13.924	14.265	0.057
r≤6	0.006	1.686	3.841	0.194	1.686	3.841	0.194
Note: Trace test indicates 6 cointegrating eqn(s), and the Max-Eigen test shows 3 cointegrating eqn(s) at the 0.05 level							
**MacKinnon et al. (1999) p-values							

The study adopts the Pelipas et al. (2016) strategy to identify and estimate the SVAR model. First, we estimate the unrestricted VAR model with the oil price as an exogenous variable. Pakistan is a small open economy, so oil prices can affect domestic macroeconomic variables contemporaneously and with lags. But domestic macroeconomic variables cannot influence oil prices. So, to make oil prices exogenous,

the study imposes restrictions on the lag structure of oil prices. This trick helps us to get impulse response functions (IRF) with oil prices.

2.5.1. Contemporaneous Causal Relationship

To identify the SVAR model, the current research uses DAG analysis using TETRAD V software. DAG analysis utilizes the residual covariance matrix as input and identifies the contemporaneous causal flows among the variables. We use a PC algorithm which starts with an undirected graph as shown in Figure 2.1. As Pakistan is a small open economy, we impose the BE assumption, which implies that oil prices can cause any variable in the system. Nevertheless, it is not caused by other variables, even with a lag. The PC algorithm is used to remove edges based on zero, first, and second-order conditioning and determine the contemporaneous causal flows among the variables

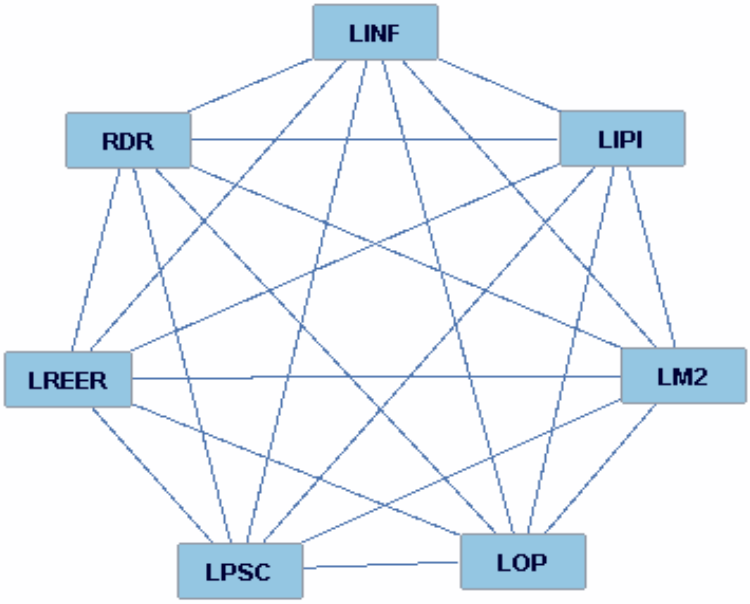


Figure 2.1 Undirected Graph of Monetary Transmission Mechanism

Source: Author's self-calculation

Figure 2.2 shows the final graph, which reveals the contemporaneous causal patterns among the variables. The DAG analysis shows that oil price cause inflation,

output, and LREER. However, inflation, output, and LREER are independent of each other, conditioning the oil price. It means that LINF, LIPI, and LREER do not contemporaneously respond to each other.

Similarly, M2, interest rates, and oil prices are unconditionally uncorrelated. However, they are correlated conditional on LINF. Here it implies that LINF is an unshielded collider on the path RDR- LINF- LOP and RDR- LINF- M2. It is a collider because arrowheads come together at LINF. Moreover, it is unshielded because there is no direct causal relationship between RDR and oil prices and RDR and M2. Moreover, DAG analysis also shows that LM2 causes LCPRVS and LINF. However, LCPRVS and LINF are independent of each other, depending on LM2.

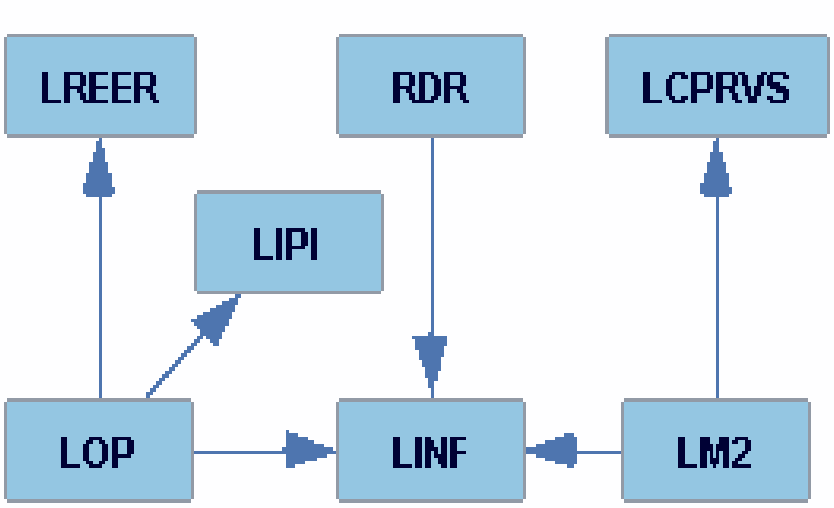


Figure 2.2 Direct Acyclic Graph

Source: Author's self-calculation

The results are also summarized in equation 2.3

$$BY_t = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ \beta_{21} & 1 & 0 & 0 & 0 & 0 & 0 \\ \beta_{31} & 0 & 1 & 0 & \beta_{35} & \beta_{36} & 0 \\ 0 & 0 & 0 & 1 & \beta_{45} & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ \beta_{31} & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} LOP \\ LIPI \\ LINF \\ LCPRVS \\ LM2 \\ RDR \\ LREER \end{bmatrix} \quad (2.3)$$

The DAG analysis suggests the following assumptions to identify the C_0 matrix. First, the study imposes a block exogenity assumption, i.e., oil prices contemporaneously affect inflation, output, and ER, but these domestic variables can not influence oil prices. This assumption is intuitive. As Pakistan is an oil-importing country, a large bulk of the import bills comprise oil. An increase in oil prices affects production, inflation, and ER. Moreover, this assumption is consistent with Nizamani et al. (2017) and several other studies.

Further, DAG analysis suggests that inflation contemporaneously responds to interest rate shocks and monetary aggregates. Similarly, CPRVS contemporaneously responds to monetary aggregates. However, output, prices, interest rates, and other variables do not contemporaneously react to the credit supply shock. One can argue that investors decreased their production in the later periods, hence it would not immediately affect output and prices. Moreover, the policy rate is decided every alternate month, so a credit supply shock cannot instantly affect MP (Duchi & Elbourne, 2016).

Likewise, interest rate (MP instrument) does not contemporaneously respond to other variables, as policymakers don't have complete information about output and prices within the same month. (Alam, 2015; Cushman & Zha, 1995; Jones & Bowman, 2019). The data on output is available with a lag, and it is not available to the monetary authorities when deciding the policy rate. (Kim & Roubini, 2000). Further, there is no direct contemporaneous causality running from RDR to EG.

The study estimates the over-identified SVAR model given by DAG in Figure 2.2. Sims (1986) proposes a likelihood ratio test to check the overidentifying restrictions. The Log-likelihood ratio test is 3173.153, Chi-square is 21.232, and the probability is 0.130. Hence, we do not find significant evidence to reject the over-

identifying restriction at a 10% level of significance. Thus, restrictions proposed by DAG are consistent with the data. To do dynamic analysis, we construct structural impulse response functions (SIRF) and structural forecast variance decomposition (SFVD) in the subsequent sections.

2.5.2. Structural Impulse Response Functions

Impulse response functions (IRFs) are used to see the impact of exogenous shocks on endogenous variables. In other words, IRFs show the dynamic response of the endogenous variables to exogenous policy shocks not only in terms of the sign but also in magnitude and significance (Stock & Watson, 2001). We have used SIRFs to gauge the impact of one standard deviation (SD) exogenous shocks on domestic macroeconomic variables. Moreover, to check the significance of the response, the study uses 95 percent confidence bands of the standard errors.

In response to the contractionary MP shock, i.e., an increase in RDR decreases inflation substantially, as shown in Figure 2.3. Hence, there is no price puzzle. Our results contradict earlier studies which observed the price puzzle. For instance, Agha et al. (2005); Javid and Munir (2010)Mukhtar and Youns (2019) note that a price puzzle exists. Moreover, the study notes that the contractionary MP shocks led to an increase in output and a decrease in LCPRVS. However, the response is insignificant. Nawaz and Ahmed (2015) also observe that MP is not effective in lowering the output gap. However, it effectively controls inflationary pressures. Moreover, the present study notes that the tight MP shock appreciates LREER. However, the response is significant only for the first four months, as shown in Figure 2.3. Hence there is no ER puzzle[17]

[17] ER puzzle occurs when monetary contraction leads to depreciation of the domestic currency.

Thus, our results confirm the ER overshooting hypothesis, where contractionary MP makes the domestic currency more attractive. So, the demand for domestic currency increases as compared to foreign currency, and ER appreciates. The SIRF shows that the ER depreciates after appreciation, hence "uncovered interest parity" exists. Thus, data reveals that there is no ER or price puzzle which previous studies failed to understand.

Similarly, in the response of one SD shock to LM2, LIPI initially decreases. Later on, in the third period, it accelerates and follows a hump-shape pattern. However, the response is significant only for a few periods, and most of the time, the response is insignificant, as shown in Figure 2.3. This implies that the impact of the expansionary MP (increase in MS) is realized after a few months. However, the response is weakly significant.

On the other hand, inflation significantly decreased in response to the positive MP shock in earlier periods. Later, the effects of money start to be transmitted into prices, though the response is insignificant. Moreover, LCPRVS significantly increased in response to LM2 shock. In contrast, a positive LM2 shock depreciates LREER. However, the results are insignificant.

Overall, we can conclude that a positive shock to LM2 has a strong positive impact on LCPRVS. Whereas output responds after some lags. However, the effect is weak. Similarly, the effect of an expansionary MP is transmitted to the prices after some lag, but the response is insignificant.

On the other hand, the one SD shock to LCPRVS and LREER do not significantly affect output and inflation, as shown in Figure 2.4. According to the SIRF, a positive shock to LCPRVS causes a rise in output after two lags and follows a hump-

shaped pattern. Furthermore, it causes inflationary pressures in the economy. However, both responses are insignificant.

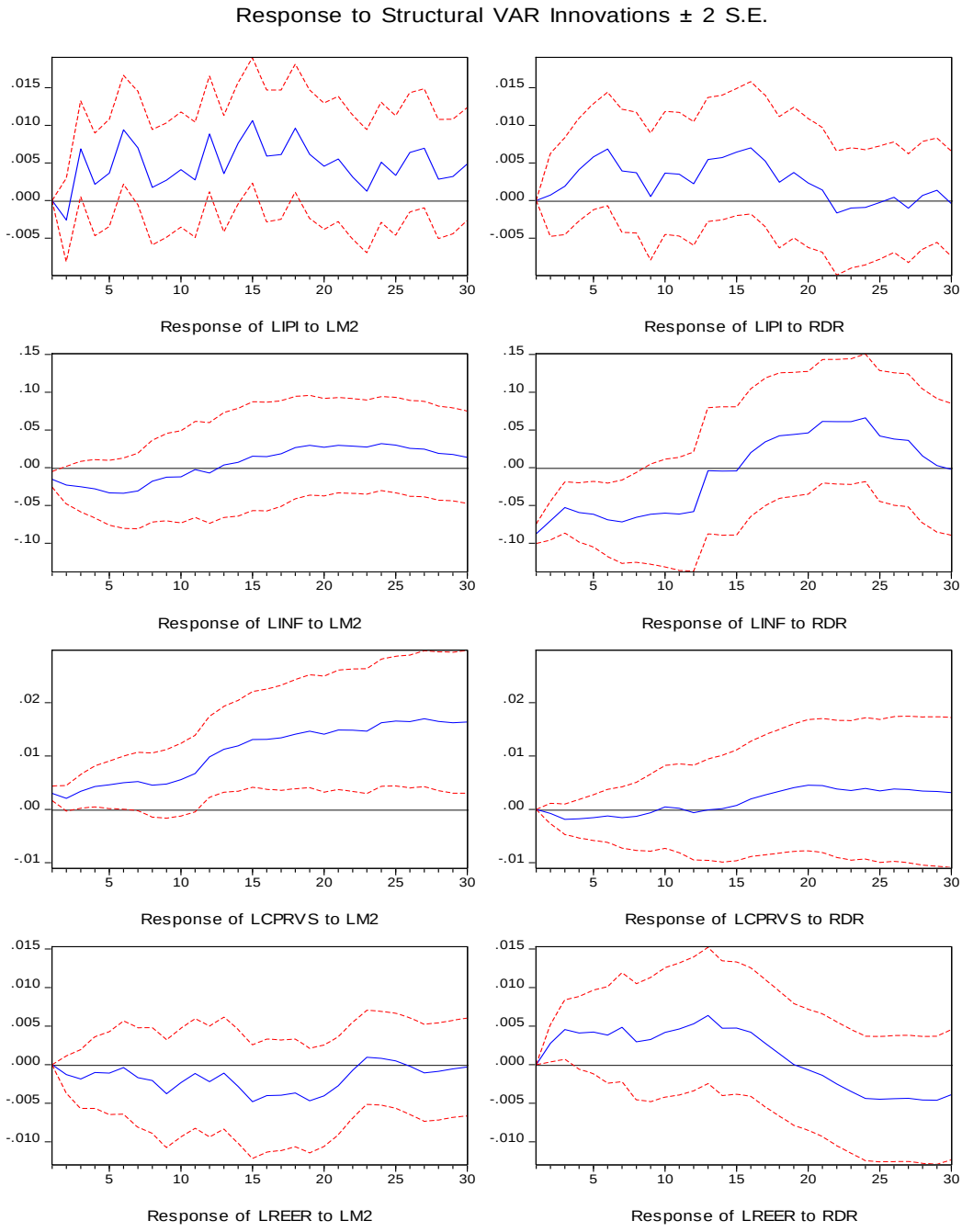


Figure 2.3 **Impact of Money supply and the Interest rate on the Domestic Macroeconomic Variables**

Source: Author's self-calculation

Note: The first panel shows the response of different macroeconomic variables to the MS shock. Whereas the second panel shows the response of different macroeconomic variables to the RDR shock.

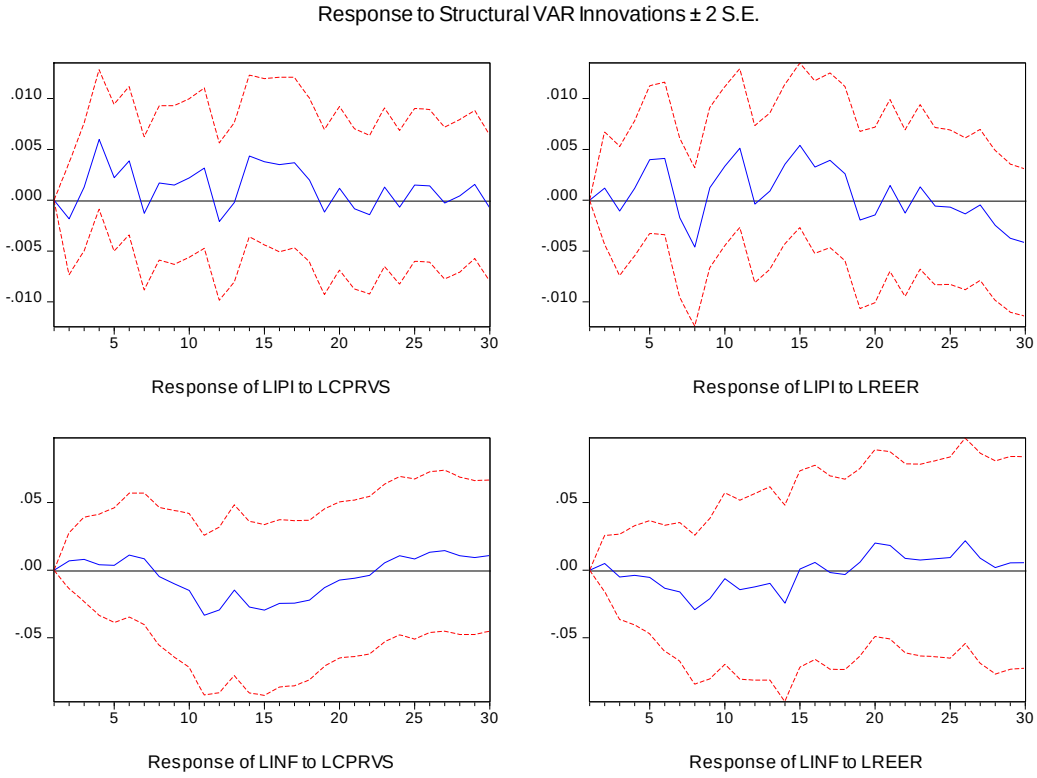


Figure 2.4 **Structural Impact Response Function of the Credit to the Private Sector and Real Effective Exchange Rate to the Shock of Output and Inflation**

Source: Author's self-calculation

Note: The first panel shows the impact of LCPRVS, and the second panel shows the impact of LREER on the output and prices.

Similarly, the positive LREER shock accelerates output with a hump-shaped pattern and lowers prices after two lags. However, both responses are insignificant. Since the interest rate shock does not significantly affect credit and exchange rates. Furthermore, the RDR and LREER shocks have no discernible effect on output or inflation. This implies that ERC and CRC are ineffective in Pakistan.

Likewise, when we consider external factors like the shock to oil prices, inflation rises dramatically, as seen in Figure 2.5. Oil price innovation significantly increases inflation and decreases RDR and LREER. However, the response is significant in the short run. Intuitively, an increase in oil prices surges inflationary

pressure on an economy because oil is the primary input. Hence, it increases the cost of production, so to facilitate producers and households, SBP adopts loose MP and decreases interest rates. Similarly, one SD shock to oil prices decreases LREER. However, the response is significant till the third period.

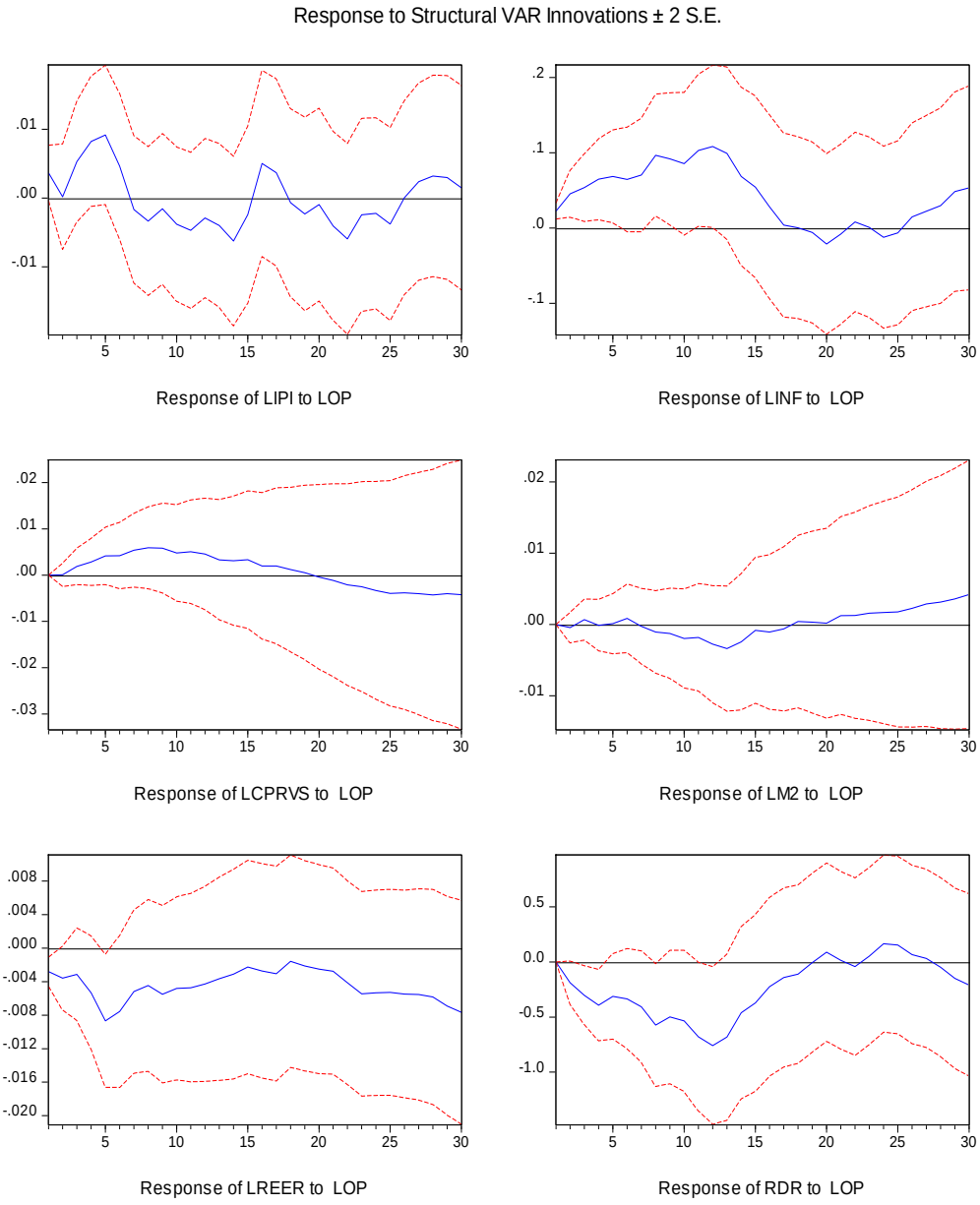


Figure 2.5 **Impact of Oil Price Shock on the Domestic Macroeconomic Variables**

Source: Author's self-calculation

Our results are also compatible with Javid and Munir (2010); Khan and Ahmed (2011); Nizamani et al. (2017), among others, who also note that the shock to oil prices

is inflationary. Furthermore, as illustrated in the Figure 2.5 oil price shock has no significant impact on LIPI, LM2, and LCPRVS.

2.5.3. Forecast Variance Decomposition of Domestic Macroeconomic Variables

The FVD provides the relative importance of each structural shock by explaining the contribution of each variable in the system. In other words, it forecasts how the shocks in one variable explain the uncertainty in the other variable. Moreover, it evolves over the horizon. For instance, a shock to one series may not be substantial in the initial periods, but it can play a significant role over the horizon. The FVD results are reported in Table 2.7.

The FVD of LIPI shows that 99% of the variation in LIPI is explained by itself in the first period. Whereas the LOP explains almost 1% of the variation. However, in the fifth period, oil prices explain nearly 9% of the variation, and LIPI itself explains 79% of the variation. In contrast, the contribution of other variables is very minimal. However, over the long term, the influence of oil prices remains around 10%. In contrast, the role of MS has increased. RDR also explains a small portion of the variation in LIPI. In the 30^{th} period, oil prices explain 10% of the variation in LIPI, and LIPI explains 46% of the variation in itself. LM2 explains 20% of the variation, the interest rate explains 10% of the variation, while inflation, LCPRVS, and LREER define minor portions. Hence, the main chunk of variation in LIPI is explained by itself. Besides LIPI, LM2 also explains some of the variation. These results also complement the IRFs.

Similarly, the FVD of the inflation rate shows that the central part of the variation in LINF is explained by RDR and LINF (itself). In the first period, LINF itself explains 46% of the variation, and RDR explains 49% of the variation, whereas LOP

explains 3% of the variation in LINF. However, over time, the share of oil prices increases, explaining the variation in LINF, and the share of RDR and inflation (itself) decreases. In the 15th period, 40% of the variation in LINF is explained by LOP, LINF explains 22% of the variation, RDR explains 23% of the variation, and LIPI explains 22% of the variation. Whereas credit, MS, and LREER play a minor role in elucidating the variation in LINF. In the last period, inflation itself explains only 19% of the variation. LOP explains 31%, LIPI describes 15%, and RDR explains 26% of the variation. Whereas LCPRVS, LM2, and LREER play negligible contributions.

Table 2.7 Forecast Variance Decomposition of all Domestic Macroeconomic Variables

Period	Shock LOP	Shock LIPI	Shock LINF	Shock LCPRVS	Shock LM2	Shock RDR	Shock LREER
Variance Decomposition of LIPI:							
1	1.219	98.781	0.000	0.000	0.000	0.000	0.000
2	0.928	98.008	0.230	0.231	0.466	0.038	0.099
5	9.426	78.686	2.512	2.225	3.509	2.674	0.968
10	9.466	65.739	4.482	2.781	9.122	5.574	2.836
15	9.634	56.712	4.137	3.418	14.444	7.587	4.068
20	9.520	50.906	4.021	3.786	18.127	9.136	4.504
25	10.668	48.623	5.262	3.695	18.736	8.671	4.344
30	10.495	46.074	6.616	3.547	20.240	8.140	4.887
Variance Decomposition of LINF:							
1	3.331	0.000	45.725	0.000	1.523	49.420	0.000
2	7.285	0.009	54.917	0.136	2.151	35.432	0.070
5	18.586	0.398	47.190	0.182	4.237	29.288	0.119
10	32.105	3.644	29.383	0.453	3.955	29.227	1.232
15	40.183	8.415	21.819	2.036	2.876	23.346	1.325
20	36.326	12.364	19.814	2.583	3.728	23.811	1.375
25	31.679	14.005	19.024	2.336	4.771	26.771	1.414
30	31.259	15.215	19.071	2.369	5.062	25.530	1.495
Variance Decomposition of LCPRVS:							
1	0.000	0.000	0.000	93.149	6.851	0.000	0.000
2	0.001	2.900	0.082	91.907	4.590	0.212	0.308
5	3.474	10.630	0.699	75.482	7.752	1.177	0.786
10	9.181	16.386	0.511	62.023	10.440	0.878	0.580
15	7.304	17.265	0.359	51.178	22.997	0.506	0.392
20	4.784	17.735	0.307	42.632	32.606	1.438	0.497
25	4.015	17.968	0.720	34.650	40.164	2.068	0.414
30	3.970	17.059	1.858	28.931	45.404	2.239	0.538

Source: Author's self-calculation

Note: The table shows the FVD of the output, inflation, and the credit to the private sector.

In the case of LCPRVS, almost 93% of the variation in LCPRVS is explained by itself, and the LM2 elucidates only 7% of the variation. However, over the horizon, the share of LCPRVS in explaining its variation decreases, and the share of other variables increases. For instance, in the 15th period, LCPRVS explains 51% of the variation, LIPI explains 17% of the variation, and LM2 explains almost 23% of the variation, and oil prices explain 7% of the variation. Similarly, in the 30th period, LM2 explains 45% of the variation, and LCPRVS (itself) explains almost 29% of the variation, LIPI explains 17% of the variation, and the rest of the variation is defined by other variables. It is interesting to note that the inflation rate, interest rate, and ER explain minor variations. However, the main chunk of variation is defined by either LM2, LIPI, and LCPRVS (itself). Moreover, our results are consistent with the SIRFs. LM2 has a significant impact on LCPRVS.

2.6. Discussion and Policy Implication

The SIRF and FVD yield some intriguing results, which are summarized below.

1. According to the SIRF and FVD, a positive oil price shock causes significant inflationary pressure in Pakistan. Oil is Pakistan's most important import, and it is a significant input used in the manufacturing process and consumed by households. An increase in the price of oil raises the cost of production and the costs borne by consumers. As a result, it causes inflationary pressures in an economy. Our findings add to those of Javid and Munir (2010); Khan and Ahmed (2011); Nizamani et al. (2017), among others, who have noted that an increase in oil prices is one of the key sources of inflation in Pakistan. As a result, the cost channel is effectively contributing to inflationary pressure.

2. Furthermore, the study observes that in order to control inflationary pressures, monetary authorities modify policy rates, which greatly reduces inflation. As a result, there is no price puzzle. Our work adds to previous research that supports the SBP's stance of regulating interest rates to manage inflation (Agha et al., 2005; Mangla & Hyder, 2017; Munir & Qayyum, 2014; Nizamani et al., 2017; Nizamani et al., 2016; Shaheen, 2020).
3. Money also plays a role in stimulating output, although a minor one. Our findings are consistent with those of Ahmad et al. (2016); Shaheen (2020), who also emphasize that money plays a role in increasing output. Furthermore, the study finds no significant evidence in favor of Friedman's worldview that "inflation is always and everywhere a monetary phenomenon."
4. CRC and ERC are ineffective tools for managing inflation or accelerating output. Hence, our findings contradict the Neoclassical Synthesis, which believes in the effectiveness of the CRC through interest rates to accelerate output and manage inflation.

Moreover, our results are partially consistent with NCM and suggest that interest rates are effective at regulating inflation. The interest rate, on the other hand, is not effective in stimulating output. Further, the study notes that money has a role, although a minor one. Surprisingly, there is a trade-off between inflation and long-term EG. A single policy variable may not be effective in achieving a high EG with a low inflation rate. Thus, the SBP must determine the right policy based on economic conditions. If the economy is experiencing double-digit inflation, tight MP (a hike in policy rate) may be more effective if inflation is not due to a rise in oil prices in the international market. But what effect does tight MP have on EG? In general, according to IRC, when MP is

tight, investment falls and, as a result, EG falls. However, the present study notes that the interest rate is ineffective at boosting IPI.

Furthermore, our research is deafeningly silent on how interest rates affect investment. Should the SBP utilize monetary aggregates to stimulate output? We have no significant evidence. The present study investigates these topics in further detail in the following essay. However, we can propose that the SBP should use tight MP (increase in interest rates) to control inflation.

2.7.Conclusion

The current study attempts to evaluate the five primary MTM channels using monthly data from January 1996 to June 2018 and the SVAR-DAG technique. Instead of employing Cholesky decomposition or an arbitrary identification strategy, the study employs DAG analysis to identify the SVAR model. One of the reasons for using DAG analysis is that theories developed for advanced economies do not always fit well with EMICs. As a result, we should consider local characteristics and allow local data to speak for itself. Furthermore, utilizing this identification technique allows us to overcome anomalies such as exchange rate riddles and pricing puzzles that prior studies discovered due to different identification schemes. Second, the current investigation makes BE assumptions and discovers several intriguing features.

The present study concludes that inflation is not solely a monetary phenomenon. Furthermore, the oil price shock is inflationary as well as recessionary. The Central Bank can respond by cutting interest rates. This means that the CB prioritizes job creation over combating inflation. According to additional research, when the CB prioritizes price stability, it can successfully employ interest rates as a policy instrument. As a result, interest rates play an important role in controlling inflationary

pressures in Pakistan. MP, on the other hand, remains ineffective in terms of stimulating output. The money channel, on the other hand, plays a function in encouraging output. CRC and ERC, on the other hand, are ineffectual in Pakistan.

CHAPTER 3

ESSAY 2: MONETARY POLICY AND AGGREGATE DEMAND: DISAGGREGATED ANALYSIS

3.1. Introduction

Mainstream economics and the prominent studies of several CBs emphasize interest rates as a policy tool over the last half-century (Lee & Werner, 2018). Generally, economists believe that the high-interest rate harms investment and output due to the high cost of capital. For this reason, to increase production and EG, the CB should decrease interest rates. On the other hand, equally prominent studies argue that an interest-based system is harmful to economic activities (Binswanger, 1982; Douthwaite, 2012; Soddy, 1926). Therefore, this chunk of literature advocates *full reserve banking* (FRB), moving away from the interest and debt-based system, see Benes and Kumhof (2012); Fisher (1935); Huber (2014); Huber and Robertson (2000)[18].

The interest rate is now universally used as the most critical policy tool by CBs all over the world. But it is evident from the GFC that interest rates did not stimulate economic activity in several countries. Even cutting interest rates to zero could not stimulate demand sufficiently to prevent the lengthy and costly Great Recession. In addition to this, the empirical studies also show that interest rates are either insignificant

[18] The full reserve banking system requires banks to keep the full amount of depositors' money in cash, so that they can return it when depositors demand it. Hence, there is no issue of banking failure or default. However, it does not mean that banks' only role is as a *money stock box*. Rather, banks can lend depositors money from time deposits and hence can function in their role as financial intermediary. On time deposit, banks are not liable to pay money on demand. Depositors can claim their money after a fixed time. During this time, the bank can lend money.

or do not have the right sign as predicted by economic theory (Bashir et al., 2018; Gelb, 1989; Kuttner & Mosser, 2002; Lee & Werner, 2018; Werner, 2012).

Similarly, the role of money is also controversial in literature. There is no unanimous agreement among economist on the impact of money on output and inflation in the short run. Although in the current scenario after the GFC, the relationship between MS and AD is getting considerable attention in the emerging and advanced economies (Hussain & Haque, 2017). The classical economist believes in money neutrality: an increase in MS only affects nominal variables, and it has no effect on the real variables. Furthermore, money is mainly used as a medium of exchange.

On the other hand, Keynes postulates that money is not only used as a medium of exchange but also held for unforeseen events (for precautionary motives)[19]. Whereas New-Neoclassical Synthesis (NNS) believes that prices are sticky and aggregate demand (AD) determines real economic activity in the short-run (Goodfriend & King, 1997). Moreover, Monetarists believe that MS affects AD[20] in the short run and inflation in the long run.

Chicago economists believe that a persistent increase in MS leads to inflation in an economy. Hence, MS targeting meets the main objectives of MP. However, the failure of monetarism in the 1970s and the dominance of New Classical economists at that time put monetary aggregates at the back of academic and policy discussions. Later, New Keynesians accept the short-run effects of MS on real variables (output and employment) due to incomplete information and price rigidities in the economy. Whereas NCM and monetarists both believe that MP are effective in the short run and ineffective in the long run. However, both disagree on the MP instruments affecting

[19] Keynes, J. M., (2008/1936). *The General Theory of Employment, Interest and Money.* BN Publishing
[20] Here, AD and output are used in the same context

macroeconomic variables. NCM believes that the interest rate should be used as an instrument to adjust the economy, while monetarists propagate monetary aggregates. Hence, there is no consensus in the literature on which MP instrument (interest rate or MS) plays a significant role in accelerating AD and in controlling inflation in an economy.

Another unresolved controversy that is given little importance in the literature is the impact of MP on various components of AD, i.e., private investment (PI), private consumption (PC), and government consumption spending (GC). It is important to note that each part of AD may behave differently in response to the tight MP and may suggest different policy implications. For instance, Conventionally, it is believed that the high-interest rate leads to an increase in saving and a decrease in PC. As consumers need to pay more on loans, they held more and spend less. On the other hand, an increase in interest rates increases the cost of borrowing and hence decreases PI and output in an economy. Therefore, tight MP negatively affects PC and PI. However, the negative effect on PI may have more long-term effects on production as compared to PC.

Generally, economists believe that IRC mainly works through the investment component of AD as compared to the consumption component. (Angeloni et al., 2003; Barran et al., 1996; Jakab et al., 2006; Khundrakpam, 2012). However, PC is the largest component of AD. Despite its importance, this area of MTM is less explored (Khundrakpam, 2012). Hence, the present study intends to contribute to the empirical literature by investigating the impact of MP on inflation, AD, and the various components of AD.

Another development that appeared after the GFC is the role of the state in supporting economic activities[21]. Most advanced economies are now suggesting that the government should intervene in bad times to accelerate EG, either by investing in infrastructure (Abiad et al., 2014) or by spending on education, health, and social safety nets. Government spending positively affects PI and PC. Furthermore, it helps in fighting against recession (Abiad et al., 2014; Alichi et al., 2019). However, literature is inconclusive on whether GC leads to crowding out of PC and PI or crowding in.

The neoclassical economist argues that an increase in deficit-financed government spending increases future taxes, which makes households (HH) feel poor over the life horizon. As a result, HH decreases consumption and leisure and increases labor supply, which lowers real wages and PC (Perotti, 2008). In contrast, some neo-Keynesian economists believe that public spending increases labor demand, which offsets the increase in labor supply. As a result, real wage increases. When labor wage increases, it increases consumption.

Similarly, in the RBC models, an increase in GC leads to a decrease in PC. In RBC models, HH lives for an infinite period and faces intertemporal budget constraint, which governs his behavior. When GC increases, while all other things remain the same in an economy, it lowers the present value of the household's disposable income. Hence, PC decreases. Moreover, the impact of GC on various components of AD can have distortionary effects in EMICs who faced lower efficiency on the part of the government (Abiad et al., 2014). However, the empirical literature is inconclusive.

The first strand of studies argues that GC increases PC (Anghelache et al., 2017; Blanchard & Perotti, 2002; Bouakez & Rebei, 2007; Fatas & Mihov, 2001; Galí et al.,

[21] Although the proponents of the market economy believe that the government should not intervene in the economy, any government intervention leads to only distortions in the economy

2007; Mountford & Uhlig, 2009). In contrast, the other strand of studies observes that GC has an insignificant or negative effect on PC (Hur et al., 2014; Petrović et al., 2020). Moreover, GC crowds out PI (Blanchard & Perotti, 2002; Galí et al., 2007; Mountford & Uhlig, 2009; Romero-Avila & Strauch, 2008; Schclarek, 2007). Some studies also support the crowd-in hypothesis (Abiad et al., 2014; Alichi et al., 2019).

In Pakistan, various studies investigate the impact of MP on output and inflation. For instance, Ayub and Shah (2015); Bilquees et al. (2012); Bon (2015); Hameed and Ume (2011); Muhammad et al. (2009); Nizamani et al. (2016) among others, investigate the impact of MP (either measured as interest rate or MS) on output and inflation. However, the results are mixed. Some studies claim that interest rates are effective in stimulating output (Hameed & Ume, 2011; Mahmood et al., 2017; Muhammad et al., 2013). While others note that MS significantly affects output (Ali et al., 2008; Fatima & Iqbal, 2003; Hameed & Ume, 2011; Mahmood et al., 2017; Muhammad et al., 2009; Usman & Miraj-ul-Haq, 2016). Similarly, some studies find that MS explains the movement in the inflation rate (Ayub & Shah, 2015; Bilquees et al., 2012), while others conclude that interest rates are effective in controlling inflation (Ayub & Shah, 2015; Bilquees et al., 2012; Bon, 2015; Nizamani et al., 2016)

Likewise, some efforts are being made to determine the impact of the various components of AD on one another, inflation, and interest rates, with inconsistent results. Some research, for example, shows that GC boosts EG and investment (Mahmood et al., 2017; Munir et al., 2010; Sakr, 1993; Usman & Miraj-ul-Haq, 2016). Others note that GC inhibits EG and crowds out PI (Ahmad & Malik, 2009; Burney et al., 1989; Fatima & Iqbal, 2003; Muhammad et al., 2009).

It is essential to mention that most studies directly investigate the impact of GC and interest rates on EG and deduce their impact on investment. (Burney et al., 1989;

Mahmood et al., 2017; Sakr, 1993; Usman & Miraj-ul-Haq, 2016). Whereas, some studies directly investigate the impact of the interest rate on investment and conclude that the interest rate negatively affects PI (Hyder & Ahmed, 2004; Muhammad et al., 2013), while others observe an insignificant effect (Nasir & Khalid, 2004; Salahuddin et al., 2009). Hence, the literature is inconclusive on these issues.

Additionally, earlier studies either used small time-series data or did not account for structural breaks like the separation of East Pakistan, Marshall laws, shifts in MPs, oil price shocks, etc., which could lead to biased results. Hence, there is no comprehensive study that analyzes the impact of the MP on various components of AD. Furthermore, the impact of each component of AD on other components of AD and the MP instrument. The present study fills this gap by using the SVAR-DAG approach and introducing relevant dummies to capture the effects of structural shocks and come up with some interesting policy implications.

Hence, the primary goal of this study is to:

1. Investigate the effect of the MP shock on inflation, AD, and the various components of AD.
2. Investigate how the various AD components (PI, PC, and GC), inflation, and MP variables respond to shocks to each component of AD.

To achieve these goals, the current study selects an emerging economy, "Pakistan," which is facing several economic and social issues like high inflation, low growth, and massive external and internal debt. The study collects annual data from 1976 to 2019 and employs the SVAR-DAG approach to answer the following research questions.

1. What is the impact of the MP shock on AD and inflation?

2. What is the impact of the MP shock on the various components of AD, i.e., private investment, private consumption, and government spending?
3. What is the impact of the private consumption shock on private investment, government spending, policy rates, money supply, and inflation?
4. What is the impact of the private investment shock on private consumption, government spending, policy rates, money supply, and inflation?
5. What is the impact of the government's spending shock on private consumption, private investment, policy rates, money supply, and inflation?
6. The study observes that MP is effective at stimulating output and inflation.

However, no single policy can influence all the components of AD and inflation. The interest rate works well in terms of inflation. However, in the long run, MS works effectively for total AD. In the short run, interest rates significantly affect investment decisions but no effect on PC. On the other hand, positive MS shock boosts PC in both the short and long run. However, it affects GC and PI only in the long run.

Further, the study is inconclusive about the impact of GC shock on the PI. Moreover, an increase in PI has no significant impact on any component of AD, but it helps to decrease the inflation rate in Pakistan. On the other hand, an increase in PC leads to a significant increase in PI, though, it has no significant impact on inflation. Furthermore, none of the components of AD have any significant effect on interest rates or MS.

The present study can help policymakers and researchers in understanding the impact of MP on various components of AD. It is important to note that one policy does not work for all problems. Moreover, the present study also sheds light on this misconception, that GC crowd out PI. Hence the government should spend on such

activities that facilitate investors and create an investment-friendly environment to stimulate AD.

The study is organized as follows: the next section briefly reviews the empirical literature. The third section deals with methodology and data sources. Estimation results are discussed in the fourth section, and the fifth section concludes the study by providing relevant policy implications.

3.2. Literature Review

This section reviews the theoretical and empirical literature. It is divided into three subsections. In the first section, the study reviews the theoretical and empirical literature on whether the CB should focus on money supply or interest rates to accelerate AD and to control inflation. In the second section, the study reviews the literature on the impact of MP shocks on the various components of AD. Similarly, in the third section, the study reviews the literature on the crowding out of PI in response to government spending.

3.2.1. Should SBP target Money or Interest Rates?

In literature[22], the efficiency of money or interest rates in boosting economic activity and regulating inflation is always being debated. Internationally, empirical investigations reveal conflicting findings regarding the relationship between price and the quantity of money in circulation. In Bangladesh, for example, Arfanuzzaman (2014) observes that MS increases EG. Similarly, Chaitip et al. (2015) reached the same conclusion for the "Authorized Economic Operators" (AEO) open region by using the autoregressive distributive lag (ARDL) model. Moreover, Audu et al. (2018);

[22] In the second chapter, a theoretical review of literature is discussed in detail. Hence, in this section we will briefly discuss the empirical literature.

Babatunde and Shuaibu (2011); Chude and Chude (2016); Ogunmuyiwa and Ekone (2010) note that MS is positively related to EG in Nigeria. Dingela and Khobai (2017) using the ARDL approach and data from 1980 to 2016, conclude that MS causes EG in South Africa. Zapodeanu and Cociuba (2010) notice that MS positively affects EG in Romania. Aslam (2016) also reaches the same conclusion for Sri Lanka.

Maitra (2011) observes that MS and AD are cointegrated in Singapore. The Malaysian economy, according to Muhammadpour et al. (2012), is driven by MS. The study uses quarterly data ranging from 1991 to 2011 and employs cointegration and Vector error correction model (VECM) to conclude that MS causes GDP growth. By employing VAR, GCT, and JC tests, Krouso et al. (2019) also conclude that MS is a contributor to GDP growth in Libya.

Other research suggests that increasing interest rates could be helpful in accelerating the rate of economic growth. For example, using the OLS approach, Di Giovanni and Levchenko (2012) find that the rise in interest rates moderately dropped the EG in the Netherlands, France, and throughout a sample of 12 European countries. A SVAR model with an open economy is also used by Vinayagathasan (2013), who comes to the same conclusion for Sri Lanka. As a result, when compared to MS and exchange rate shocks, the interest rate shock provides a better explanation of economic variables. Furthermore, using quarterly data from 2003 to 2012, Mutinda (2014) shows that interest rates negatively affects EG in Kenya by using quarterly data from 2003 to 2012.

On the other hand, Otolorin and Akpan (2017) employ the VAR technique on the data ranges from 1981 to 2015 and conclude that interest rates, asset prices, credit, and ER channels are ineffective in stimulating output. Moreover, the MP is effective at controlling inflation in Nigeria. Rafiq and Kazmi (2017) also note the negative

relationship between the interest rate and EG in three industrialized countries: Norway, Australia, and Singapore. The study collects data from 1980-2012 and employs fixed and random effect model techniques. Similarly, Yien et al. (2017) investigates the dynamic association between EG and MP for the Malaysian economy by using data from 1980-2015. The study employs the VAR-based Granger causality test (GCT) and finds that the interest rate (measured as the deposit rate) causes EG, MS, inflation, FDI, and unemployment in the Malaysian economy. Further, the study argues that the shift from "monetary targeting" to "interest rate targeting" is beneficial for the Malaysian economy.

Urbanovský (2017) aims to investigate the causal relationship between interest rate, MS, inflation, and EG in the Czech Republic by using data from 1996Q1 to 2015Q3. The study uses the three-month Prague Interbank Offered Rate and estimates two VAR models. In the VAR (1) model, Urbanovský (2017) observes that inflation and EG cause interest rates. Interest rates, on the other hand, have no effect on the EG. Moreover, EG is a contributing factor to inflation in the Czech Republic. Furthermore, according to VAR (2), there is a bidirectional causal relationship between EG and interest rate, and MS and interest rates. Secondly, there is a one-way causality running from inflation to interest rate, and MS to inflation. However, forecasting power is not very strong. But still, both VAR conclude that the price level and EG affect interest rates in the Czech Republic.

On the other hand, Lee and Werner (2018) contend that EG causes interest rates in Germany, Japan, and the UK, whereas in US there is a bidirectional causal relationship. Similarly, Werner (1997, 2005) also observes a positive association between interest rates and EG. In Nigeria, according to Idris (2019), there exists is a

negative relationship between interest rates and EG. However, the study notes that there is bidirectional causality between both variables.

Despite this, the efficiency of monetary and fiscal policies in Pakistan is a well-researched issue. However, the literature on its effectiveness is still inconclusive. The literature mostly uses money supply (MS) or interest rates as MP tools to examine the impact of MP on EG and inflation, and each has its own set of consequences. Some studies suggest that MS can help to accelerate EG. For instance, Ali et al. (2008) argue that increase in MS significantly affects EG in the short-run as well as the long-run in South Asian countries, including Pakistan. Further, GC does not significantly affect EG. The study uses data from 1990 to 2007 and employs the ARDL model.

Hameed and Ume (2011); Muhammad et al. (2009) also reached to this conclusion by using the JC test. However, Hameed and Ume (2011) observe that interest rates are also useful, but their impact is weaker than MS. The study used data from 1980 to 2009. Similarly, Usman and Miraj-ul-Haq (2016) also employ the JC test in the VECM setting and on the annual data from 1972 to 2015 and observe that MP instruments MS and ER deaccelerate EG in the short run and accelerate EG in the long run. Further, the study notes that GC significantly affects EG in the long run. On the other hand, Mahmood et al. (2017) use annual data from 1983 to 2013 and employ the JC test and VECM and observe that MP is effective in stimulating AD through interest rates and MS (interest rates negatively affect AD and MS positively affect AD). Further, the study notes that GC, currency appreciation, and inflation positively affect EG. Similarly, Shaheen (2020) uses the threshold VAR model and observes that MS is effective in accelerating EG in the long run as compared to the interest rate.

The other strand of literature argues that interest rates play an effective in stimulating AD. For instance, Agha et al. (2005) employs the SVAR model and notes

that interest rates and CRC are useful in accelerating output and controlling inflation. Khan (2008b), Munir and Qayyum (2014), and Rashid and Jehan (2014) also observe that interest rates are effective in accelerating output. Mushtaq and Siddiqui (2016) distinguish between Muslims and non-Muslim countries and monitor the impact of interest rate and EG on the saving and investment behavior of both groups of countries. The study employs panel least square and fixed-effect models on both groups separately on the panel of 57 non-Muslim and 17 Muslim countries. The study notes that the interest rates negatively affect investment in both Muslim and non-Muslim countries. However, saving is not related to the interest rate in Muslim countries and is positively associated with non-Muslim countries.

In addition to interest rate and MS, some studies observe that interest rates are not effective in stimulating AD as compared to other channels. For instance, Hussain (2009) observes that interest rates, credit, and GC are not effective in shrinking the output gap and controlling inflation. Further, the study notes that the ERC is effective in achieving MP objectives. On the other hand, Nizamani et al. (2016) employ the SVAR model and observe that interest rates are not effective in accelerating EG. However, credit plays a significant role in accelerating output. Similarly, Mukhtar and Youns (2019) also note that the interest rate is ineffective in accelerating AD in Pakistan.

Most researchers agree that interest rates can be used to control inflation. For instance, Agha et al. (2005); Mangla and Hyder (2017); Munir and Qayyum (2014); Nizamani et al. (2017); Nizamani et al. (2016); Shaheen (2020) observe that interest rates are effective in controlling inflation in Pakistan. However, in contrast to earlier studies, Javid and Munir (2010) note that contractionary MP lead to an increase in inflation over a 48-month horizon, and conclude that MP is not effectively controlling

inflation. Additionally, high-interest rates discourage investment, so the MP is not influential in Pakistan. Later on, Nawaz and Ahmed (2015) observe that the MP is not effective in controlling the output gap. However, it can be used to control inflation.

Another strand of literature focuses on the use of both MS and interest rates to control inflation. For instance, Bilquees et al. (2012), Ihsan and Anjum (2013), and note that MS and interest rates both play a significant role in affecting the inflation rate in Pakistan. The study uses data from 2000-2011 and employs OLS regression analysis. Moreover, the study notes that interest rates and CPI are negatively related to GDP. However, any conclusion based on such a small sample in time series analysis is most likely to yield biased results. On the other hand, Bon (2015) observes that in Asian countries, including Pakistan, interest rates, and MS both contribute to inflation. The study utilizes data from 1985 to 2012 and employs pooled mean group, VECM, and GMM.

3.2.2. Impact of Monetary Policy Shock on Various Component of Aggregate Demand

The most debatable issue in monetary economics is the effectiveness of the MP in stabilizing the economy (Di Giovanni et al., 2009), and is the central concern of numerous studies (Christiano et al., 1999; Romer & Romer, 1989; Sargent & Sims, 2012; Sims, 1972). It also includes the work of Sargent and Sims (2012), who won a Nobel prize for investigating the effects and causal relations of unexpected shocks on an economy. Sargent and Sims (2012) argue that monetary shocks, like interest rate shocks, have a significant impact on both real and monetary variables. However, these effects are relatively slow and have a hump-shaped pattern.

A rise in interest rates surges the cost of money, especially when investment is sensitive to interest rate changes. Hence AD decreases-either directly by lowering investment or indirectly by reducing private sector wealth and consumption. On the other hand, an increase in interest rates increases saving and induces capital inflows, which leads to currency appreciation in a small open economy with mobile capital and flexible ER (Briotti, 2005).

Formally, Jorgenson (1963) is the first to incorporates the effect of the real interest rate on investment. The study has derived an investment equation by showing that desired capital stock (K) is the function of "opportunity cost of capital" (r) and "real output" (y). Here, k negatively relates to r and positively relates to y. Hence, a fall in real interest rate lowers the cost of capital and increases K and investment-Neoclassical view. Keynes (1936) and Tobin (1965) also supported the negative relationship between interest rates and investment, and the positive relationship between interest rates and saving. Moreover, they argue that if real interest rates decrease (either by an increase in inflation or a decrease in nominal interest rates), saving drops because people prefer to spend more on land as compared to the financial sector in the form of deposits.

On the other hand, another group of economists led by McKinnon and Shaw (1973) focuses on "interest rate liberalization" (IRL) policies, where repression is dangerous from a long-term economic perspective. This argument is based on the idea that low-interest rates decrease saving. Hence, in a self-financed nation, low saving means low investment and low EG in the future. So, the rise in interest rate increases saving, and improves the efficiency of investment and production in an economy.

Empirically, the relationship between interest rates and investment is inconclusive. Greene and Villanueva (1991) observe a negative relationship between

the interest rate and the PI. The study utilizes data from 23 developing countries from 1975-1985 and employs “pool time series and cross-section” analysis. Moreover, the study concludes that EG, income, and GC positively affect PI. While real interest rate, inflation, debt-service ratio, and debt to GDP ratio negatively affect PI.

Similarly, Barran et al. (1996) and Angeloni et al. (2003) observe that the PI component of AD plays a significant role in transmitting interest rate shocks to the output in EU countries as compared to consumption. Additionally, Angeloni et al. (2003) note that the PC plays a dominant role in the US. Whereas, Disyatat and Vongsinsirikul (2003) note that the CRC is more effective, and PI mainly relies on credit in Thailand, and the interest rate affects PI through the CRC. Moreover, for Hungary, Jakab et al. (2006) observe that PI is sensitive to interest rate changes as compared to PC and net exports in Hungary. On the other hand, for MENA countries, Mukherjee and Bhattacharya (2011) observe that PI and PC are both sensitive to interest rate changes.

Similarly, for India, Khundrakpam (2012) observes that the investment component of AD plays an essential role in transmitting the effects of MP. Tokuoka (2012) argues that a negative relationship exists between interest rates and investment in India. Similarly, Pattanaik et al. (2013) investigate the impact of the real interest rate on investment and EG by using firm-level and macroeconomic data. Moreover, the study employs diverse methods like panel regression, simple OLS, Quantile regression, and VAR and concludes that the real interest rate hurts PI and EG. However, they are against reducing interest rates at the risk of an increase in tolerance for inflation.

Geng and N'Diaye (2012) also note that the interest rate negatively affects PI in China. The study concludes that financial sector reforms play a significant role in accelerating PI in China. On the other hand, Batu (2016); Hailu and Debele (2015)

observe that an increase in MS encourages PI, while an increase in interest rate hurts investment in Ethiopia. Dakin (2015), on the other hand, notes that interest rate has a minor impact on PI at both aggregated and disaggregated levels. The study collects quarterly data from 1987-2013 and employs VAR, variance decomposition, IRF, and GCT.

However, for Nigeria, Onwumere et al. (2012) note that the interest rate positively affects saving and PI before FL. However, the relationship is insignificant. Whereas, after FL, the interest rate negatively affects PI as suggested by Keynes. But for saving, the results are insignificant. Further, the study argues that interest rate liberalization policies are "counterproductive" in Nigeria. One possible reason is improper sequencing. Onwumere et al. (2012) believe that we need to distinguish between loans, deposits, wholesale and retail transactions, and interest charges on wholesale transactions should be liberalized first. After that, lending and deposit rates should be liberalized to safeguard banks' profits and give time for investors to adjust in line with liberalization. Moreover, the study notes that China, Korea, Malaysia, and Turkey also follow this sequence, which gives enough time for the general public to adjust in line with the new rates. On the other hand, Kelikume (2014) investigates the IRC of MP in Nigeria during 1996Q1-2013Q3. The study observes that the nominal prime lending rate negatively affects output in the long run. The study employs the Engle-Granger's two-step cointegration and ECM.

Bano (2018) investigates the short-run and long-run association between the real interest rate and investment in Pacific Island countries. The study employs a "pooled mean group" (PMG) and Panel ARDL approach for the period 1980–2016. The study observes a negative association with investment in the long run. However, in the short run, interest rates are positively related to PI for all countries, excluding Samoa.

Further, the study notes that EG, FDI, Aid, and ER are positively associated with investment. However, saving is negatively related to investment in the long-run. Bano (2018) also notes that FDI and EG are positively associated with investment in the short run. However, in the long run, all other variables negatively affect investment.

Similarly, in Pakistan, empirical studies find mixed results. For instance, Nasir and Khalid (2004) analyze the effect of interest rate on saving and investment. The study observes that interest rate mildly affects saving and investment. The study reached to this conclusion by using data from 1971-2003. Salahuddin et al. (2009) also note that investment is relatively unresponsive to changes in the interest rate in the sample of 21 Muslim developing countries. The study uses data from 1970-2002 and employs GMM and fixed effects models. Salahuddin et al. (2009) note that last year's investment, EG, domestic saving, trade openness, and institutions have a positive impact on investment. Whereas debt servicing hurts investment. Though private sector credit and foreign aid have a positive effect on investment, the results are not robust. On the other hand, the lending rate, inflation, population growth, and human capital have no impact on investment.

On the other hand, Hyder and Ahmed (2004) and Muhammad et al. (2013) observe a negative relationship between interest rates and investment. Hyder and Ahmed (2004) observe that investors lack confidence due to harmful economic and non-economic factors during 1978-2002, which led to low investment in Pakistan. During this period, economic policies focused on controlling fiscal and trade deficits. Currency devaluation to exploit the trade deficit increases the cost of imported inputs, which negatively affects investment. On the other hand, Pakistan experiences a high real interest rate due to excessive government borrowing to overcome the budget deficit, which crowds out PI. In addition to economic issues, non-economic factors like

external and internal shocks also affect investment in Pakistan. For instance, "the freezing of foreign currency accounts, the military coup, the harassment of the partially successful accountability drive of the military government, the 9/11 incident, the Afghan war and tensions on the Pak-India border have complemented the shock" (Hyder & Ahmed, 2004). The study also explores the determinants of investment for each sector (agriculture, manufacturing, and services sector) separately and observes that the real interest rate (measured as the interest rate on advances) plays a vital role in determining investment, among other variables.

Similarly, Muhammad et al. (2013) employs the JC and ECM by using data from 1964-2012 and concludes that interest rates negatively affect investment. However, the study did not consider structural breaks, for instance, the Bangladesh issue, Marshall laws, oil price shocks, etc. Madni (2014) also reached the same conclusion by using data from 1979-2012 by employing ARDL and VECM. The study notes that the budget deficit, external debt, interest rates, and inflation negatively affect PI, while exports and ER accelerate PI.

3.2.3. Does government Consumption Expenditures Crowds Out Private Spending?

The impact of GC on PI and PC is an ongoing controversy among a group of economists. The first group, who favor a "market economy" and against state intervention, believes that an increase in GC leads to a decrease in PC and PI. Hence, an increase in GC means higher taxes in the future, which discourages PI. On the other hand, high taxes make HH feel poor, so they decrease consumption and leisure and increase labor supply, which further lowers wages and PC (Perotti, 2008). However, if the government borrows to finance GC, adverse effects are more severe on PC and PI due to a rise in interest rates.

Moreover, it also left lower resources available for the private sector to finance their projects. As a result, PI and PC crowd out (Kaputo, 2012; Naa-Idar et al., 2012). In short, GC leads to the crowding out of the private sector through higher future taxes and interest rates and lower wages and credit availability.

On the other hand, the second group of economists believes in the active role of the state in stimulating output and stabilizing prices. Economists argue that GC increases labor demand, which offsets the increase in labor supply, hence real wage increases. When labor wages increase, they increase consumption (Petrović et al., 2020). Moreover, if the government spends on education, health, offers social safety net benefits, build roads, dams, railways, facilitates private investors, keeps the rule of law, and reduces uncertainty in the economy, then investment increases (Adugna, 2013; Hailu & Debele, 2015; Jalloh, 2002; Mbaye, 2014; Molapo & Damane, 2015). Furthermore, it also increases HH income and consumption (Hur et al., 2014).

After the GFC, governments of advanced and emerging economies are actively involved in the growth process, to cope up recessionary phase. However, empirical studies find mixed results. For instance, some scholars note that GC increases PC (Anghelache et al., 2017; Blanchard & Perotti, 2002; Bouakez & Rebei, 2007; Fatas & Mihov, 2001; Galí et al., 2007; Mountford & Uhlig, 2009). In contrast, other groups of scholars believe that GC negatively affects PC or may have an insignificant impact (Hur et al., 2014; Petrović et al., 2020). Moreover, the impact of GC on investment is also inconclusive. For instance, Blanchard and Perotti (2002); Galí et al. (2007); Mountford and Uhlig (2009); Romero-Avila and Strauch (2008); Schclarek (2007) observe that GC crowds out PI. Whereas Abiad et al. (2014); Alichi et al. (2019), among others, note that GC crowds in PI, especially at the time of recession.

Blanchard and Perotti (2002) observe that GC increases PC and decreases PI. Galí et al. (2007) also argue that GC leads to a significant increase in PC, while investment either decreases or does not have a considerable impact, depending on sticky prices or deficit financing by the government. Feldmann (2006) observes that in a sample of 19 industrialized nations, public spending is more than PI, and it plays a significant role in job creation. Similarly, Schclarek (2007) investigates the impact of GC on PC and unemployment in a panel of 40 countries and reaches the same result for both developing and advanced nations, that GC crowds out private sector demand.

Similarly, Gozgor (2013) observes the impact of GC on CEE countries and notes that the GC temporarily affects PC except in Croatia and Slovenia, where GC increases PC in the long run. Hur et al. (2014) use the SVAR model along with the panel cointegration and error correction models in a panel of 24 countries, along with 10 Asian countries. Hur et al. (2014) observe that GC does not crowd out PI and PC, but it crowds in. However, the results are insignificant. On the other hand, Adugna (2013); Hailu and Debele (2015) observe that GC significantly affects PI in Ethiopia.

Scutaru et al. (2015), on the other hand, argue that bank loans and wages significantly affect PC in Romania, besides GC. On the other hand, Anghelache et al. (2017) observe that GC significantly increases PC in Romania. Moreover, the study notes that the PC has a more substantial impact on GDP as compared to the GC. Keho (2019) observes that GC, interest rate, and inflation insignificantly affect PC in Cote d'Ivoire. The study reaches this conclusion by using data from 1970-2016 and employing the ARDL model.

Recently, Petrović et al. (2020), Ramey and Zubairy (2018) find that GC explains little variation in the growth of the private sector. Ramey and Zubairy (2018) note that GC has a negligible effect on PC and EG. Moreover, few studies investigate

the impact of PC on PI and GC. For example, Yıldırım and Yıldırım (2017) observe that a positive consumption shock accelerates PI. Moreover, investment shocks reduce unemployment and increase PC.

Similarly, in Pakistan, Ahmad and Malik (2009) observe that GC deaccelerates EG in a panel of 35 developing countries. Similarly, Muhammad et al. (2009) also conclude that GC hurts EG. However, the study notes that MS accelerates EG by employing a cointegration test on the annual data from 1977 to 2007. Moreover, Fatima and Iqbal (2003) also reached the same conclusion. On the other hand, Jawaid et al. (2011) observe that MS and GC both effectively stimulate output in Pakistan. However, MS is more effective than GC.

Chowdhury (1988) argues that institutional factors affect the effectiveness of fiscal policy. However, it differs across countries. In low-income countries, an increase in GC is fully offset due to negative substitution and wealth effects on PI. Similarly, Burney et al. (1989) observe that the government's budget deficit, when financed by private sector credit, raises the interest rate, which is expected to crowd out PI in Pakistan. The study uses annual data from 1971 to 1989 and employs simple OLS regression. On the other hand, Sakr (1993) observes that GC is positively related to the PI in Pakistan by using data from 1974 to 1992. Moreover, the study notes that CPRVS, and GDP growth also positively affect PI.

Similarly, Munir et al. (2010) investigate the short-run and long-run association among saving, public and private investment, real deposit rate, and CPRVS from 1973-2007 by using the ARDL bounds testing approach. The study notes that all these variables are positively related to the PI.

In recent literature, Rahman et al. (2015) employs the JC test and VECM and observes that when the government spends on the agriculture, health, and transport sectors, they crowd in PI. However, when the government spends on debt and community service, it crowds out PI. The study utilize data from 1974 to 2010. Similarly, Chaudhry et al. (2016) observe that the interest rate negatively affects PI. Further, the study notes that GC positively affect PI. However, its results are insignificant. Moreover, the study utilizes annual data from 1973-2015 and estimates nine variable ARDL models without controlling for any structural shift. Later on, Hye and Lau (2018) analyze the financial and trade liberalization policies on PI in Pakistan and observe that the interest rates negatively affects PI, while GC positively affects PI. The study reached this conclusion by using data from 1971-2014 and employing an ARDL bound testing and cointegration approach.

Munir and Riaz (2019) use the VAR framework with Cholesky decomposition to analyze the impact of fiscal policy in Pakistan. The study notes that one SD shock to GC increases PC, EG, inflation, and interest rates, and decreases PI. However, none of the responses are significant. The study uses quarterly data from 1976 to 2017 but does not consider any dummy variables to control for structural shifts during this period. Khan (2020) observes that GC negatively affects EG by using data from 1973-2015. Moreover, the study notes that GC significantly explains the variation in PI. However, the study is silent on its sign.

From the empirical review, the study observes that literature is inconclusive on the impact of interest rate and MS on inflation, output, and various components of AD. Further, the effect of each element of AD on each other, inflation, interest rate, and MS are also controversial in the literature. In addition to this, the impact of GC on PI has always been a source of contention. The effect of GC on PC, on the other hand, has

received less attention. Similarly, the influence of PC on PI and GC has received little attention in the empirical literature. Another issue that has been identified in previous studies is the use of a small number of observations in a single nation scenario, which may result in biased conclusions. Studies utilizing huge data sets, on the other hand, typically neglect structural and policy shifts that occur over time. For example, the partition of East Pakistan (Bangladesh), the war with India, the transition in MP from monetary aggregates to interest rates, and now the interest rate corridor system, the GFC, and the oil price shocks of 2008 and 2016. As a result, the current study is an attempt to address these weaknesses and provide a more comprehensive analysis.

3.3.Model Specification and Variables

The main objective of this essay is to investigate the impact of MP shocks on inflation, AD, and its three components, i.e., GC, PI, and PC. Further, the study investigates the impact of a shock on different parts of AD on each component of AD, inflation, and policy variables. To achieve these objectives, the study developed two closed economy SVAR models. The first model is designed for aggregate analysis. In contrast, the second model is set for the disaggregated analysis of AD. As the study already established in the earlier chapters, SVAR model is used in the literature to analyze the dynamic impact of random disturbances and the effectiveness of MTM (Bernanke, 1986; Blanchard & Watson, 1986; Sims, 1986). However, instead of relying on the Cholesky decomposition or arbitrary theoretical assumptions, the study uses DAG analysis, which provides the contemporaneous causal relationship among the variables based on conditional dependence and independence relationships among variables. Moreover, it helps us to identify the restrictions. The basic structure of the SVAR model stays the same, as discussed in the earlier chapter.

The reduced form equation for the baseline model is

$$X_{1t} = [LGDP\ LINF\ LM2\ RDR]' \quad (3.1)$$

Where LGDP is the real GDP used to measure AD. Similarly, LINF is the inflation rate, measured as the annual change in the log of CPI. Further, LM2 is the broad money supply, and RDR is the real discount rate used to measure the policy rate. The real discount rate is calculated by subtracting the inflation rate from the nominal discount rate.

For the disaggregated analysis, the study follows the expenditure approach to GDP, which can be calculated as

$$Y = C + I + G \quad (3.2)$$

Where C is household consumption expenditures, I is private investment, and G is the government's final consumption expenditures. However, our empirical strategy differs from that of Khundrakpam (2012), who examines the effectiveness of MP on different components of AD. Khundrakpam (2012) uses two variables. The first variable is the component of AD on which he wants to see the impact of a shock to MP, and the second variable captures the joint effect of all the remaining components of AD. For instance, to investigate the impact of investment, the study uses two variables. The first variable is investment, and the second variable is GDP minus investment. Similarly Khundrakpam (2012) estimates SVAR models for each component of AD. On the contrary, the present study introduces all the components of AD into one model along with inflation, MS, and RDR. The reason for introducing all components is to see the impact of different components of AD on each other. Hence, the reduced form equation becomes:

$$X_{2t} = [LGC, LPI, LPC, LINF, LM2\ RDR]' \quad (3.3)$$

Where LGC is government consumption spending measured as the log of real general government final consumption expenditure. LPI is a private investment measured as the log of real gross fixed capital formation. LPC is a private consumption measured as the log of real household final consumption expenditure. LINF is the inflation rate, LM2 measures the broad money supply, and RDR is the real discount rate. We have taken a log of all variables except interest rate. Data is collected from 1976-2019. Various issues of the Economic Survey of Pakistan, State Banks of Pakistan (SBP) reports, along with the IFS database, are used to collect the most reliable data. It is surprising to note that the marginal propensity to consume (MPC) is 0.84 in 2019, which is very high and is the main driving force of AD. But the Pakistan Bureau of Statistics (PBS) does not collect data on PC expenditure. It is considered as a residual term while calculating GDP from the expenditure approach *(Pakistan Economic Survey 2018-19)*. Hence, this could affect the reliability of our estimates.

3.4. Estimation Results

The ADF and PP tests, which showed that all variables are I (1). The test results are reported in Table 3.1.

Table 3.1 Results of Unit Root Test

Variable	Level		First Difference		Order of Integration	
	ADF	PP	ADF	PP	ADF	PP
LGDP	-2.034 (0.272)	-2.006 (0.283)	-4.182 (0.002)	-4.207 (0.002)	I (1)	I (1)
LGC	-0.933 (0.769)	-0.574 (0.866)	-8.887 (0.000)	-8.541 (0.000)	I (1)	I (1)
LPI	-1.542 (0.503)	-1.670 (0.440)	-5.294 (0.000)	-5.141 (0.000)	I (1)	I (1)
LPC	-1.293 (0.625)	-1.608 (0.471)	-6.053 (0.000)	-6.057 (0.000)	I (1)	I (1)
LINF	-1.213 (0.203)	-1.001 (0.280)	-9.880 (0.000)	-11.206 (0.000)	I (1)	I (1)
LM2	-1.057 (0.725)	-1.308 (0.618)	-5.641 (0.000)	-5.601 (0.000)	I (1)	I (1)
RDR	-3.389 (0.065)	-3.351 (0.071)	-9.811 (0.000)	-10.043 (0.000)	I (1)	I (1)

Note: P- values are available in the parenthesis

3.4.1. Model 1: The Baseline Model

First, we estimate the unrestricted VAR model by using data from 1976 to 2019 on real GDP, inflation, MS, and RDR and check the lag length criterion. The study chose one lag based on SC and HQ criteria, as shown in Table 3.2.

Table 3.2 Lag length criterion for Baseline Model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-186.017	NA	0.066	8.637	8.799	8.697
1	44.52	408.671	3.87e-06	-1.114	-0.303*	-0.814*
2	65.74	33.770*	3.11e-06*	-1.352*	0.108	-0.811

Note: * indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

The study also observes the residual plots to trace the structural breaks in the data. Residual plots show that three breaks occur over time, as shown in Figure 3.1.

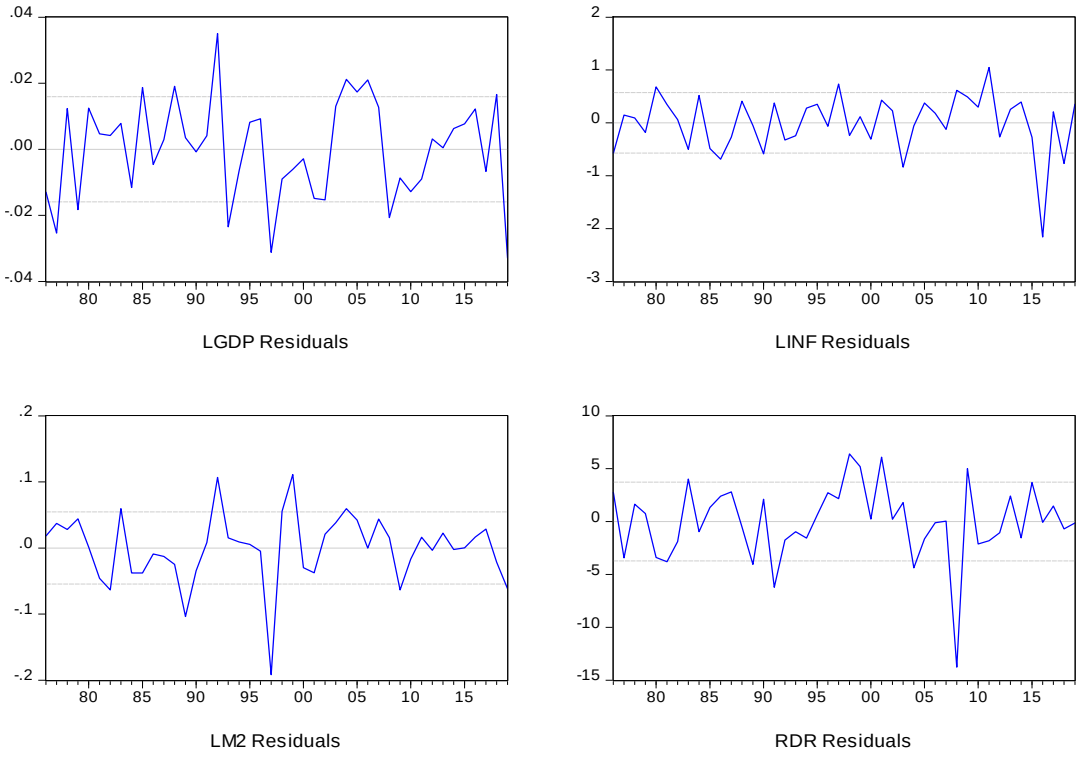


Figure 3.1 Plot of VAR Residuals

Source: Author's self-calculation

The first break occurred in 1997, when the MP shifted from monetary aggregates to the interest rate as a policy variable. The second break occurred in 2008, when the GFC and the sharp increase in oil prices negatively affected the world, including Pakistan. This effect is captured in the residual plot of RDR, which decreased significantly in 2008. Later, in 2016, the significant decrease in oil prices led to a substantial decline in inflation, as shown in the residual plot of LINF. The study also observes that these dummies remain significant in unrestricted VAR. By introducing relevant dummies and one lag in the VAR, all diagnostics are also satisfied as shown in Table 3.3. Residuals are normally distributed with no autocorrelation and heteroscedasticity. Further, the model is stable, and all roots are less than one, as shown in Table 3.4.

Table 3.3 Diagnostics of the Baseline Model

Test		**Test Statistics**
Normality Test	Skewness	1.222 (0.891)
	Kurtosis	0.490 (0.974)
	Jarque-Bera	1.612 (0.991)
Heteroskedasticity Test		96.549 (0.816)
Serial Correlation LM Tests	Lag	LM Stat
	1	17.522 (0.355)

Note: P values are reported in the parenthesis

Table 3.4 VAR Stability Condition of the Baseline Model

Root	**Modulus**
0.990	0.990
0.926	0.926
0.307 - 0.145i	0.339
0.307 + 0.145i	0.339

Note: No root lies outside the unit circle

Further, the JC test is conducted to test the long-run relationship between the variables. The JC test confirms the long-run relationship between the variables, as reported in Table 3.5. The Trace and maximum eigenvalue tests indicate that four cointegrating equations exist at a 0.05 level of significance. Hence, the study estimates the SVAR model at the level followed by Aslanidi (2007); Kim and Roubini (2000), among others.

Table 3.5 Results of Johansen Cointegration Test of the Baseline Model

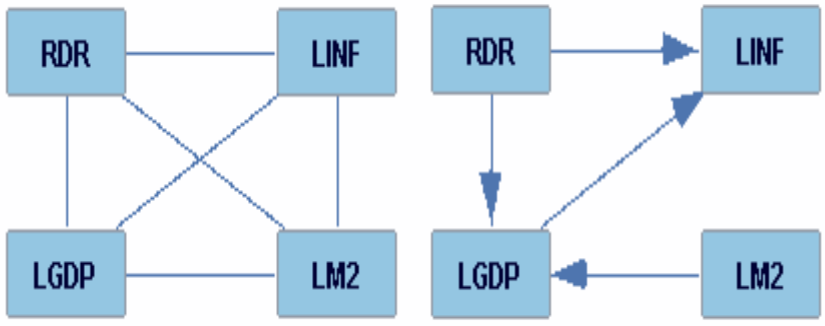
No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**	Max-Eigen Statistic	0.05 Critical Value	Prob.**
r=0	0.670	99.322	47.856	0.000	48.762	27.584	0.000
r≤1	0.448	50.561	29.797	0.000	26.137	21.132	0.009
r≤2	0.359	24.424	15.495	0.002	19.587	14.265	0.007
r≤3	0.104	4.836	3.841	0.028	4.836	3.841	0.028

Note: Trace test and Max-Eigen test indicates 4 cointegrating eqn(s) exists at the 0.05 level.

**MacKinnon et al. (1999) p-values

3.4.1.1.Contemporaneous Causal Relationship of the Baseline Model

The study estimates the unrestricted VAR model, and uses its residual covariance matrix as an input in TETRAD V. TETRAD begins with an undirected graph as shown in panel (a) of Figure 3.2 and uses a PC algorithm to generate the following contemporaneous causal structure as shown in panel b of Figure 3.2



(a) **(b)**

Figure 3.2 Contemporaneous Causal Relationship of the Baseline Model

Source: Author's self-calculation

Note: By using the covariance matrix of unrestricted VAR, the study generates the above causal structure. Panel (a) shows an undirected graph and panel (b) shows the contemporaneous causal relationships among the variables.

The DAG analysis shows that RDR causes inflation both directly and indirectly through AD[23]. Similarly, AD affects inflation. Moreover, LM2 directly affects AD, but it indirectly affects LINF through AD. Hence, AD screens off LM2 and inflation. Hence, there is no direct contemporaneous causal relationship between MS and inflation. However, MS and interest rates both directly affect AD. Moreover, the DAG analysis shows that other variables do not contemporaneously cause RDR and LM2.

The results are also summarized in equation 3.4

$$B_1 Y_t = \begin{bmatrix} 1 & 0 & \beta_{13} & \beta_{14} \\ \beta_{21} & 1 & 0 & \beta_{24} \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} LGDP \\ LINF \\ LM2 \\ RDR \end{bmatrix} \tag{3.4}$$

The over-identified SVAR model is estimated by using the identification scheme proposed by DAG analysis in equation 8. The chi-square value of the LR test of overidentification is 1.052, with a probability of 0.591. Hence, the study does not find significant evidence to reject the overidentifying restriction at a 10% level of significance. Thus, we can find SIRF and FVD.

3.4.1.2. Structural Impulse Response Functions of the Baseline Model

The impact of one SD shock to LM2 and RDR on AD and inflation is reported in Figure 3.3, along with a 95% confidence band. The SIRFs show that one SD shock to LM2 leads to a sharp increase in AD; however, the response is significant after four years. On the other hand, one SD shock to RDR leads to a sharp decrease in AD. After that, it starts rising; however, the results are insignificant. Thus, monetary aggregates

[23] AD and LGDP are used interchangeably

are useful in accelerating output as compared to interest rates. Our findings are consistent with the earlier studies like Ali et al. (2008); Fatima and Iqbal (2003); Mahmood et al. (2017); Muhammad et al. (2009); Shaheen (2020); Usman and Miraj-ul-Haq (2016) among others who also note that MS positively affect EG as compared to interest rates.

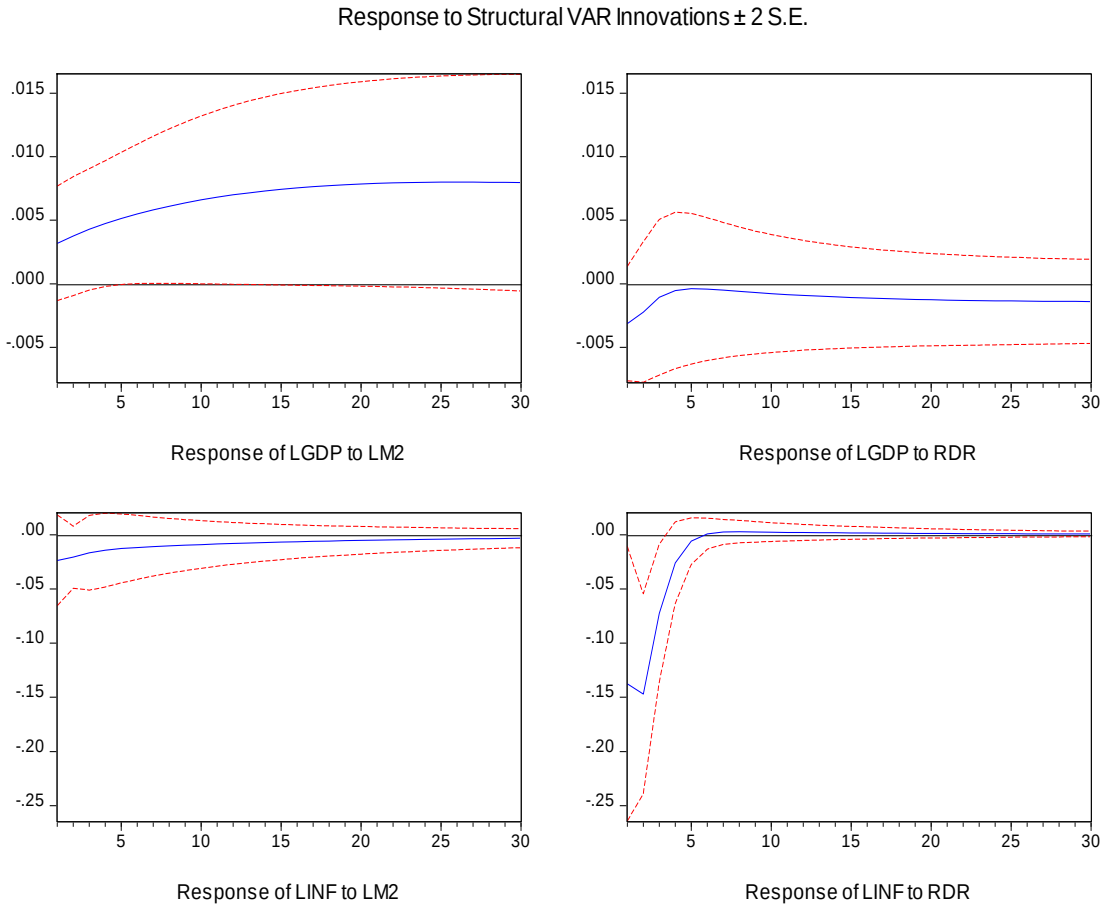


Figure 3.3 **Baseline Model: Structural Impulse Response Function of Output and Inflation to the Money Supply and Interest rate Shock**

Source: Author's self-calculation

Note: The first panel shows the response of different macroeconomic variables to the MS shock. Whereas the second panel shows the response of different macroeconomic variables to RDR shock.

However, the response of LINF is opposite to the AD. The tight MP, in the form of a high-interest rate shock, leads to a significant decrease in the inflation rate in the first two periods. After that, it starts rising and converges to the long-run path. Whereas

the expansionary MP (increase in MS) leads to an insignificant decrease in the inflation rate. Our results also complement the earlier studies who also note that interest rate is effective in controlling inflation in Pakistan. For instance, Agha et al. (2005); Mangla and Hyder (2017); Munir and Qayyum (2014); Nizamani et al. (2017); Nizamani et al. (2016); Shaheen (2020). Hence, we can conclude that monetary authorities can use broad money to accelerate AD in the long run, and interest rate to control inflationary pressure in the short run.

3.4.1.3. Forecast Variance Decomposition of the Baseline Model

FVD of LGDP and LINF is reported in Table 3.6. In the case of AD, 91% variation in AD is explained by itself in the first period. On the other hand, LM2 and RDR each explain four percent of the variation in AD. In the fifth period. AD itself contributes to explain 86% of the variation, whereas LM2 explains 8%, LINF explains 4%, and RDR explains only one percent variation in AD. Similarly, in the 30^{th} period AD explains 56% of the variation, and LM2 explains 40% of the variation in AD. On the other hand, LINF and RDR only explain three percent and one percent of the variation in AD respectively. Hence, the FVD also supports the findings of SIRFs that is MS plays a significant role in explaining the variation in AD, as compared to RDR.

Similarly, the FVD of the inflation rate shows that almost 83% variation in LINF is explained by itself. In comparison, 10% variation in LINF is explained by RDR, 6% variation is explained by LGDP, and LM2 explains less than one percent variation in LINF. However, in the 30^{th} period, 72% variation in LINF is explained by itself, while RDR explains 21% variation. Moreover, the share of LGDP remains 6%, and the percentage of LM2 remains one percent. Hence, the primary source of variation in inflation may be due to supply-side factors. However, the interest rate is also useful

in explaining variation in inflation, but its share is minimal. Overall, we can conclude that RDR is effective in controlling inflation as compared to MS.

Table 3.6 Forecast Variance Decomposition of the Baseline Model

Period	LGDP Shock	LINF Shock	LM2 Shock	RDR Shock
Variance Decomposition of LGDP:				
1	91.447	0.000	4.335	4.218
2	89.514	2.390	5.031	3.066
5	85.858	4.373	8.289	1.480
10	79.662	4.242	15.103	0.992
15	72.929	3.772	22.337	0.961
20	66.492	3.321	29.132	1.055
25	60.788	2.946	35.080	1.186
30	55.938	2.647	40.093	1.321
Variance Decomposition of LINF:				
1	6.285	83.296	0.298	10.122
2	5.503	75.047	0.461	18.989
5	5.855	72.443	0.731	20.971
10	6.172	72.020	0.965	20.844
15	6.306	71.816	1.091	20.788
20	6.364	71.714	1.162	20.760
25	6.388	71.660	1.205	20.746
30	6.398	71.631	1.232	20.739

3.4.2. Model 2: Disaggregated Analysis

To analyze the impact of MP shock on each component of AD. Moreover, we have investigated the effect of a shock to each component of AD on the other components of AD, inflation, interest rate, and MS. For this purpose, we have estimated the unrestricted VAR model and check the lag length. The results of the lag length criterion are reported in Table 3.7, which suggests that we should include one lag in the model based on SC and HQ criteria. Further, we have also included three dummies to capture structural breaks, as discussed in the last section.

All the diagnostics are satisfied, as shown in Table 3.8. The residuals are normally distributed with no problem of autocorrelation and heteroskedasticity. Further, we have checked the stability condition of the model. The result of the VAR stability condition is reported in Table 3.9, which shows that all roots are less than one. Hence the model is stable.

Table 3.7 VAR Lag Order Selection Criteria of Model 2

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-91.499	NA	8E-06	5.250	6.223	5.611
1	179.123	418.234	2E-10	-5.415	-2.982*	-4.512*
2	225.289	58.756*	1E-10*	-5.877*	-1.984	-4.433

Note: * indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 3.8 Diagnostics of the Model 2

Test		**Test Statistics**
Normality Test	Skewness	4.759 (0.575)
	Kurtosis	10.121 (0.112)
	Jarque-Bera	14.879 (0.248)
Heteroskedasticity Test		274.413 (0.952)
Serial Correlation LM Tests	Lag	LM Stat
	1	48.001 (0.094)

Note: P values are reported in the parenthesis

Table 3.9 VAR Stability Condition of the Model 2

Root	**Modulus**
0.992	0.992
0.772	0.772
0.392 - 0.184i	0.433
0.392 + 0.184i	0.433

Note: No root lies outside the unit circle

Since all the variables are I (1), to check the long-run relationship between the variables, the study estimates the JC test. The result of the JC test is reported Table 3.10, which indicates that three cointegration equations exist. Hence, a long-run relationship exists among the variables.

Table 3.10 Results of Johansen Cointegration Test of Model 2

No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**	Max-Eigen Statistic	0.05 Critical Value	Prob.**
r=0	0.723	146.656	95.754	0.000	56.415	40.078	0.000
r≤1	0.600	90.240	69.819	0.001	40.310	33.877	0.008
r≤2	0.510	49.930	47.856	0.032	31.414	27.584	0.015
r≤3	0.240	18.516	29.797	0.528	12.104	21.132	0.537
r≤4	0.107	6.412	15.495	0.647	5.002	14.265	0.742
r≤5	0.032	1.410	3.841	0.235	1.410	3.841	0.235

Note: Trace and Max-Eigen test indicate 3 cointegrating eqn(s) exists at the 0.05 level.

**MacKinnon et al. (1999) p-values

3.4.2.1. Contemporaneous Causal Relationship of Model 2

Since there exists a long-run relationship between the variables, now we can estimate the SVAR model at levels. For this purpose, we have identified the covariance matrix by imposing restrictions proposed by the DAG analysis as depicted in Figure 3.4.

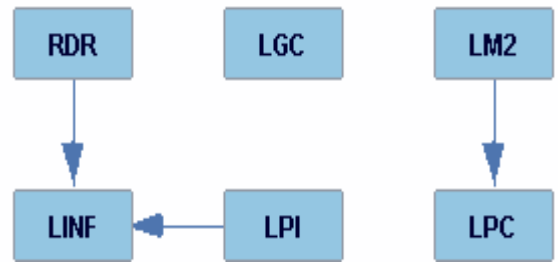


Figure 3.4 Contemporaneous Causal Relationship of Model 2

The DAG analysis of model 2 can be summarized as follows

1. RDR and investment contemporaneously cause inflation. Here, LINF is a collider. RDR and LPI are dependent when conditional on a collider- they are independent unconditionally.
2. LM2 causes LPC. When MS increases, consumers increase consumption. This is aligned with Keynesian theories – with sticky prices, an increase in money stock

will increase AD. It is not aligned with the short-run neutrality of money posited in Lucas-Sargent RBC models.

3. However, LM2 is not contemporaneously causing any other variables, nor is it caused by any variable. This implies that the money supply is exogenously determined.
4. Similarly, LGC is not contemporaneously caused nor caused by any variable. Hence, government consumption is exogenously fixed.
5. The policy rate has no direct contemporaneous impact on the different components of AD. This assumption is in line with Alam (2015); Cushman and Zha (1995); Jones and Bowman (2019), among others. Further, AD does not contemporaneously cause policy rate (Kim & Roubini, 2000).

The results are also summarized in equation 3.5.

$$B_2 Y_t = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & \beta_{35} & 0 \\ 0 & \beta_{42} & 0 & 1 & 0 & \beta_{46} \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} LGC \\ LPI \\ LPC \\ LINF \\ LM2 \\ RDR \end{bmatrix} \quad (3.5)$$

Equation 3.5 is used to identify the SVAR model. The log LR test is conducted to check the significance of over-identifying restrictions. The LR test statistics is 17.738 and the probability is 0.124. Hence, we do not find significant evidence to reject the over-identifying restrictions at a 10% level of significance.

3.4.2.2. Structural Impulse Response Function of the Model 2

3.4.2.2.1. Structural Impulse Response Function of the MP shock on the Different Components of Aggregate Demand

The response of various components of AD and inflation to one SD shock to LM2 and RDR is depicted in Figure 3.5. An expansionary MP by one SD positive shock

to LM2 leads to a significant increase in all components of AD. However, the impact on LGC and LPI is significant in the long run. However, PC increases instantaneously, and this shift in consumption remains significant and persists in the long run. Hence, money plays an essential role in stimulating AD.

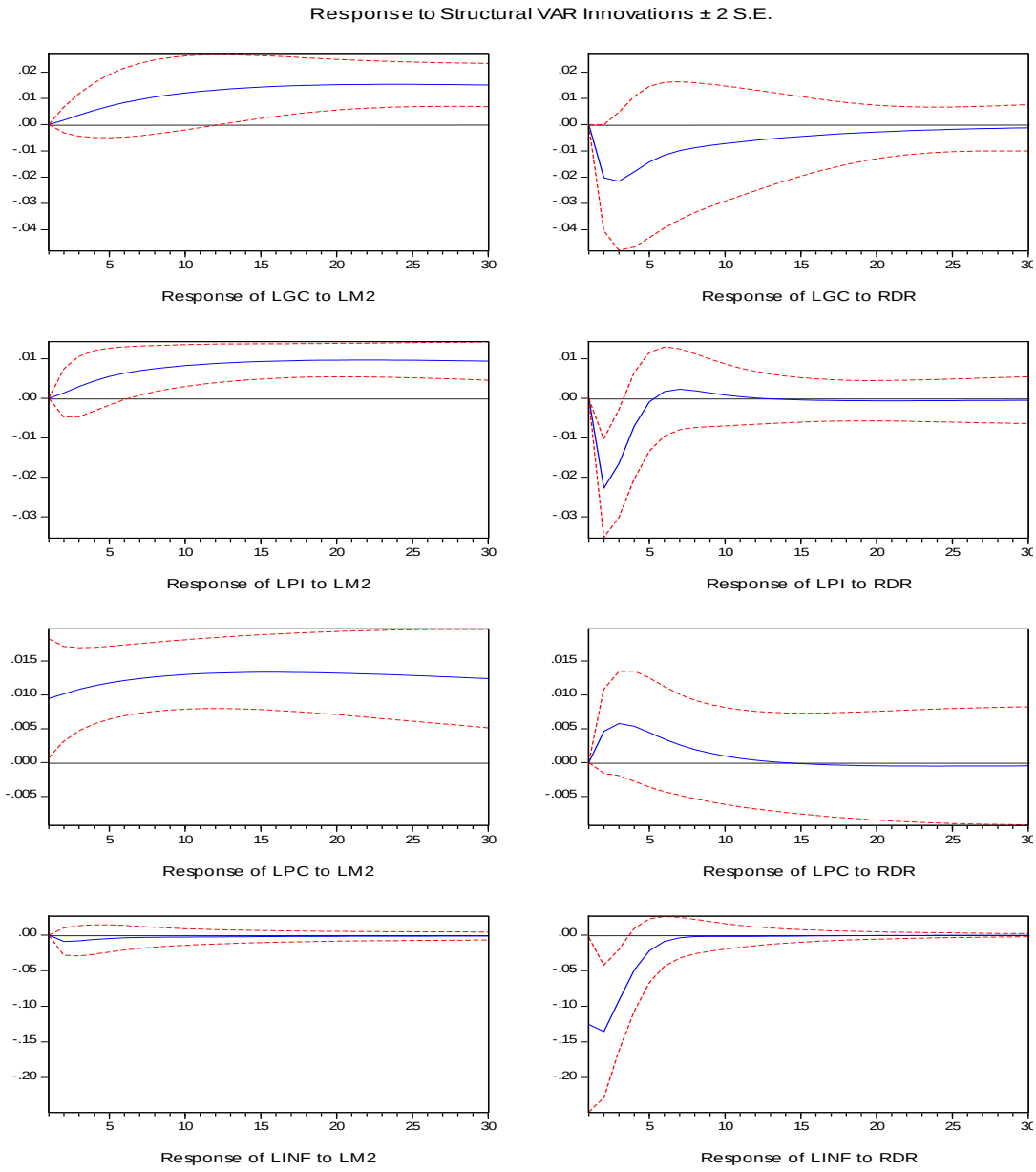


Figure 3.5 **Model 2: Structural Impulse Response Function- Shock to Money Supply and Interest Rate**

Source: Author's self-calculation.

Note: The first panel shows the response of different macroeconomic variables to the MS shock. Whereas the second panel shows the response of different macroeconomic variables to RDR shock.

Similarly, the contractionary MP, a rise in RDR, led to a significant decrease in GC and PI. However, the response is significant only in the short run. On the other hand, an increase in RDR leads to a rise in PC. However, the results are insignificant. Hence, the interest rate significantly impacts the PI and GC in the short run. Yet, it has an insignificant impact on PC, which is the largest component of AD. Our results are consistent with Hyder and Ahmed (2004); Muhammad et al. (2013) among others who also argue that interest rates negatively affect PI. However, our results contradict Nasir and Khalid (2004); Salahuddin et al. (2009), who conclude that interest rates do not significantly impact PI. Further, the response of inflation is the same to both the interest rate and the MS shock, as we have discussed in the last section. In response to the RDR shock, inflation decreased significantly.

3.4.2.2.2. Structural Impulse Response Function of the Aggregate Demand Shock

Figure 3.6. depicts the SIRF of the shock to the various components of AD. LPI, LPC, LM2 and RDR are not significantly affected by the positive shock to the LGC. LPI and LINF increased in response to LGC and LPC, LM2 and RDR fell. Therefore, LGC doesn't crowd out PI, even if it doesn't crowd. Significant decreases to the LINF are also associated with a positive shock to LPI. However, its effect on other factors is negligible. For example, it resulted in a decrease in LGC and an increase in LPC and RDR. In addition, the influence on LM2 is insignificant.

The positive shock to LPC on the other hand leads to a significant increase in LPI. This implies that the producer also raises investment and production as customers spend and want more. The study also highlights that an increase in LPC leads to an increase in LGC, RDR and LINF. However, none of the responses are statistically significant. Furthermore, the study shows that an increase in LPC results in a slight decrease in LM2, but the response is insignificant.

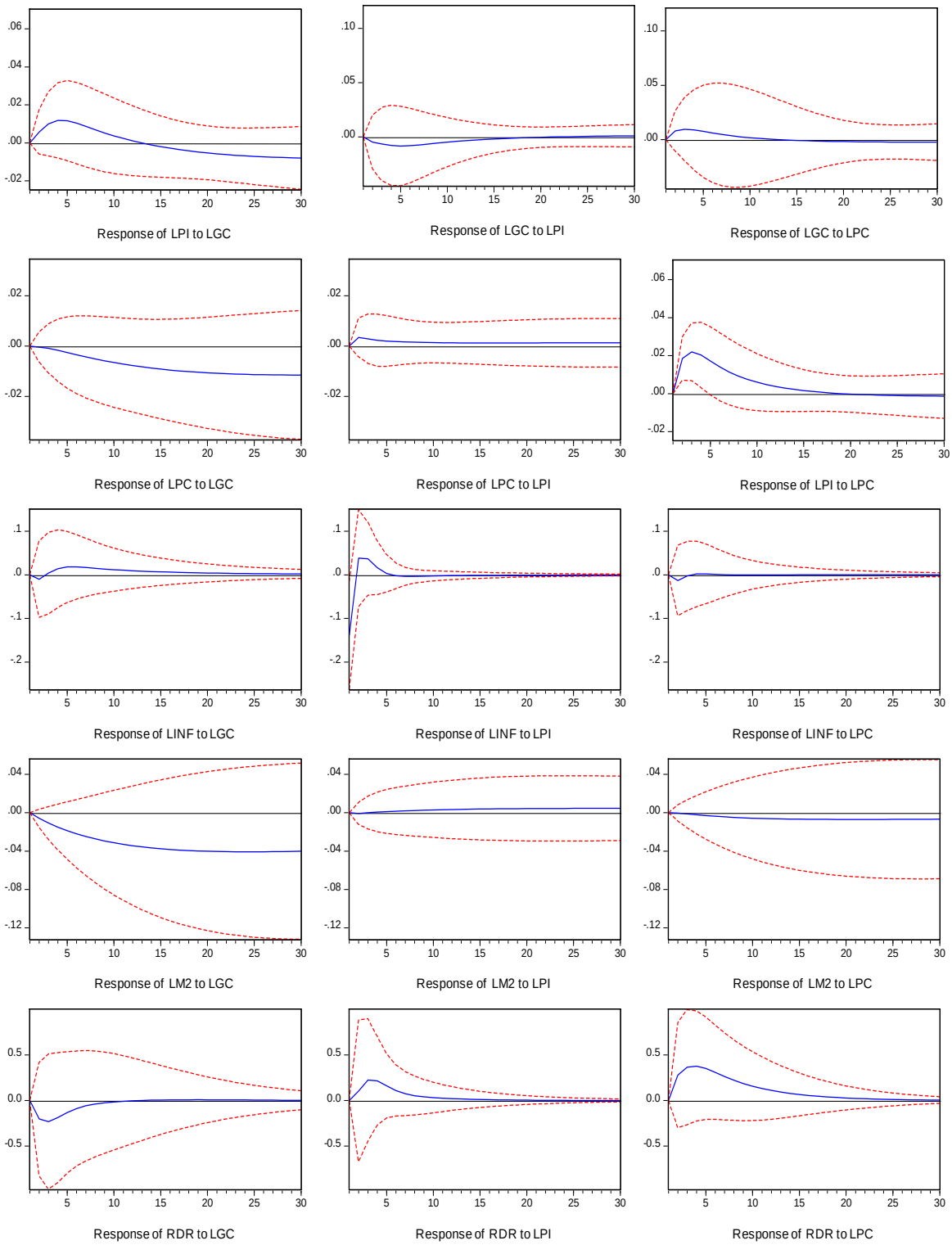


Figure 3.6 Structural Impulse Response Function of the shock to AD

Source: Author's self-calculation.

Note: The first panel shows the response of different macroeconomic variables to the government's consumption shock. The second panel shows the response of different macroeconomic variables to the private investment shock. The third panel shows the response of different macroeconomic variables to the private consumption shock.

Overall, we may infer that the influence of all the components of AD on MS and RDR is minimal Further, the study notes that GC does not crowd out LPI. Hence, the government should invest in projects that encourage and facilitate private investors to finance more. For instance, telecommunication, infrastructure, continuous supply of electricity, and gas create an investor-friendly environment and social security.

The study also observes that PC causes PI, which is evident when consumers demand more, and producers produce more. "Demand creates its own supply." This supports Keynesian demand-side economics against supply-siders. Further, the study notes that when investors increase investment and production, it decreases prices. Hence, our results are in line with the law of demand, i.e., when supply increases, prices fall.

3.4.2.3.Forecast Variance Decomposition of the Model 2

The FVD of model 2 is reported in Table 3.11. The FVD of LGC shows that most of the variation in LGC is explained by itself. However, in the short run, RDR explains some variation. However, in the long run, LM2 explains some variation in LGC. For instance, in the 5^{th} period, 94% variation in LGC is explained by itself, and RDR explains 4% variation. Whereas LM2 explains almost none of the variation. In the 20^{th} period, nearly 86% variation in LGC is explained by itself, and RDR explains the remaining 4% variation, and LM2 explains 2% variation. Similarly, in the 30^{th} period, 83% variation in LGC is explained by itself, whereas LM2 explains 10% of the variation, and RDR explains 4% of the variation. Hence it is clear that most of the variation in LGC is self-explanatory. RDR has some influence on LGC in the short run and LM2 in the long run, but they are not very useful in explaining the variation in LGC, which is very evident.

Table 3.11 Forecast Variance Decomposition of Model 2

Period	LGC Shock	LPI Shock	LPC Shock	LINF Shock	LM2 Shock	RDR Shock
Variance Decomposition of LGC:						
1	100	0.000	0.000	0.000	0.000	0.000
2	97.231	0.117	0.353	0.004	0.018	2.277
5	93.877	0.571	0.889	0.165	0.291	4.207
10	92.074	0.954	0.903	0.168	1.541	4.358
15	89.891	1.007	0.865	0.166	3.572	4.499
20	87.507	0.988	0.864	0.186	5.948	4.506
25	85.254	0.958	0.881	0.217	8.278	4.412
30	83.283	0.933	0.902	0.250	10.363	4.269
Variance Decomposition of LPI:						
1	0.000	100	0.000	0.000	0.000	0.000
2	0.641	82.357	6.570	0.480	0.035	9.917
5	5.301	59.794	19.812	3.474	0.783	10.837
10	7.698	52.215	23.034	3.627	3.802	9.624
15	7.433	49.583	22.453	3.457	7.930	9.143
20	7.909	46.821	21.216	3.287	12.118	8.649
25	9.373	43.792	19.861	3.125	15.746	8.103
30	11.324	40.871	18.585	2.979	18.672	7.569
Variance Decomposition of LPC:						
1	0.000	0.000	89.906	0.000	10.094	0.000
2	0.010	0.760	83.113	2.070	12.650	1.396
5	0.391	1.085	70.399	2.845	21.452	3.828
10	3.732	1.075	54.281	2.121	35.472	3.319
15	9.458	0.969	41.348	1.666	44.036	2.524
20	15.265	0.874	32.423	1.450	48.000	1.988
25	20.104	0.811	26.513	1.344	49.595	1.633
30	23.869	0.771	22.525	1.284	50.161	1.389
Variance Decomposition of LINF:						
1	0.000	10.218	0.000	81.420	0.000	8.362
2	0.047	9.683	0.077	74.235	0.038	15.920
5	0.281	9.816	0.080	69.821	0.091	19.911
10	0.785	9.776	0.080	69.411	0.113	19.836
15	0.946	9.762	0.080	69.283	0.124	19.805
20	1.005	9.757	0.080	69.235	0.131	19.792
25	1.029	9.755	0.080	69.214	0.136	19.787
30	1.040	9.754	0.080	69.203	0.140	19.783

The FVD of LPI shows that in the first period, 100% variation in LPI is self-explained. There is no immediate impact of other variables on LPI. However, in the second period, LPI explains 82% of the variation in itself, LPC explains almost 7% of the variation, and RDR explains 10% of the variation. In contrast, LGC and LM2 explain less than one percent of the variation in LPI. Similarly, in the fifth period, 20%

of the variation in LPI is explained by LPC and RDR explains the remaining 11% variation. Where LGC explains 5% of the variation, LINF explains 3% of the variation, and LM2 explains less than 1% of the variation, and the remaining 60% of the variation in LPI is explained by itself. Hence, it is evident that in the short run, RDR explains some portion of the variation in LPI as compared to LM2. However, in the long run (30th period), LPI explains 41% of the variation in itself, whereas LPC and LM2 each explain 19% of the variation. Similarly, 11% of the variation is explained by LGC, and RDR explains 8% of the variation, and LINF explains only 3% of the variation. Hence, the FVD results are also consistent with the SIRFs. Thus, this implies that the LM2 and LGC shocks affect LPI in the long run and RDR effects in the short run. Further, the FVD of LPI shows that LPC persistently explains the variation in LPI.

The FVD of LPC shows that in the first period, LM2 explains approximately 10% of the variation in LPC. In contrast, the LPC itself explains the remaining variation. However, in the fifth period, LPC explains almost 70% of the variation, whereas LM2 explains 21% of the variation in LPC, RDR explains 4% of the variation, and other variables explain the remaining variation in LPC. Similarly, in the 20th period, 32% of the variation is explained by LPC, LM2 explains 48% of the variation, LGC explains 15%, and other variables explain the remaining variation. In the 30th period, LM2 explains 50% of the variation in LPC, LGC explains 24% of the variation, LPC itself explains only 23% of the variation, and the remaining variation is defined by the other variables. Hence, it is evident from the FVD of LPC that LM2 explains the central portion of the variation in LPC, and LGC works in the long run. On the other hand, the shock of LINF, RDR, and LPI play a minor role. These results are consistent with the SIRF.

The FVD of LINF shows that in the first period, LPI explains 10% of the variation in LINF, whereas RDR explains 8% of the variation, and LINF explains the remaining 81% of the variation. Similarly, in the fifth period, almost 10% of the variation in LINF is explained by LPI, and RDR explains 20% of the variation, and LINF explains the remaining 70% of the variation. Further, this behavior persists in the long run. Hence, consistent with SIRF, FVD of LINF also shows that RDR and LPI consistently explain some portion of the variation in LINF.

3.5. Discussion and Policy Implication

The SIRF and FVD of the aggregate analysis of AD (Model 1) show that

1. The interest rate is ineffective in stimulating AD in both the short-run and the long run.
2. The RDR is effective in controlling inflation as compared to the MS.

Hence, this supports the SBP stance of using the interest rate to control inflation. However, this is merely one side of the coin. When we look at the disaggregated analysis, we get the whole picture.

3. In the short run, interest rates substantially affect investment and GC. However, its impact on PC, which is the most significant component of AD, is negligible. If we only look at aggregates, as most research do, we can conclude that interest rates are ineffectual in increasing output in Pakistan, as Mukhtar and Younas (2019); Nizamani et al. (2016), among others, have. However, disaggregate analysis clarifies the dynamics and brings the real picture to light, emphasizing the role of interest rates in supporting AD through PI and GC in the short run. Hence, our findings corroborate the Keynesian IRC of MTM. Furthermore, our findings are consistent with those of Hyder and Ahmed (2004); Madni (2014); Muhammad et

al. (2013), among others, who observe that interest rates negatively affect investment.

4. The study also concludes that interest rates have no substantial impact on PC. The two likely explanations for obtaining these links are a less developed financial sector and a greater reliance on the informal economy. Financial access is relatively limited in Pakistan. People prefer to use cash for transactions rather than banking channels. As a result, the PC is less sensitive to interest rates.
5. The study also observes that MS has a long-term, considerable impact on AD. But in the short run, it is insignificant.
6. In addition, MS impacts PC considerably in the short and long-term, but it positively affects GC and PI in the long-term. The research above shows that if the government intends to increase the PI in the short term, the interest rate should be decreased. Similarly, the government should employ MS as an MP instrument if it wishes to promote consumer demand. Tight MPs (raising RDRs) can also be efficiently employed to control inflation.
7. The study also provides empirical evidence against the crowding-out hypothesis of PI. The study reveals that GC does not crowd-out PI, it actually crowds-in. However, the results are not significant. Hence, this implies that the government should spend on such projects that create a positive externality for investors. For instance, as previous studies noted, government spending on infrastructure projects, roads, and telecommunication services, providing continuous electricity and gas supply to industries, implementing the rule of law, and creating an investor-friendly environment is a positive externality for investors and encourages them to invest in new projects. Moreover, our results are consistent with Munir et al. (2010); Rahman et al. (2015), among others.

8. Further, the study notes that an increase in GC is crowding out PC in Pakistan. However, the results are insignificant. However, from the FVD of LPC, we observe the impact of GC shock on PC is more evident in the long run. The possible reason is that an increase in GC means high future taxes, which will crowd out PC in the future. Hence, our results are consistent with the RBC models, which predict that an increase in GC negatively affects HH wealth by lowering their permanent income. Although labor increases its supply of services, the substitution effect is not strong enough to offset the negative wealth effect. As a result, PC decreases.
9. Another important insight from our analysis is that an increase in PI leads to a significant decrease in inflation in the short run, which is natural. When the supply of goods increases, the price decreases. Similarly, a positive shock to the PC significantly increases PI. Hence, when consumers spend more, demand increases, and producers also increase their production by investing more. Further, the study notes that an increase in PC leads to a decrease in inflation in the short run. Later on, it converges on the log run path, but the results are insignificant.

We can therefore conclude that the SBP should employ policy rates for inflation control and short-term PI enhancement. In addition, MS can be utilized to stimulate PCs both in the short-term and long-term. MS can also be employed in the long term to influence GC and PI. In addition, the government should fund projects that create long-term beneficial externalities for PI.

3.6. Conclusion

The impact of MP on AD has been a controversial issue since the start of monetarism. However, its roots go back to classical economics. The present study contributes to this debate by providing empirical evidence from Pakistan. The study collects data from 1976 to 2019 on AD and its various components, MS, inflation, and

interest rates, and employs the SVAR-DAG approach. The study is divided into two parts. The first part deals with the aggregate analysis of AD and the second part deals with the disaggregated analysis of AD. From the aggregate analysis, the study notes that the MS shock is effective in accelerating AD in the long run, as compared to the interest rate shock. Further, our study also complements the findings of chapter 2, that the RDR shock plays a significant role in controlling inflation as compared to MS.

However, the disaggregated analysis of AD shows a complete and contrasting picture. As PC is the largest component of AD, the interest rate is ineffective in stimulating PC. This may lead to the ineffectiveness of the interest rate channel in stimulating AD. Further, the study notes that IRC is effective in stimulating PI and GC in the short run. Hence, this supports the Keynesian ideology of the effectiveness of the IRC.

Hence, the study concludes that SBP should use interest rates to control inflationary pressures in the economy and to promote PI in the short run. However, if authorities want to stimulate PC, then the MS channel works better in both the short and the long run. The MS channel also plays a significant role in accelerating GC and PI in the long run. In addition to this, the study also notes that GC does not significantly crowd out PI and PC. This implies that the government should invest in those projects that serve as a positive externality for PI in the long run. Further, the increase in PC leads to an increase in PI, which leads to a decrease in inflation, and hence PC increases.

CHAPTER 4

ESSAY 3: BANK CREDIT AND ECONOMIC GROWTH: NEW INSIGHTS FROM PAKISTAN

4.1. Introduction

The Global Financial Crisis (GFC) of 2008 was the most critical event in the modern history of macroeconomics. It helps in reshaping macroeconomics and MP by looking at the new challenges that the world is facing. History shows that after every crisis, a new paradigm emerges. For instance, the Great Depression led to the emergence of the Keynesian school of thought. Similarly, the 1970s recession and oil price shocks gave birth to monetarists, RBC, and NCM to explain the reasons for stagflation and recession. In short, each school emerges to explain the reasons behind the crisis and propose a way forward.

Similarly, the GFC raises several questions about modern macroeconomics and highlights the weaknesses of the old paradigm. For instance, the assumptions like perfect information, rational agents, complete markets, no transaction costs, fully flexible prices, and full employment, which are unable to be fulfilled in real-time. Furthermore, the advanced texts on macroeconomics like Romar (2012) do not feature money and banks in their analysis, which is an integral part of recent economies. Interestingly, Romar (2012) elucidates that "incorporating money into models of growth would only obscure the analysis" (p. 3). Furthermore, there is a plethora of research that does not include the financial sector in Dynamic Stochastic General Equilibrium (DSGE) models before the event of the GFC. Financial activities remain relatively unimportant in their discussions and banks are considered as an intermediary

between buyers and sellers. For this reason, DSGE models could not read the pace and direction of the GFC. However, it is now widely believed that the GFC is, in fact, a banking crisis.

According to Nobel Laureate Joseph Stiglitz "This crisis, like so many earlier crises, was a credit crisis; but few of the macroeconomic models modeled credit; neither banks (perhaps particularly surprising in models used by central banks) nor securitization was typically incorporated into the analysis" (Stiglitz, 2011). Similarly, the view of the Post Keynesian economist (PKE) gains considerable attention in explaining the causes of the GFC and the nature of the modern banking system. Money that was traditionally believed to be exogenous, and under the control of the CB, is no longer valid. The PKE recognizes the endogenous nature of MS, which is created in the process of granting loans. Furthermore, unlike the fractional reserve system, banks do not keep idle reserves. If they have a shortage of funds, they obtain reserves at the interbank overnight lending rate (Holmes, 1969). According to the Bank of England, 97% of the money is created by commercial banks through the process of lending.

Similarly, PKE recognize the role of banks in creating boom-and-bust cycle and economic activities, depending upon credit is extended to which sectors of the society (Kaldor, 1970; Lavoie, 1984; Minsky, 1992; Robinson, 2016). Hence, after GFC, literature is more focused on the disaggregated analysis of the credit to analyze the effect of "uses of credit" on EG. This strand of literature is known as 'functional differentiation of credit.' For instance, Bezemer et al. (2014); Jordà et al. (2014) [24] note that mortgage credit and house prices best explain the credit boom and bust cycles and financial crises. Bezemer and Zhang (2014) observe that excessive mortgage credit

[24] Jordà et al. (2014) show that mortgage and house prices are significantly associated with financial crises. The study uses the data from 1880-2010 for 14 advanced economies.

leads to the house price boom. The study examines 37 economies by using data on four different categories of credit: non-financial business credit, financial business credit, mortgages, and consumer credit.[25] Similarly, Sutherland and Hoeller (2012) find that when household debt rises above trend, the likelihood of recession increases and the depth of the recession is greater.

However, these ideas are not new; writings by Marx, Keynes, Minsky, Schumpeter, and Tobin also advocate a distinction between credit flows to the productive sectors and credit to property and capital markets (Bezemer et al., 2014). Clavero (2017) observes that non-disaggregated analysis shows no resilient causal relationship between credit flows and real economic activity. However, there is no unanimous opinion on the relationship between credit and EG so far. This controversy motivates researchers to reinvestigate the nexus. Donald Kohn, Vice-Chairman, Federal Reserve (2009) notes that "…asset price movements and the feedback among those movements, credit supply, and economic activity were not well captured by the models used at most central banks". Similarly, Werner (1997, 2009) argues that credit use for GDP transactions accelerates output. On the other hand, credit use for financial sector transactions leads to asset price inflation.

Another issue that sharply arose after the GFC is excessive public sector borrowing. In advanced countries, it has crossed the limit of 100% of GDP, and it is continuously rising in emerging and middle-income countries. (Huang et al., 2019). Following the influential contributions of Reinhart and Rogoff (2010), several studies examine the impact of government debt on EG and investment. For instance, Cecchetti et al. (2011); Checherita-Westphal and Rother (2012); Woo and Kumar (2015), among others.

[25] Bezemer and Zhang (2014) note that credit booms in which the share of mortgage credit in total bank credit increases are more likely to 'go bad', leading to subsequent credit growth contractions

However, there is a controversy in the literature about whether commercial banks' credit to the government sector (BCG) crowds out or crowds in PI. Moreover, its impact on EG and inflation is not fully established. In the previous chapter, we did not find significant evidence in favor of or against the crowding-out hypothesis. Generally, it is believed that when GC increases, it squeezes resources. Hence, fewer resources are available for the private sector.

In literature, there are two contrasting views about the impact of government borrowing from domestic banks on private sector borrowing. The first strand of literature argues that if today's government decides to borrow one more dollar from the banks, it leaves the banks with one less dollar for the other sectors. If government borrowing increased substantially from commercial banks, banks would adjust their loan portfolios, given the risk-return characteristics of commercial banks. If banks are comprised of "lazy banks," then it crowds out private credit.

The second strand of literature argues that government borrowing does not crowd out CPRVS. Two arguments are presented to support this idea. First, banks have excess reserves, so high government borrowing does not reduce CPRVS. Secondly, government assets are safe assets, so when banks keep more government assets to diversify their portfolio, they undertake risky PI (Kumhof & Tanner, 2005), which crowds-in CPRVS or, at least, partially offsets the crowding-out effect.

A considerable amount of work has been done so far in advanced and emerging economies on disaggregated credit and its impact on the economy. However, very few attempts have been made so far in EMIC like Pakistan. For a long time, Pakistan has been experiencing unsustainable EG with high inflation, immature capital markets, low tax base, current account problems, corruption, and political instability. Along with

these issues, Pakistan has been experiencing high internal and external debt to cope with the ever-growing fiscal deficit.

Before 2010, Pakistan's domestic and external debt were in close contact. However, after 2010, Pakistan's primary focus is on domestic sources, especially domestic commercial banks, which provide funds to the government to meet its expenditures, as shown in Figure 4.1.

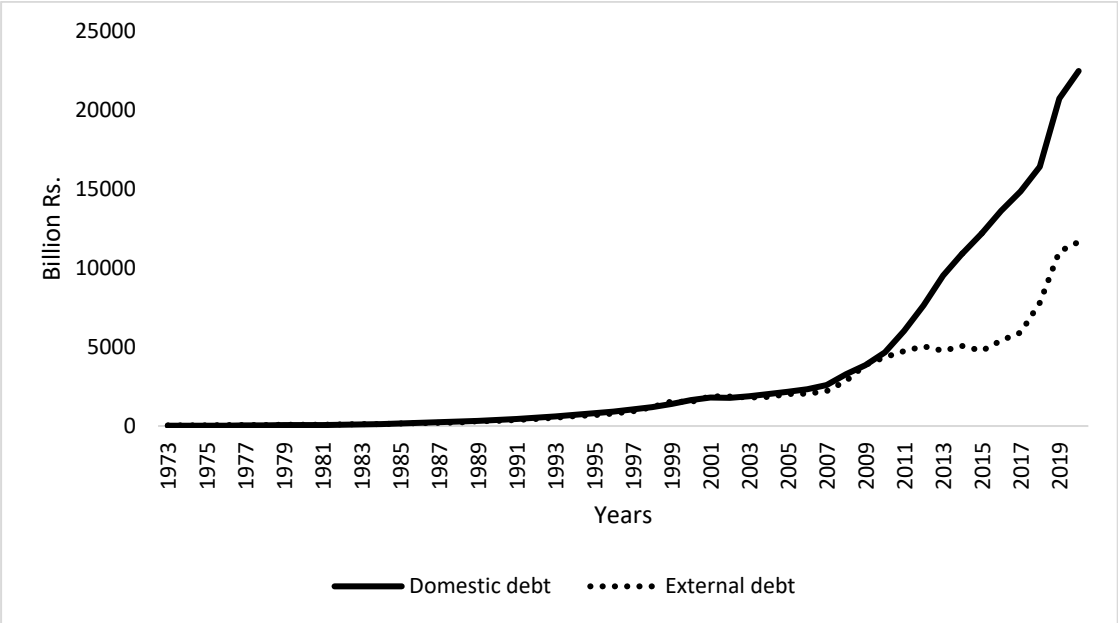


Figure 4.1 Pakistan's Debt Profile

Source: Economic Survey of Pakistan 2019-20

Similarly, in 2020, public debt from domestic sources is Rs. 22477.7 billion, and from external sources is Rs. 11658.1 billion. It clearly shows that public debt from domestic sources is almost double that of external sources in 2020(Pakistan Economic Survey 2019-20). Moreover, if we look at the credit dynamics, the BCG increased substantially, especially after 2010, and squeezed credit to firms, as shown in Figure 4.2

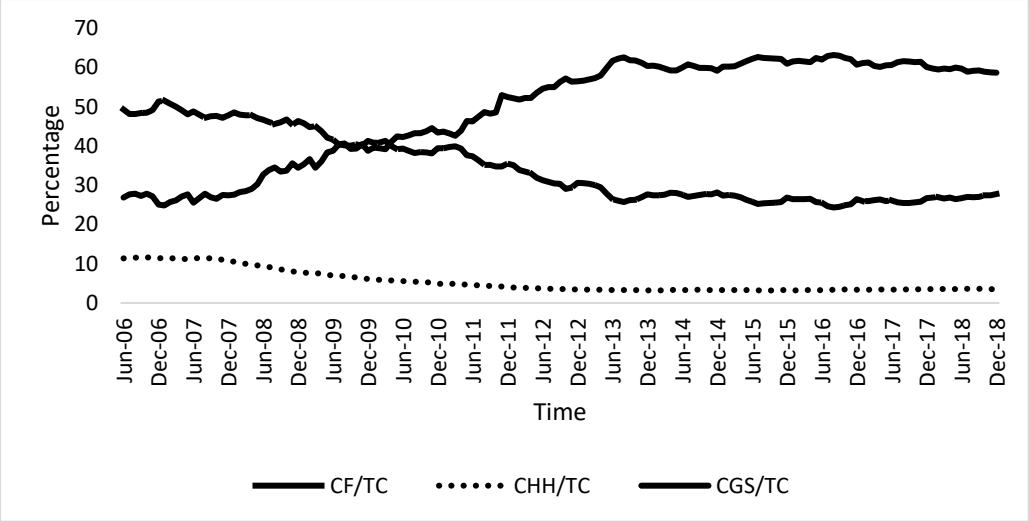


Figure 4.2 Pakistan's Credit Dynamics

Note:

(i) CF/TC is the percentage of total credit allocated to private firms.
(ii) CHH/TC is the percentage of total credit allocated to the HH sector.
(iii) CGS/TC is the percentage of total credit allocated to the government sector.

Source: Author's self-calculation

In Pakistan, credit to HH always remains low as compared to credit to firms and the government sector, unlike in advanced economies. On June 06, bank credit to HH was almost 11% of the total credit. Moreover, credit to the government sector is 27%, and credit to the corporate sector is 49%. However, over time, the share of government credit increased substantially, especially after 2010, as shown in Figure 4.2. In December 2018, HH credit comprised only 3.5% of total credit, whereas CF accounts for 28%, and CGS accounts for 59% of total credit. Hence, the government sector is squeezing funds from the corporate sector, which is the heart of any economy.

On the other hand, if we look at the overall credit extended to the productive (CPS) and non-productive sectors (CNPS) of the economy, the share of CNPS is relatively low in Pakistan, as shown in figure 4.3. Hence, the idea of a boom-and-bust cycle is not appealing in Pakistan. But the core issue that Pakistan is facing is the excessive amount of BCG, which is squeezing CPRVS.

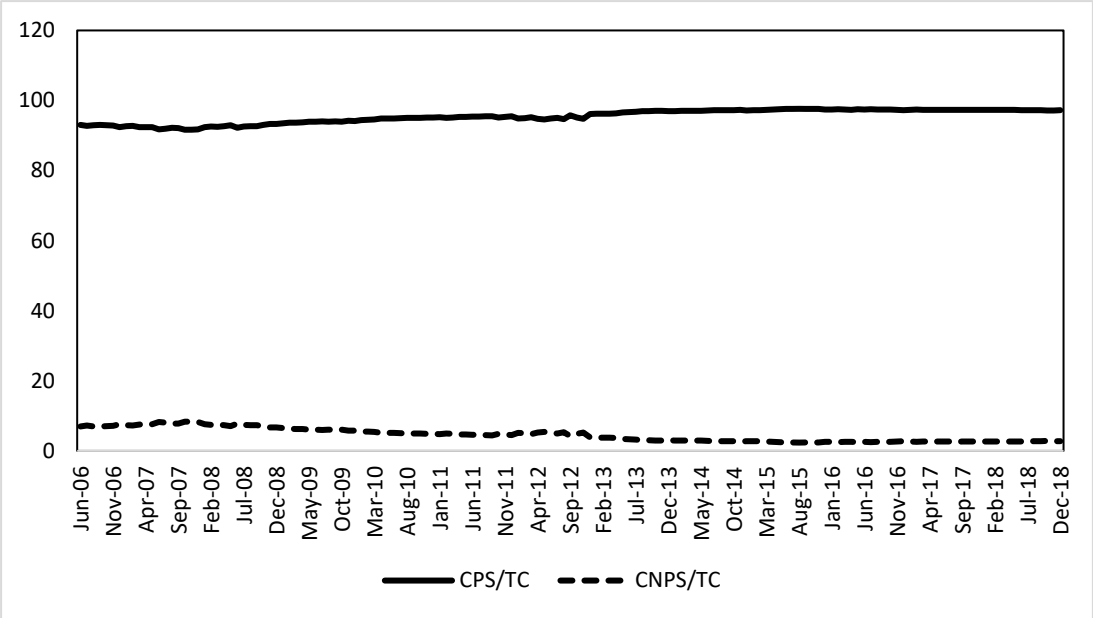


Figure 4.3 **Bank Credit to Productive and Non-Productive Sector**

Note: CPS includes credit extended to private non-financial corporations, households, non-profit institutions serving households, and the general government. In contrast, CNPS includes credit extended to non-bank financial corporations, the real estate sector, and the construction sector.

Source: Author's self-calculation

This initial analysis of credit allows us to develop a hypothesis that BCG is crowding out CPRVS. Further, there is a need to investigate how it affects EG and inflation. Credit that is extended to the government sector is usually used to meet current expenditures. Whereas development expenditures only account for 4.7% of GDP in 2018 (Fiscal policy statement, 2018-19). The State Bank of Pakistan (SBP), in its various reports, stresses that the government should avoid excessive borrowing from commercial banks.[26]

It is well established in the literature that credit to the private sector is used as a proxy to measure financial development (FD) (Beck et al., 2005; Beck et al., 2000; Demirgüç-Kunt & Levine, 2004; King & Levine, 1993a, 1993b; Levine et al., 2000).

[26] For details, see financial stability reviews available at http://www.sbp.org.pk/FSR/2018/index.htm

However, the literature is inconclusive about the relationship between FD and EG. In literature, there are two well-established hypotheses. First is the "Supply Leading Hypothesis" (SLH), which states that financial sector development leads to EG. The second is the "Demand Following Hypothesis" (DFH), which states that EG causes FD. When an economy starts growing, the financial system develops during this process (Robinson, 2013). However, empirical studies find mixed results. Some studies support SLH, for instance, Chang and Caudill (2005); King and Levine (1993a); Levine (2005); Rahman (2004); Rousseau and Wachtel (2011) among others. While others support DFH, for instance, Gurgul and Lach (2012); Rehman and Cheema (2013); Zang and Kim (2007), among others.

Hence, the present study intends to empirically investigate all the above-discussed controversies by using the advanced approach of SVAR-DAG. The main objectives of the present essay are to:

1. Investigate the Finance-Growth nexus.
2. Investigate the banks' credit allocations (CPRVS and BCG) on output and inflation.
3. Investigate the crowding-out hypothesis.

To achieve the above-mentioned objectives, the study will answer the following research questions by using the SVAR DAG approach.

1. Does FD lead to EG or EG lead to FD?
2. What is the impact of the positive BCG shock on the CPRVS? Does BCG crowd out CPRVS or crowd in?
3. What is the impact of the positive BCG shock on output and inflation? Does it lead to inflationary pressure in Pakistan? Does BCG productive and accelerate output.
4. What is the impact of the positive CPRVS shock on output and inflation? Does it lead to inflationary pressure in Pakistan? Does positive CPRVS shock accelerate output?

5. What is the impact of the positive CPRVS shock on the BCG?
6. What is the impact of the positive output shock on BCG and CPRVS?

How this essay differs from the first two essays? In the first essay, the study uses data from 1996 to 2018. It starts from the period when Pakistan has initiated measures towards FL. However, in this essay, data starts from June 2006, when a lot of measures have already been taken towards FL. Further, we want to collect harmonized data from one source to avoid definitional ambiguities. The SBP collects data on credit allocations to different sectors of society. It is available from June 2006 on its website.

In the first essay, the study develops an open economy SVAR model, where we examine the impact of different channels of MTM along with the CRC. However, in the present essay, we solely focus on the effectiveness of the CRC and considered a close economy model. The reason for considering the close economy model is to make the analysis simple. Further, we have already seen that the CRC is ineffective in an open economy model.

Similarly, in the second essay, we observe that GC does not crowd out PI. However, we did not find significant evidence in support of the crowding-in hypothesis. It is generally believed that if GC crowds out PI, this implies that excessive government borrowing from commercial banks leaves banks with fewer resources for the private sector, hence PI decreases. Hence, in the current essay, we empirically investigate the impact of BCG on CPRVS. Does it crowd out CPRVS or crowd in?

In Pakistan, there is plenty of literature on the effectiveness of the CRC and the crowding in/out hypothesis. However, the literature is still inconclusive. Some studies observe that credit extended to the public sector crowds in private investment/ borrowing(Hussain et al., 2009; Khan & Gill, 2009; Rashid & Ahmad, 2005; Saeed et

al., 2006). In contrast, others observe that excessive public sector borrowing crowds out private investment (Ahmed, 2016; Khan, 2016; Zaheer et al., 2017). Moreover, some studies observe that CRC (measured as a credit to the private sector) is effective in Pakistan in accelerating EG (Agha et al., 2005; Chaudhry et al., 2012; Mukhtar & Younas, 2019). In contrast, others observe that the CRC is ineffective in Pakistan (Baig, 2011; Hussain, 2014). Further, different studies use different estimation methods and hence reach different conclusions. Therefore, the present study contributes to the literature by providing empirical evidence based on the advanced technique SVAR, which is standard practice to understand the impact of policy shocks on the economy.

Our study complements the earlier findings. The CRC is ineffective at stimulating EG, even in a closed economy model. Further, we find support for the DFH, i.e., EG leads to FD. In addition to this, the present study notes that BCG crowds out CPRVS. These findings have thought-provoking policy implications, which are discussed in the last section of this chapter.

The chapter is organized as follows: in the next section, an empirical review of literature is discussed. The third section deals with the model specifications, variables, and data sources. In the fourth section, the study presents the estimation results. Discussion and policy implications are carried out in the fifth section, and the last section concludes the study.

4.2. Literature Review

Literature is broadly divided into two categories about the impact of bank credit on EG. The first strand of literature deals with the relationship between FD and EG. Generally, bank credit or CPRVS is used as a proxy to measure FD (Beck et al., 2005; Beck et al., 2000; Demirgüç-Kunt & Levine, 2004; King & Levine, 1993a, 1993b;

Levine et al., 2000). Furthermore, it also helps in understanding the effectiveness of bank CRC. MP actions, such as a rise in interest rates, if significantly affect bank credit to the private sector. As a result, it is expected to affect firms and households' purchasing decisions, and hence AD.

The second body of literature consists of a disaggregated examination of credit and its impact on EG and inflation. This section of the literature appears in the aftermath of the Great Recession. It addresses the notion that credit supplied to the HH sector is the primary cause of financial crises, whereas credit extended to enterprises causes EG. However, BCG has climbed significantly in both emerging and established economies since the GFC. In this section, we analyze the literature on how credit supplied to various industries affects EG. Another critical issue is the idea of private sector credit crowding out as a result of excessive public sector borrowing.

4.2.1. Financial Development and Economic Growth

After the pioneering work of Schumpeter (1934), the finance-growth nexus received a lot of attention. Schumpeter asserts that FD is essential for EG. Later, McKinnon and Shaw (1973) advocate the importance of FL in stimulating EG. Moreover, the endogenous growth theories from the early 1990s also emphasize the importance of FD and considered it as one of the key determinants of EG. However, the nature of the relationship between FD and EG is still inconclusive.

The nature of the relationship between FD and EG is explained by two basic hypotheses presented in the literature. The first hypothesis is the "Supply Leading Hypothesis" (SLH), which states that a well-functioning financial system leads to high EG by efficiently channeling resources through financial services such as minimizing transaction, monitoring, and information costs. It also encourages investment by

supporting good business-related projects and mobilizing savings. As a result, resources are more efficiently utilized, which contributes to the accumulation of human and physical capital as well as technological progress, hence accelerating EG.

The second hypothesis is the "demand following hypothesis" (DFH), which states that EG causes FD. When an economy starts growing, the financial system developed during this process (Robinson, 2013). However, empirical studies find mixed results. Some studies support SLH, for instance, Chang and Caudill (2005); King and Levine (1993a); Levine (2005); Rahman (2004); Rousseau and Wachtel (2011) among others. While other support DFH, for instance, Gurgul and Lach (2012); Rehman and Cheema (2013); Zang and Kim (2007), among others.

Similarly, in Pakistan, a lot of studies analyze the impact of FD on EG by using different econometric techniques. The most common are the ARDL, cointegration, and GCT. Most studies conclude that FD is essential for EG. For instance, Ahmed and Ansari (1998) observe that FD causes EG in South Asian countries like Sri Lanka, Pakistan, and India by using data from 1973 to 1991. The study reaches this conclusion by employing GCT and pooled regression along with simple correlation analysis.

Khan et al. (2005) also support the SLH that FD causes EG by using data from 1971-2004. The study uses an ARDL bound testing approach to reach this conclusion. Similarly, Khan and Qayyum (2007) note that financial integration leads to EG while analyzing the impact of financial integration and trade liberalization on EG. The study uses data from 1961-2005 and employs cointegration analysis. Jalil and Ma (2008) also supported the SLH by conducting a comparative study between China and Pakistan. However, the study notes that CPRVS is negatively related to EG, and liquid liabilities are positively related to EG in China. Hence, Chinese banks are not solely working for

profit maximization. The study employs the ARDL model on two-sample data. The first sample is from 1960 to 2006, and the second sample is from 1979 to 2006.

Khan (2008a) observes that FD causes EG by employing the ARDL approach in Pakistan and using annual data from 1961 to 2005 and observes that investment is positively related to EG. Similarly, Ahmad and Malik (2009) note that bank credit to the private sector plays an essential role in enhancing workers' productivity and facilitates long-run EG by using data from 1970 to 2003 on 35 developing countries, including Pakistan. Ellahi and Khan (2011) investigate the finance-growth nexus for four SAARC region countries, including Pakistan, and employ the ARDL approach. The study uses annual data from 1975-2009 and observes that FD is positively associated with EG in India, Pakistan, and Sri Lanka. On the contrary, the study notes that this relationship is significantly negative in Bangladesh.

Jalil and Feridun (2011) find that FD promoted economic activities in Pakistan over the period 1978-2003 by using the ARDL approach. A developed financial system helps in reducing transaction costs and accelerates EG. Similarly, Shaheen et al. (2011) also support SLH by employing ARDL and GCT. use data from 1972-2011 and employ cointegration and GCT. The study confirms that a long-run relationship exists between inflation, CPRVS, foreign direct investment, saving, and EG. On the other hand, Rehman and Cheema (2013) support DFH and note that growth in the real sector leads to FD by employing a cointegration test.

Similarly, Hasan (2015) argues that in developing countries where the financial system is not well developed, the relationship between FD and EG does not exist. FD leads to EG in those countries where the financial system is well advanced. The study reaches this conclusion by using panel data in five emerging Asian economies, like Bangladesh, India, Nepal, Pakistan, and Sri Lanka, from 1974 to 2012. Further, the

study employs fixed and random effect models. Ahmed (2016) also notes that an increase in output positively affects CPRVS. Rahman et al. (2020) observe that FD spurs EG by employing the Markov Switching Model. The study further notes that when the economy is in a high growth regime, the impact of FD on EG is high, as compared to the low growth regime.

As discussed in the second chapter, some studies investigate the effectiveness of the CRC of MTM and find inconsistent results. For instance, Agha et al. (2005); Chaudhry et al. (2012); Mukhtar and Younas (2019) observe that CRC is effective in Pakistan, whereas Baig (2011); Hussain (2014); Imran and Nishat (2013) observe that CRC is ineffective in Pakistan. Imran and Nishat (2013) note that domestic deposits, EG, exchange rate, foreign liabilities, and monetary conditions are associated with CPRVS in Pakistan. In contrast, neither the inflation rate nor the interest rates are associated with CPRVS. The study employs ARDL model and utilizes data from 1971 to 2010.

Similarly, Hussain (2014) investigates the effectiveness of IRC and CRC of MTM by using quarterly data from 1991 to 2012. The study employs Variance decomposition and IRF to observe that both channels are ineffective in Pakistan. Moreover, the study split the sample into two parts. The first sample covers data from 1991 to 2000, and the second sample covers data from 2001 to 2012. The study notes that in the first sample, CRC is effective, while in the second sample, IRC is effective in transmitting the effects of MP on the economy. Hence, CRC is no more effective in Pakistan. Similarly, Cheema and Naeem (2019) note that the CRC is not providing any additional leverage to the monetary authorities for conducting MP in Pakistan. The study employs ARDL bound testing, cointegration, and ECM on the monthly data series ranging from 2002-2012. On the other hand, Mukhtar and Younas (2019) observe that

CRC is effective in stimulating output and controlling inflation in Pakistan. The study employs the SVAR approach.

4.2.2. Disaggregated Credit and its Impact on the Economy

Banks play an essential role in the MTM through interest rates and CRCs. The proponents of the bank lending channel assert that it helps in smoothing the fluctuations in output by affecting investment and consumer spending (Bernanke & Gertler, 1995). Thus, the CPRVS provided by banks helps in achieving economic development and stability. However, it is also true that most of the financial crises are due to abnormal fluctuations in credit. For instance, Japan and Scandinavia's financial crises in the early 1990s and the Southeast Asian crises in 1997-98 were due to excessive foreign and domestic credit (Kaminsky & Reinhart, 1999). However, after the GFC, extensive credit to the public sector is also alarming and may lead to another crisis.

Government borrowing from commercial banks is common in developed as well as developing countries. The share of government borrowing in advanced countries is much higher due to high public service provisions as compared to low and lower-middle-income countries. Whereas in poor economies, governments borrow to finance their infrastructure projects or to finance their debt service (Morrison, 1982; Ramamurti, 1992; Bua, Pradelli, & Presbitero, 2014). Pakistan is also among those countries whose tax base is low and hence relies on borrowing to finance the budget deficit. The SBP highlighted in its several publications that excessive government borrowing crowds out CPRVS. However, government borrowing also benefits private banks by earning risk-free returns, which, in turn, motivates banks to lend credit to the risky private sector to earn abnormal profits, hence BCG crowds-in CPRVS.

In general, the literature focuses on the impact of GC or government borrowing on PI. In general, it is thought that the government borrows to fund its expenditures. However, few studies attempt to directly examine the influence of government borrowing from commercial banks on the CPRVS. For example,

Rana and Abid (2009) use annual data from 1972 to 2006 and observe that government borrowing does not crowd out PI in Pakistan. The study employs VECM and the cointegration approach. The study concludes that the government should use internal resources and avoid external debt as long as excess liquidity prevails in the market.

On the other hand, Aftab et al. (2016) observe that a high-interest rate decreases CPRVS in the short-run as well as in the long-run. The study employs the ARDL model and utilizes data from 1975-2011. Ali et al. (2016) use the ARDL model and conclude that domestic borrowing negatively affects CPRVS by utilizing annual data from 1972 to 2015. Ahmed (2016) also concludes that bank credit to the government sector crowds out CPRVS by using equilibrium and disequilibrium analysis. Khan et al. (2016) argue that the government is the dominant borrower that borrows to finance the fiscal deficit. During the recession, external borrowing is limited, borrowing from the CB is inflationary, and an increase in taxes is not a wise idea. Hence, borrowing from commercial banks increases, which leads to a rise in interest rate spreads and a decrease in PI, which further negatively affects the economy and deepens the recessionary phase. Khan et al. (2016) note that a low policy rate couldn't increase CPRVS in Pakistan. Commercial banks are less willing to lend to the private sector. Hence, excessive government borrowing weakens the MTM. Zaheer et al. (2019), observe that a one percent increase in government borrowing decreases CPRVS by eight basis points. Furthermore, the study notes that the interest rate corridor system (IRCS) does not

influence behavior. However, it expects that IRCS may fade away government borrowing from commercial banks. Hence, the existing literature is inconclusive. The present study contributes to the literature by providing empirical evidence on the relationship between FD and EG, the effectiveness of CRC, and the impact of government borrowing on output and inflation and on private sector borrowing.

4.3. Model Specification and Variables

In this section, we propose two closed-economy SVAR models. The first model helps in understanding the Finance-Growth nexus and the effectiveness of the CRC of MTM. In contrast, the second model allows us to understand the crowding in/out hypothesis. In addition to this, it allows us to comprehend how output and inflation respond to the shock of BCG and CPRVS. Moreover, how credit to the public and private sector responds to the output shock.

The reduced form equation for model 1 is

$$X_{1At} = [LIPI\ LINF\ LCPRVS\ LM2\ RDR]' \quad (4.1)$$

Where LIPI is the log of the industrial production index, LINF is the inflation rate, measured as the annual change in the log of CPI. LCPRVS is the log of credit to the private sector. It includes both credits, i.e., credit extended to the firms and HH. Similarly, LM2 is the log of broad money supply, and RDR is the real discount rate used to measure the policy rate. The real discount rate is calculated by subtracting the inflation rate from the nominal discount rate.

Keeping in view that commercial banks give loans at the lending rate, the present study also estimates the same model by using the real lending rate (RLR) instead of the real discount rate to get robust results. In this case, the reduced form equation becomes

$$X_{1Bt} = [LIPI\ LINF\ LCPRVS\ LM2\ RLR]' \quad (4.2)$$

Similarly, the reduced form equation for model 2 is.

$$X_{2At} = [LIPI\ LINF\ LBCG\ LCPRVS\ LM2\ RDR]' \quad (4.3)$$

Here, all the variables remain the same, except we add LBCG to the reduced form equation. LBCG is the log of banks' credit to the public sector. Further, the study re-estimates the same equation with RLR instead of RDR, as shown in equation 4.4

$$.X_{2Bt} = [LIPI\ LINF\ LBCG\ LCPRVS\ LM2\ RLR]' \quad (4.4)$$

The present study collects the data from June 2006 to June 2018. Instead of covering the long series, the study utilizes the latest available data to cover the recent trends in the economy. Further, in 2006 SBP starts to implicitly monitor short-term interest rates (STIR) to influence AD and to control inflation. Moreover, the "Private Sector Credit Advisory committee" (PSCAC) was established, and the "National Credit Consultative Council" (NCCC) was abandoned (Choudhri et al., 2015). The data on LIPI is taken from the study of Ejaz and Iqbal (2019). The data on RLR, LM2, BCG, and CPRVS is collected from the SBP website. Moreover, the data on RDR is collected from IFS, and LINF is collected from PBS and SBP website.

4.4. Estimation Results

To estimate the SVAR model, the study uses monthly data from June 2006 to June 2018 and express all variables in the log form except interest rates. Further, to capture the seasonality effect, we introduce eleven seasonal dummies while estimating the unrestricted VAR model. Moreover, to capture the effect of oil price shocks two dummies are included, as discussed in the last chapter. Further, to identify and estimate the SVAR models, we check the stationary properties of all variables. For this purpose, we employ ADF and PP unit root tests. Results are available in Table 4.1which shows

that all variables are the first difference stationary, which is the necessary condition for proceeding with the non-recursive SVAR model.

Table 4.1 Results of Unit Root Test

Variable	Level		First Difference		Order of Integration	
	ADF	PP	ADF	PP	ADF	PP
LIPI	0.92 (0.99)	-2.1 (0.30)	-4.88 (0.00)	-26 (0.00)	I (1)	I (1)
LINF	-1.67 (0.45)	-1.5 (0.50)	-10.1 (0.00)	-10 (0.00)	I (1)	I (1)
LM2	-0.97 (0.76)	-0.5 (0.90)	-4.79 (0.00)	-33.1 (0.00)	I (1)	I (1)
LCPRVS	1.23 (0.99)	-1 (0.94)	-6.46 (0.00)	-8.85 (0.00)	I (1)	I (1)
LBCG	-1.09 (0.72)	-1 (0.80)	-6.59 (0.00)	-12.8 (0.00)	I (1)	I (1)
RDR	-1.68 (0.44)	-3.1 (0.10)	-6.47 (0.00)	-11.4 (0.00)	I (1)	I (1)
RLR	-1.47 (0.55)	-2.5 (0.10)	-6.92 (0.00)	-9.8 (0.00)	I (1)	I (1)

Note: P- values are available in the parenthesis

4.4.1. Model 1: Finance-Growth Nexus

The lag length criteria are reported in Table 4.2, following AIC study used six lags

Table 4.2 VAR Lag Order Selection Criteria of Model 1

	Model 1A				
Lag	**LR**	**FPE**	**AIC**	**SC**	**HQ**
0	NA	0.00	-6.15	-4.46	-5.46
1	1058.10	0.00	-14.84	-12.61*	-13.93*
2	46.70	0.00	-14.89	-12.13	-13.77
3	52.79	2.14e-13*	-15.02	-11.73	-13.68
4	32.38	0.00	-14.98	-11.16	-13.42
5	40.29*	0.00	-15.03	-10.68	-13.26
6	33.46	0.00	-15.03*	-10.15	-13.05
	Model 1B				
0	NA	0.00	-6.32	-4.59	-5.62
1	1013.69	0.00	-14.92	-12.65*	-13.00*
2	51.08	0.00	-15.02	-12.21	-13.88
3	55.91	1.81e-13*	-15.19	-11.84	-13.83
4	28.43	0.00	-15.11	-11.22	-13.53
5	38.38*	0.00	-15.15	-10.71	-13.35
6	36.76	0.00	-15.19*	-10.22	-13.17

Note: * indicates lag order selected by the criterion. Where, LR: sequentially modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion

The study includes six lags in the VAR model, as all diagnostics are satisfied. The residuals are normally distributed. Thus, there is no heteroskedasticity and autocorrelation, as shown in Table 4.3 and Table 4.4.

Table 4.3 Normality and Heteroskedasticity test of Model 1

	Model 1A	**Model 1B**
Normality Test		
Skewness	11.46 (0.06)	7.97 (0.16)
Kurtosis	3.98 (0.55)	3.60 (0.61)
Jarque-Bera	15.45 (0.12)	11.57 (0.31)
Heteroskedasticity Test		
	1180.62 (0.20)	1167.35 (0.28)

Table 4.4 Serial Correlation LM Tests of Model 1

	Model 1A		**Model1B**	
Lags	**LM-Stat**	**Prob**	**LM-Stat**	**Prob**
1	34.66	0.09	31.83	0.16
2	34.01	0.11	27.24	0.34
3	23.92	0.52	23.89	0.53
4	21.18	0.68	17.92	0.85
5	13.79	0.97	19.25	0.79
6	25.93	0.41	25.48	0.44

Moreover, the estimated models are stable; all roots are less than one, as shown in Table 4.5. Since all the variables are I(1), however, it is possible to estimate VAR in levels even with the I(1) series (Aslanidi, 2007; Kim & Roubini, 2000) to avoid information loss. Hence, we estimate VAR in level. Further, to confirm the long-run relationship among the variables, we have estimated the JC test, which ensures that the long-run relationship exists among the variables. The result of the JC test is reported in Table 4.6.

Table 4.5 VAR Stability Condition of Model 1

Model 1A		Model 1B	
Root	Modulus	Root	Modulus
0.989524	0.989524	0.987191	0.987191
0.963186	0.963186	0.965017	0.965017
0.914617 - 0.205225i	0.937358	0.901774 - 0.201828i	0.924084
0.914617 + 0.205225i	0.937358	0.901774 + 0.201828i	0.924084
0.790733 - 0.410693i	0.891026	0.788591 - 0.412444i	0.889936
0.790733 + 0.410693i	0.891026	0.788591 + 0.412444i	0.889936
-0.429207 + 0.774534i	0.885506	-0.428071 + 0.770797i	0.881687
-0.429207 - 0.774534i	0.885506	-0.428071 - 0.770797i	0.881687
0.674972 + 0.535115i	0.861357	0.674877 - 0.537572i	0.862811
0.674972 - 0.535115i	0.861357	0.674877 + 0.537572i	0.862811
0.820637	0.820637	0.239311 + 0.796300i	0.831483
0.524349 - 0.630745i	0.820233	0.239311 - 0.796300i	0.831483
0.524349 + 0.630745i	0.820233	0.541183 - 0.630499i	0.830908
0.212688 - 0.779059i	0.80757	0.541183 + 0.630499i	0.830908
0.212688 + 0.779059i	0.80757	0.820064	0.820064
-0.169306 + 0.773009i	0.791333	-0.195241 - 0.781084i	0.805115
-0.169306 - 0.773009i	0.791333	-0.195241 + 0.781084i	0.805115
-0.541866 + 0.526408i	0.755463	-0.527056 - 0.569789i	0.776175
-0.541866 - 0.526408i	0.755463	-0.527056 + 0.569789i	0.776175
-0.740129 - 0.029358i	0.740711	-0.72089	0.720886
-0.740129 + 0.029358i	0.740711	-0.497153 - 0.462783i	0.679212
-0.019373 - 0.722072i	0.722332	-0.497153 + 0.462783i	0.679212
-0.019373 + 0.722072i	0.722332	-0.674521 - 0.046703i	0.676136
-0.6485	0.648497	-0.674521 + 0.046703i	0.676136
-0.448880 - 0.464625i	0.646042	-0.017972 + 0.663691i	0.663934
-0.448880 + 0.464625i	0.646042	-0.017972 - 0.663691i	0.663934
0.62577	0.62577	0.646539	0.646539
-0.177923 + 0.456705i	0.490139	-0.125577 - 0.564086i	0.577895
-0.177923 - 0.456705i	0.490139	-0.125577 + 0.564086i	0.577895
0.193959	0.193959	0.249091	0.249091

Note: No root lies outside the unit circle.

The trace and maximum eigenvalue test indicate that four cointegrating equations exist for model 1A. Whereas for model 1B, the trace test indicates that four cointegrating equations exist. In contrast, the maximum eigenvalue test shows that one cointegrating equation exists at a 0.05 level of significance. Hence there exists a long-run relationship among the variables. So, we can estimate VAR in levels with I (1) series.

Table 4.6 Results of Johansen Cointegration Test of Model 1

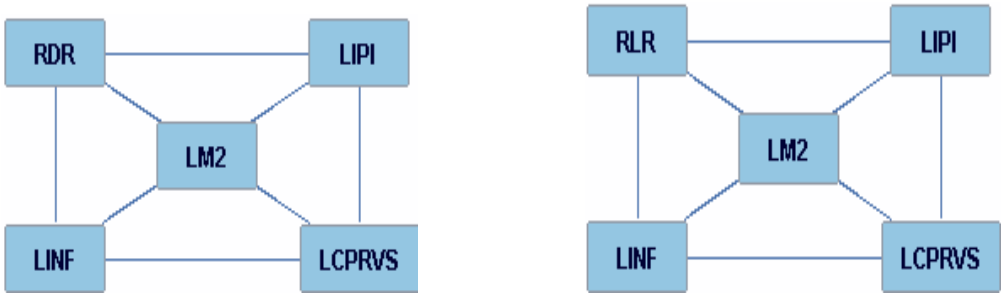
Model 1A							
No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**	Max-Eigen Statistic	0.05 Critical Value	Prob.**
r=0	0.317	121.172	69.819	0.000	52.709	33.877	0.000
r≤1	0.190	68.463	47.856	0.000	29.163	27.584	0.031
r≤2	0.153	39.300	29.797	0.003	22.876	21.132	0.028
r≤3	0.112	16.424	15.495	0.036	16.401	14.265	0.023
r≤4	0.000	0.022	3.841	0.882	0.022	3.841	0.882
Model 1B							
No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**	Max-Eigen Statistic	0.05 Critical Value	Prob.**
r=0	0.312	117.416	69.819	0.000	51.513	33.877	0.000
r≤1	0.175	65.903	47.856	0.000	26.546	27.584	0.067
r≤2	0.157	39.357	29.797	0.003	23.631	21.132	0.022
r≤3	0.108	15.726	15.495	0.046	15.725	14.265	0.029
r≤4	0.000	0.001	3.841	0.971	0.001	3.841	0.971

Note: Trace test indicates 4 cointegrating eqn(s) exists in both models, and the Max-Eigen test indicates 4 cointegrating eqn(s) exists for model 1A, and 1 cointegrating eqn exists for Model 1B at the 0.05 level

*MacKinnon et al. (1999) p-values

4.4.1.1. Contemporaneous Causal Relationship of Model 1

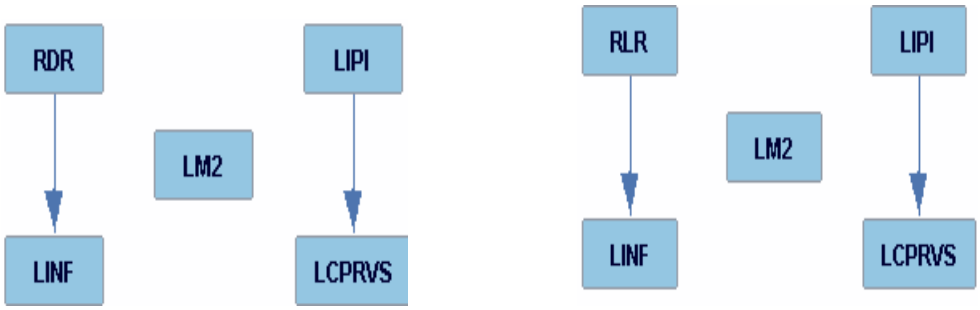
To investigate the causal relationship between the variables and to identify the SVAR model, the study uses DAG analysis. The DAG starts with an undirected graph and connects all variables as depicted in Figure 4.3



Model 1A Model 1B

Figure 4.3 Undirected Graph: Model 1A & 1B

The PC algorithm is used to remove edges based on conditional correlation. Finally, we get the following pattern as shown in Figure 4.4



Model 1A Model 1B

Figure 4.4 Direct Acyclic Graph of Model 1A & Model 1B

The DAG analysis shows that the interest rate causes inflation, and LIPI causes LCPRVS. It also suggests that EG contemporaneously causes FD. Moreover, DAG analysis shows that none of the variables contemporaneously cause interest rates. This assumption is justified as policymakers don't have complete information about output and prices within the same month, it is available with a lag (Alam, 2015; Cushman & Zha, 1995; Jones & Bowman, 2019; Kim & Roubini, 2000). Also, there is no direct contemporaneous causality running from RDR to EG.

The results of model 1A are summarized in equation 4.5, and model 1B is summarized in equation 4.6.

$$B_{1A}Y_t = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & \beta_{25} \\ \beta_{31} & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} LIPI \\ LINF \\ LCPRVS \\ LM2 \\ RDR \end{bmatrix} \quad (4.5)$$

$$B_{1B}Y_t = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & \beta_{25} \\ \beta_{31} & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} LIPI \\ LINF \\ LCPRVS \\ LM2 \\ RLR \end{bmatrix} \quad (4.6)$$

The study uses the identification restrictions proposed by the DAG analysis and estimate the over-identified SVAR model. The log-likelihood ratio test is available in Table 4.7, which shows that overidentifying restrictions are not rejected at a 10% level of significance for both models.

Table 4.7 LR test for Over-identification of Model 1A & 1B

	Log-likelihood	Chi-square	Probability
Model 1A	1133.712	5.507	0.702
Model 1B	1147.182	5.515	0.701

Hence, restrictions proposed by the DAG are consistent with the data. For dynamic analysis, the study uses SIRF and SFVD.

4.4.1.2. Structural Impulse Response Function of Model 1

The SIRFs are used to observe the response of domestic macroeconomic variables to one SD exogenous shock to the variables in the system. The study also reports 95% confidence bands of the standard errors to see the significance of the response. The study estimates two models; the results of model 1A are reported in the first panel, and the SIRFs of model 1B are stated in the second panel of *Figure 4.5*

The unanticipated contractionary MP by one SD shock to RDR and RLR leads to an increase in output and follows a hump-shaped pattern. Both models show the same

behavior, as shown in *Figure 4.6*. However, the response is significant only for seven to eleven months.

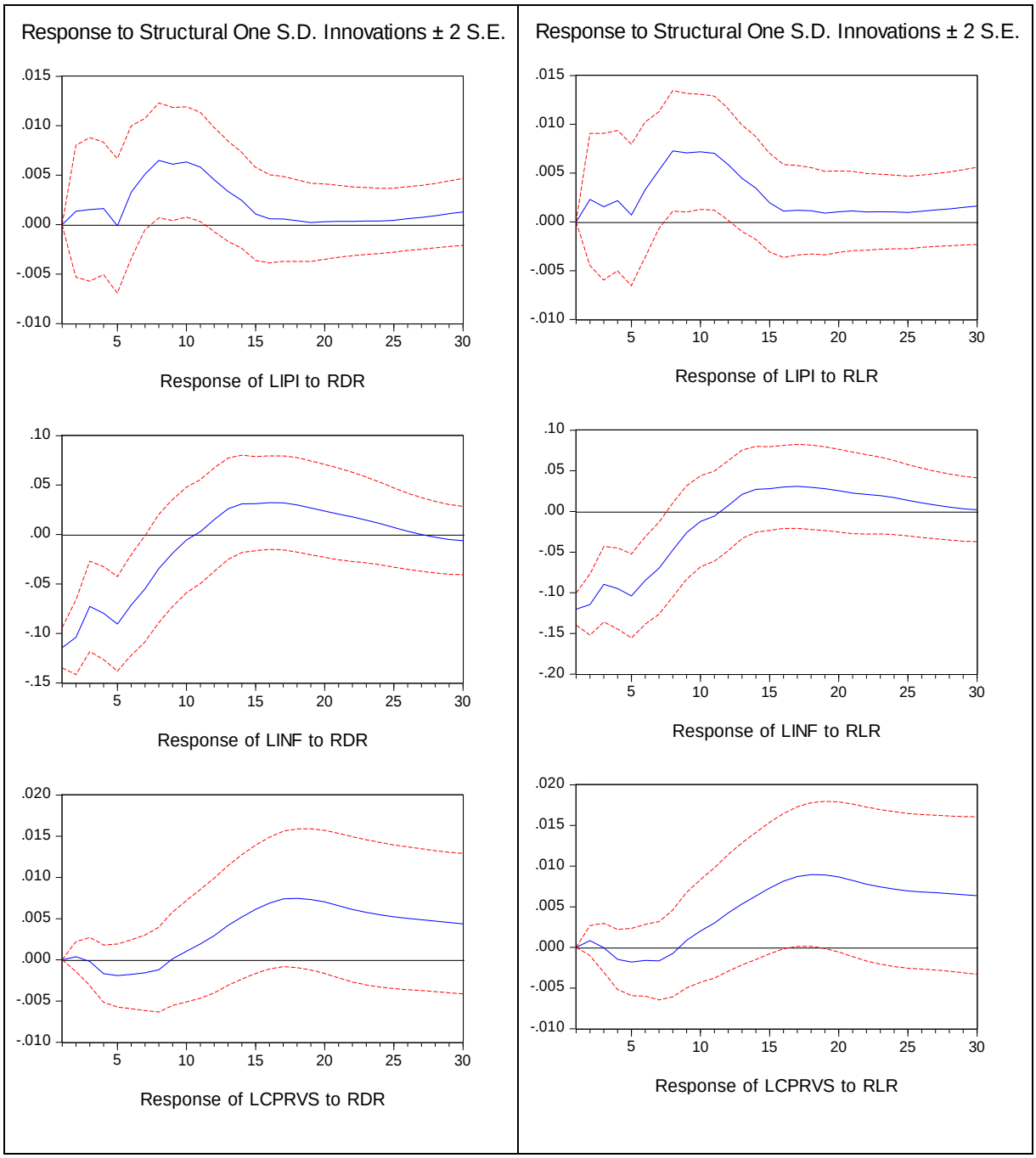


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Figure 4.5 **Structural Impulse Response Function of the Output, Inflation, and Credit to the Private Sector to the Shock to Interest rate**

Note: The left panel shows the SIRFs of model 1A, and the right panel shows the SIRF of model 1B

Moreover, our results support the McKinnon and Shaw (1973) hypothesis that an increase in interest rates leads to a rise in output. However, the results are weakly significant. Our results are also consistent with our earlier findings of the open economy SVAR model, where LIPI increases in response to the positive interest rate shock. However, the response was insignificant.

Further, we observe that one SD shock to the interest rate led to a sharp decrease in the inflation rate in the first month. After that, it starts rising but remains below the long-run path. Moreover, the results are significant until seven months for RDR and eight months for RLR. Thus, the interest rate is effective in controlling inflation. Moreover, we do not observe any price puzzles.

Similarly, in response to tight MP (increase in RDR), CPRVS responds after three periods. Initially, CPRVS decreased and, after eight months, it started rising. However, the results are insignificant. The almost same pattern is observed when RLR is considered instead of RDR. This implies that the CPRVS does not significantly respond to interest rate movement. Hence, the CRC is ineffective in Pakistan. Our results are consistent with our earlier findings of an open economy SVAR model discussed in chapter 2. Moreover, our results are consistent with Baig (2011); Hussain (2014); Imran and Nishat (2013), who also observe that the CRC is ineffective in Pakistan.

The SIRF for the Finance-Growth nexus is reported in Figure 4.6. The SIRF shows that an unanticipated shock to the LIPI led to a significant increase in LCPRVS. Therefore, when an economy grows, FD occurs, and more credit is extended to the private sector. On the other hand, the positive shock positively affects LCPRVS. However, the results are insignificant. Hence, our study complements the DFH, instead of the SLH. Moreover, the results are consistent in both models (1A and 1B).

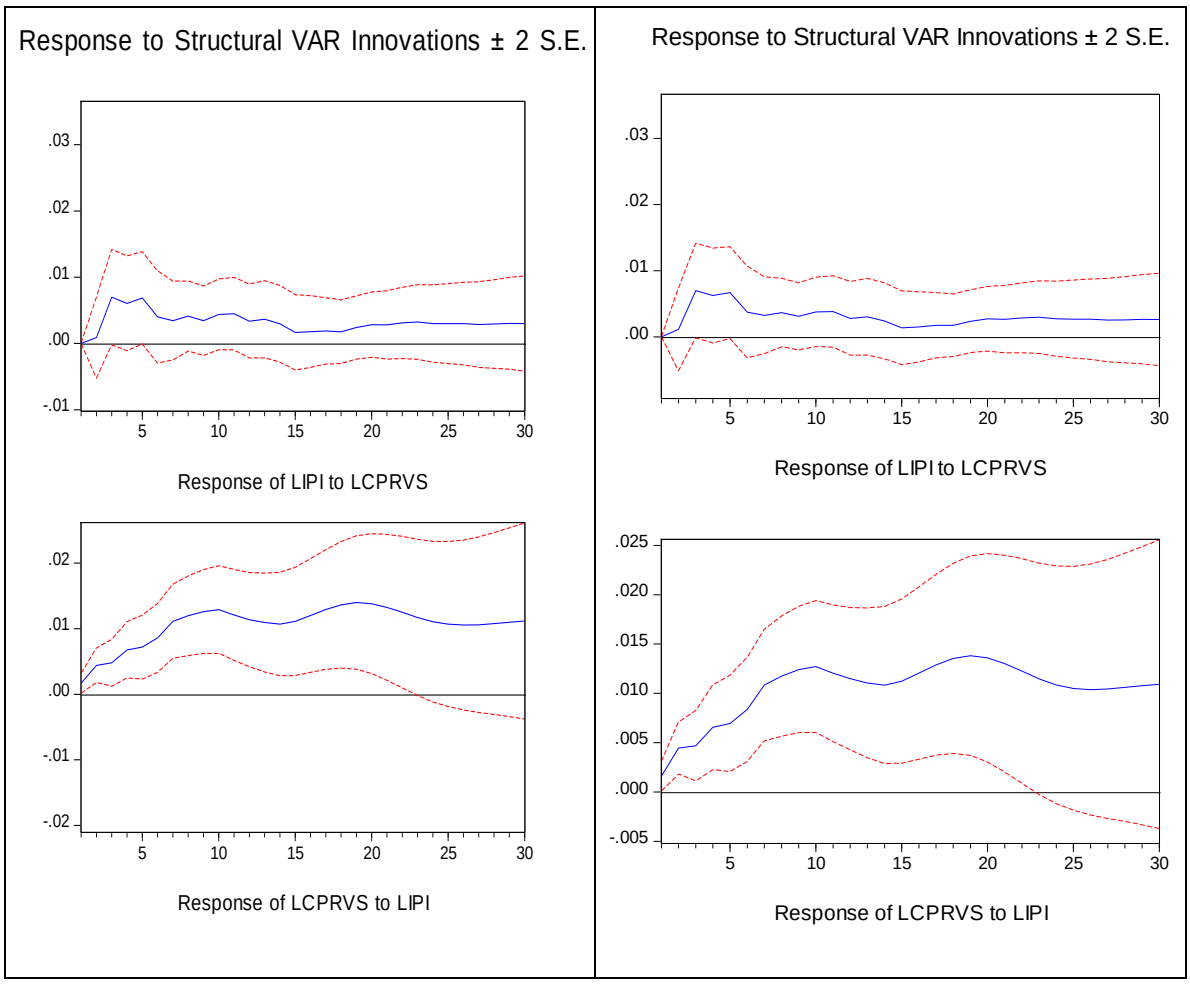


Figure 4.6 **Structural Impulse Response Function for the Finance-Growth Nexus**

Note: left panel reports the results of Model 1 A, and the right panel reports the results of Model 1B.

Our results also complement the DAG analysis that shows that the causality moves from LIPI to LCPRVS. The results are also consistent with Rehman and Cheema (2013); Ahmed (2016), among others, who also support the DFH. In Pakistan, several other factors hinder EG besides FD. For instance, power crises, unstable policies, corruption, high import bills, and ER fluctuations negatively affect EG. Hasan (2015) notes that in low and middle-income countries, the financial system is not well developed. FD leads to EG in those countries, where the financial system is well developed.

4.4.1.3. Forecast Variance Decomposition of Model 1

The FVD of model 1A and model 1B are reported in Table 4.8 and Table 4.9, respectively. In Model 1A, the FVD of LIPI shows 100% variation in LIPI is explained by itself in the first period. However, in the fifth period, LIPI explains 90% of the variation, and LCPRVS explains almost 8% of the variation. In contrast, the remaining variation is elucidated by the other variables. Later on, over the horizon, the share of other variables increases a bit, and the share of LIPI decreases in explaining the variation in LIPI. In the last period, 64% of the variation in LIPI is explained by itself. LINF explains almost 11%, LCPRVS explains 14%, LM2 explains 2%, and RDR shock explains 9% of the variation in LIPI. Thus, the main chunk of variation in LIPI is explained by itself, whereas the other variables explain only minor variation.

Similarly, Model 1B also depicts the same behavior. A major chunk of the variation in LIPI is explained by itself. In the first period, 100% variation in LIPI is explained by itself. However, in the last period, 65% of the variation in LIPI is explained by itself. In contrast, LCPRVS explains 12% of the variation, RLR explains 13% of the variation, LINF explains 8% of the variation, and LM2 explains 2% of the variation. Hence, in both models, the significant portion of the variation in LIPI is defined by itself.

The FVD of LINF shows that RDR plays a major role in explaining the variation in LINF. In the first period, 63% of the variation is explained by RDR, and nearly 37% of the variation in LINF is explained by itself. However, over time, the share of RDR decreases, and LINF increases, along with other variables, but still, RDR explains the highest variation in LINF. In the 30^{th} period, almost 42% of the variation in LINF is

explained by itself. The RDR explains 38% of the variation, while the other variables explain the remaining variation.

Table 4.8 Forecast Variance Decomposition of Model 1A

Period	LIPI Shock	LINF Shock	LCPRVS Shock	LM2 Shock	RDR Shock
Variance Decomposition of LIPI:					
1	100.000	0.000	0.000	0.000	0.000
2	99.392	0.004	0.060	0.408	0.136
5	90.025	0.344	8.392	0.809	0.430
10	75.076	4.005	10.561	2.137	8.221
15	70.552	5.839	11.431	2.042	10.136
20	67.747	8.595	11.871	2.085	9.702
25	65.280	10.594	12.970	1.976	9.178
30	64.224	11.168	13.873	1.887	8.848
Variance Decomposition of LINF:					
1	0.000	37.380	0.000	0.000	62.620
2	0.061	47.013	1.294	0.009	51.623
5	1.635	41.121	6.884	0.168	50.193
10	1.365	45.534	6.583	1.810	44.708
15	5.796	44.185	7.018	3.735	39.266
20	8.682	42.253	6.948	3.550	38.567
25	8.680	41.859	7.143	3.552	38.765
30	8.788	41.864	7.416	3.623	38.308
Variance Decomposition of LCPRVS:					
1	3.597	0.000	96.403	0.000	0.000
2	10.562	6.E-06	89.074	0.299	0.065
5	22.686	0.194	74.634	1.425	1.061
10	51.504	0.083	46.380	1.091	0.942
15	48.657	0.872	45.213	1.568	3.690
20	48.185	3.007	39.916	1.222	7.670
25	46.905	5.898	37.906	0.920	8.371
30	44.814	9.425	36.948	0.737	8.076

Similarly, in Model 1B, 30% of the variation in LINF is described by itself, and the RLR explains the remaining 70% of the variation. However, over time, the share of RLR shock decreases in explaining the variation in LINF, but still, the major chunk of variation in LINF is defined by RLR. In the 30th period, almost 34% of the variation in LINF is explained by itself, RLR explains 45% of the variation, the LIPI explains 11%, LCPRVS explains 7%, and the LM2 defines almost 3%. It shows that the shock to output, money supply, and CPRVS do not play a significant role in explaining the variation in LINF. However, the interest rate is the primary factor that explains the

variation in LINF. These results are also consistent with the SIRFs discussed in the previous section.

Table 4.9 Forecast Variance Decomposition of Model 1B

Period	LIPI Shock	LINF Shock	LCPRVS Shock	LM2 Shock	RLR Shock
Variance Decomposition of LIPI:					
1	100.000	0.000	0.000	0.000	0.000
2	99.044	0.122	0.098	0.347	0.390
5	89.867	0.243	8.415	0.662	0.812
10	74.796	2.645	9.832	2.417	10.310
15	70.300	3.707	10.017	2.175	13.801
20	67.628	6.285	10.459	2.188	13.440
25	65.583	7.851	11.471	2.090	13.005
30	64.725	8.250	12.237	2.009	12.779
Variance Decomposition of LINF:					
1	0.000	30.468	0.000	0.000	69.532
2	0.120	38.816	0.976	0.001	60.086
5	2.342	30.027	4.522	0.129	62.980
10	1.923	34.945	5.192	1.057	56.883
15	7.018	35.973	5.896	2.740	48.373
20	10.517	34.657	5.955	2.657	46.213
25	10.758	34.026	6.357	2.616	46.243
30	11.193	33.820	6.926	2.611	45.450
Variance Decomposition of LCPRVS:					
1	3.2428	0.000	96.757	0.000	0.000
2	10.652	0.346	88.453	0.218	0.330
5	22.011	0.574	75.043	1.376	0.997
10	49.861	0.454	47.545	1.057	1.082
15	47.949	0.457	44.384	1.608	5.601
20	47.8777	1.428	38.058	1.296	11.340
25	46.684	3.524	35.806	1.006	12.979
30	44.874	6.152	34.904	0.820	13.251

The FVD of LCPRVS in Model 1A shows that 96% of the variation in LCPRVS is explained by itself, whereas the LIPI defines the remaining 4% of the variation. However, over time, the share of LIPI in explaining the variation in LCPRVS has increased. In the 10th period, LIPI explains almost 52% of the variation, and LCPRVS explains 46% of the variation, whereas RDR explains nearly 4% of the variation. LINF explains less than 1% of the variation, and LM2 explains 2% of the variation. Similarly, in the 30th period, LIPI explains 45% of the variation, and LCPRVS explains 37% of

the variation. On the other hand, LINF explains 9% of the variation, and RDR explains 8% of the variation. Moreover, LM2 explains less than 1% of the variation.

Similarly, Model 1B shows that 97% of the variation in LCPRVS is explained by itself, and the LIPI explains the remaining 3%. Also, over time, the role of LIPI shock in explaining the variation in LCPRVS increases, and the share of LCPRVS decreases. In the 30th period, almost 45% of the variation in LCPRVS is explained by LIPI. Whereas LCPRVS explains 35% of the variation, RLR shock explains 13% of the variation, LINF explains 6% of the variation, and LM2 explains less than 1 % of the variation. Hence, we can conclude that the LIPI and LCPRVS themselves explain the major chunk of variation in LCPRVS. Our results support the DFH. Hence, when EG increases, the financial sector develops.

4.4.2. Model 2: Credit to Private Sector VS Credit to the Government Sector

The study estimates the unrestricted VAR model and decides the lag length. The results of different lag order selection criteria are reported in Table 4.10. The SC and HQ suggest two lags, FPE suggests three lags, and AIC suggests four lags for both models. However, if we add four lags to the model, we lose the normality condition. For this reason, increasing the number of lags is a good option. We note that residuals are normally distributed with eight lags with no autocorrelation and heteroskedasticity, as shown in Table 4.11 and Table 4.12, respectively. Moreover, the model is stable with eight lags as shown in Table 4.13.

Table 4.10 VAR Lag Order Selection Criteria of Model 2

Model 2A					
Lag	LR	FPE	AIC	SC	HQ
0	NA	1.1E-11	-8.230	-6.302	-7.446
1	1120.357	1.1E-15	-17.443	-14.744*	-16.346*
2	64.495	1.0E-15	-17.505	-14.035	-16.095
3	79.999	8.34e-16*	-17.752	-13.512	-16.029
4	52.081*	8.6E-16	-17.760*	-12.748	-15.723
5	39.870	1.0E-15	-17.668	-11.886	-15.319
6	35.238	1.2E-15	-17.554	-11.000	-14.890
7	38.206	1.4E-15	-17.508	-10.183	-14.531
8	40.544	1.6E-15	-17.534	-9.438	-14.244
9	39.741	1.7E-15	-17.597	-8.731	-13.994
Model 2B					
Lag	LR	FPE	AIC	SC	HQ
0	NA	9.1E-12	-8.398	-6.461	-7.611
1	1112.828	9.1E-16	-17.626	-14.914*	-16.524*
2	70.507	8.2E-16	-17.746	-14.259	-16.329
3	80.046	6.54e-16*	-17.997	-13.736	-16.265
4	51.513*	6.8E-16	-18.000*	-12.964	-15.954
5	40.883	7.8E-16	-17.921	-12.111	-15.560
6	36.405	9.3E-16	-17.821	-11.236	-15.145
7	39.683	1.1E-15	-17.797	-10.437	-14.806
8	42.291	1.1E-15	-17.851	-9.716	-14.545
9	37.435	1.3E-15	-17.885	-8.975	-14.264

Note: * indicates lag order selected by the criterion. Where, LR: sequentially modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion

Table 4.11 Normality and Heteroskedasticity test of Model 2A &2B

	Model 2A	**Model 2B**
Normality Test		
Skewness	7.987 (0.239)	7.848 (0.249)
Kurtosis	8.213 (0.222)	9.636 (0.14)
Jarque-Bera	16.200 (0.182)	17.484 (0.132)
Heteroskedasticity Test		
	2300.583 (0.669)	2319.80 (0.561)

Table 4.12 Serial Correlation LM Tests of Model 2A & 2B

	Model 2A		Model 2B	
Lags	LM-Stat	Prob	LM-Stat	Prob
1	47.334	0.098	37.792	0.387
2	43.239	0.190	40.480	0.279
3	49.657	0.065	42.941	0.198
4	21.955	0.968	24.750	0.922
5	25.580	0.902	29.119	0.785
6	52.654	0.036	54.040	0.027
7	36.596	0.441	38.384	0.362
8	32.400	0.641	34.684	0.531
9	47.334	0.098	37.792	0.387

Table 4.13 VAR Stability Condition for Model 2A & 2B

Model 2A		Model 2B	
Root	Modulus	Root	Modulus
0.987875 - 0.033162i	0.988432	0.989008 + 0.028948i	0.989431
0.987875 + 0.033162i	0.988432	0.989008 - 0.028948i	0.989431
0.944634 - 0.240549i	0.974781	-0.97786	0.977861
0.944634 + 0.240549i	0.974781	0.944925 + 0.226091i	0.971597
0.923869 - 0.151632i	0.93623	0.944925 - 0.226091i	0.971597
0.923869 + 0.151632i	0.93623	0.919223 + 0.148409i	0.931126
0.794267 + 0.489742i	0.933117	0.919223 - 0.148409i	0.931126
0.794267 - 0.489742i	0.933117	0.794999 + 0.477773i	0.927518
-0.930086 - 0.025807i	0.930444	0.794999 - 0.477773i	0.927518
-0.930086 + 0.025807i	0.930444	-0.629560 + 0.662147i	0.913665
-0.625783 - 0.660379i	0.909782	-0.629560 - 0.662147i	0.913665
-0.625783 + 0.660379i	0.909782	-0.428218 - 0.799295i	0.906777
-0.422249 - 0.805446i	0.909416	-0.428218 + 0.799295i	0.906777
-0.422249 + 0.805446i	0.909416	-0.88739	0.887394
0.818697 + 0.354294i	0.892071	0.500180 - 0.725827i	0.881479
0.818697 - 0.354294i	0.892071	0.500180 + 0.725827i	0.881479
0.510943 - 0.724480i	0.886529	-0.646536 - 0.595975i	0.879315
0.510943 + 0.724480i	0.886529	-0.646536 + 0.595975i	0.879315
0.640822 - 0.598685i	0.87697	0.633647 - 0.604741i	0.875911
0.640822 + 0.598685i	0.87697	0.633647 + 0.604741i	0.875911
-0.87434	0.874336	0.302004 - 0.811125i	0.865523
0.323812 - 0.803008i	0.865838	0.302004 + 0.811125i	0.865523
0.323812 + 0.803008i	0.865838	0.121231 - 0.839980i	0.848684
-0.627831 + 0.595798i	0.865533	0.121231 + 0.839980i	0.848684
-0.627831 - 0.595798i	0.865533	0.787488 + 0.304933i	0.844465
0.162653 + 0.829573i	0.845368	0.787488 - 0.304933i	0.844465
0.162653 - 0.829573i	0.845368	-0.216236 + 0.809852i	0.838224
-0.182223 - 0.819705i	0.839715	-0.216236 - 0.809852i	0.838224
-0.182223 + 0.819705i	0.839715	-0.390243 - 0.737360i	0.83426
-0.715527 + 0.435726i	0.837756	-0.390243 + 0.737360i	0.83426
-0.715527 - 0.435726i	0.837756	0.700893 + 0.439938i	0.827524
-0.367587 - 0.737150i	0.823718	0.700893 - 0.439938i	0.827524
-0.367587 + 0.737150i	0.823718	-0.118868 - 0.812096i	0.82075
0.677978 - 0.431315i	0.803546	-0.118868 + 0.812096i	0.82075
0.677978 + 0.431315i	0.803546	-0.692491 - 0.432957i	0.816697

0.215717 + 0.751357i	0.78171	-0.692491 + 0.432957i	0.816697
0.215717 - 0.751357i	0.78171	0.206799 - 0.767810i	0.795172
0.760204	0.760204	0.206799 + 0.767810i	0.795172
-0.724262 - 0.212842i	0.754889	-0.727803 - 0.124288i	0.738339
-0.724262 + 0.212842i	0.754889	-0.727803 + 0.124288i	0.738339
-0.005633 + 0.744324i	0.744346	0.465090 - 0.497690i	0.681179
-0.005633 - 0.744324i	0.744346	0.465090 + 0.497690i	0.681179
-0.389581 - 0.575665i	0.695099	-0.569017 + 0.174879i	0.595284
-0.389581 + 0.575665i	0.695099	-0.569017 - 0.174879i	0.595284
0.369694 + 0.566093i	0.676117	0.265294 + 0.392452i	0.473708
0.369694 - 0.566093i	0.676117	0.265294 - 0.392452i	0.473708
-0.19727	0.197266	0.342585	0.342585
-0.13144	0.131443	-0.32928	0.329283

The study also estimates the JC test, which confirms that long-run relationships exist among the variables, as reported in Table 4.14. Since all the variables are I (1) and there exist long-run relationships among the variables, we estimate the SVAR at level by following Aslanidi (2007); Kim and Roubini (2000), among others.

Table 4.14 Results of Johansen Cointegration Test of Model 2A & 2B

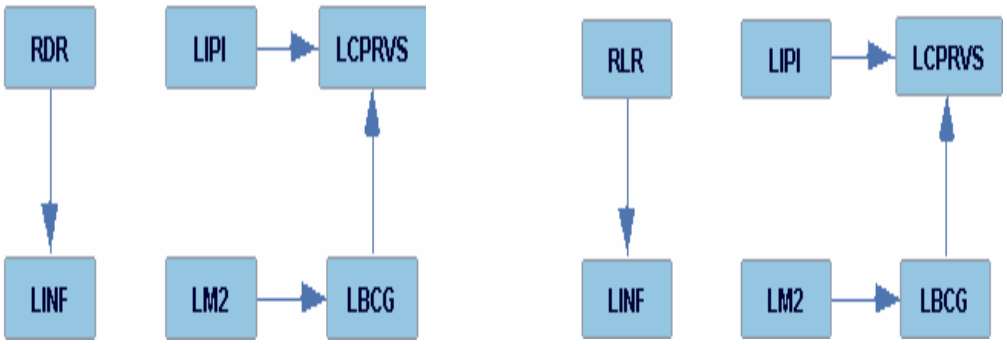
Model 2A							
No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**	Max-Eigen Statistic	0.05 Critical Value	Prob.**
r=0	0.350	188.132	95.754	0.000	58.202	40.078	0.000
r≤1	0.317	129.930	69.819	0.000	51.486	33.877	0.000
r≤2	0.267	78.444	47.856	0.000	41.908	27.584	0.000
r≤3	0.145	36.535	29.797	0.007	21.074	21.132	0.051
r≤4	0.089	15.461	15.495	0.051	12.518	14.265	0.093
r≤5	0.022	2.943	3.841	0.086	2.943	3.841	0.086
Model 2B							
No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**	Max-Eigen Statistic	0.05 Critical Value	Prob.**
r=0	0.309	174.366	95.754	0.000	49.981	40.078	0.003
r≤1	0.291	124.385	69.819	0.000	46.414	33.877	0.001
r≤2	0.250	77.972	47.856	0.000	38.820	27.584	0.001
r≤3	0.129	39.151	29.797	0.003	18.649	21.132	0.107
r≤4	0.125	20.503	15.495	0.008	18.058	14.265	0.012
r≤5	0.018	2.444	3.841	0.118	2.444	3.841	0.118

Note: Trace test indicates 4, and Max-eigenvalue indicates 3 cointegrating eqn(s) exists in model 2A. Similarly, the trace test indicates 5, and Max-eigenvalue indicates 3 cointegrating eqn(s) exists in model 2B at the 0.05 level

*MacKinnon et al. (1999) p-values

4.4.2.1. Contemporaneous Causal Relationship of Model 2

The study estimates the unrestricted VAR model and uses its residual covariance matrix as an input in TETRAD V and applies the PC algorithm to find the contemporaneous causal relationship among the variables and to identify the SVAR model. The contemporaneous causal relationship for both models is depicted in Figure 4.7.



Panel (a) Panel (b)

Figure 4.7 Direct Acyclic Graph of Model 2A & Model 2B

Both models depict the same pattern. The DAG analysis shows that RDR causes inflation; it is consistent with model1A and model 1B. Further, the study notes that LM2 causes LBCG and LBCG causes LCPRVS. It implies that LM2 and LCPRVS are dependent. However, they are independent conditional on LBCG. Moreover, LBCG is said to screen off LM2 from LCPRVS. These results are also in line with model 1A and model 1B, where we observe that LCPRVS is independent of LM2. Further, LBCG and LIPI are unconditionally uncorrelated; however, they are correlated conditional on LCPRVS. Hence, it implies that LCPRVS is an unshielded collider on the path LBCG-LCPRVS- LIPI. It is a collider because both arrowheads come together at LCPRVS. Moreover, it is unshielded because there is no direct causal relationship between LBCG and LIPI. The results are also summarized in equations 4.7 and 4.8.

$$B_{2A}Y_t = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & \beta_{26} \\ 0 & 0 & 1 & 0 & \beta_{35} & 0 \\ \beta_{41} & 0 & \beta_{43} & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} LIPI \\ LINF \\ LBCG \\ LCPRVS \\ LM2 \\ RDR \end{bmatrix} \quad (4.7)$$

$$B_{2B}Y_t = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & \beta_{26} \\ 0 & 0 & 1 & 0 & \beta_{35} & 0 \\ \beta_{41} & 0 & \beta_{43} & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} LIPI \\ LINF \\ LBCG \\ LCPRVS \\ LM2 \\ RLR \end{bmatrix} \quad (4.8)$$

Hence, DAG analysis suggests the following assumptions:

1. No variable contemporaneously causes LIPI. However, LIPI causes LCPRVS. It implies that EG causes FD.
2. LBCG causes LCPRVS. Hence, government borrowing from banks affects bank credit to the private sector. So, there is a need to see whether it crowds out private sector credit or crowds in.
3. The DAG analysis shows that M2 causes LBCG.
4. M2 and RDR are not caused by any variable. This assumption is justified as policymakers don't have complete information about output and prices within the same month. It is available with a lag (Alam, 2015; Cushman & Zha, 1995; Jones & Bowman, 2019; Kim & Roubini, 2000). Also, there is no direct contemporaneous causality running from RDR to EG.

With these assumptions, the present study estimates the over-identified SVAR model. The likelihood ratio rest couldn't reject the overidentifying restrictions for both models at a 10% level of significance, as shown in Table 4.15. Hence restrictions proposed by DAG are consistent with the data.

Table 4.15 LR test for Over-identification of Model 2A & 2B

	Log-likelihood	Chi-square	Probability
Model 1A	1318.391	17.226	0.101
Model 1B	1341.237	16.322	0.130

4.4.2.2.Structural Impulse Response Functions of Model 2

First, we have investigated the response of LIPI, LINF, and LCPRVS to one SD shock to the LBCG. The IRFs are reported in Figure 4.8. The first panel shows the results of model 2A, while the second panel depicts the results of model 2B.

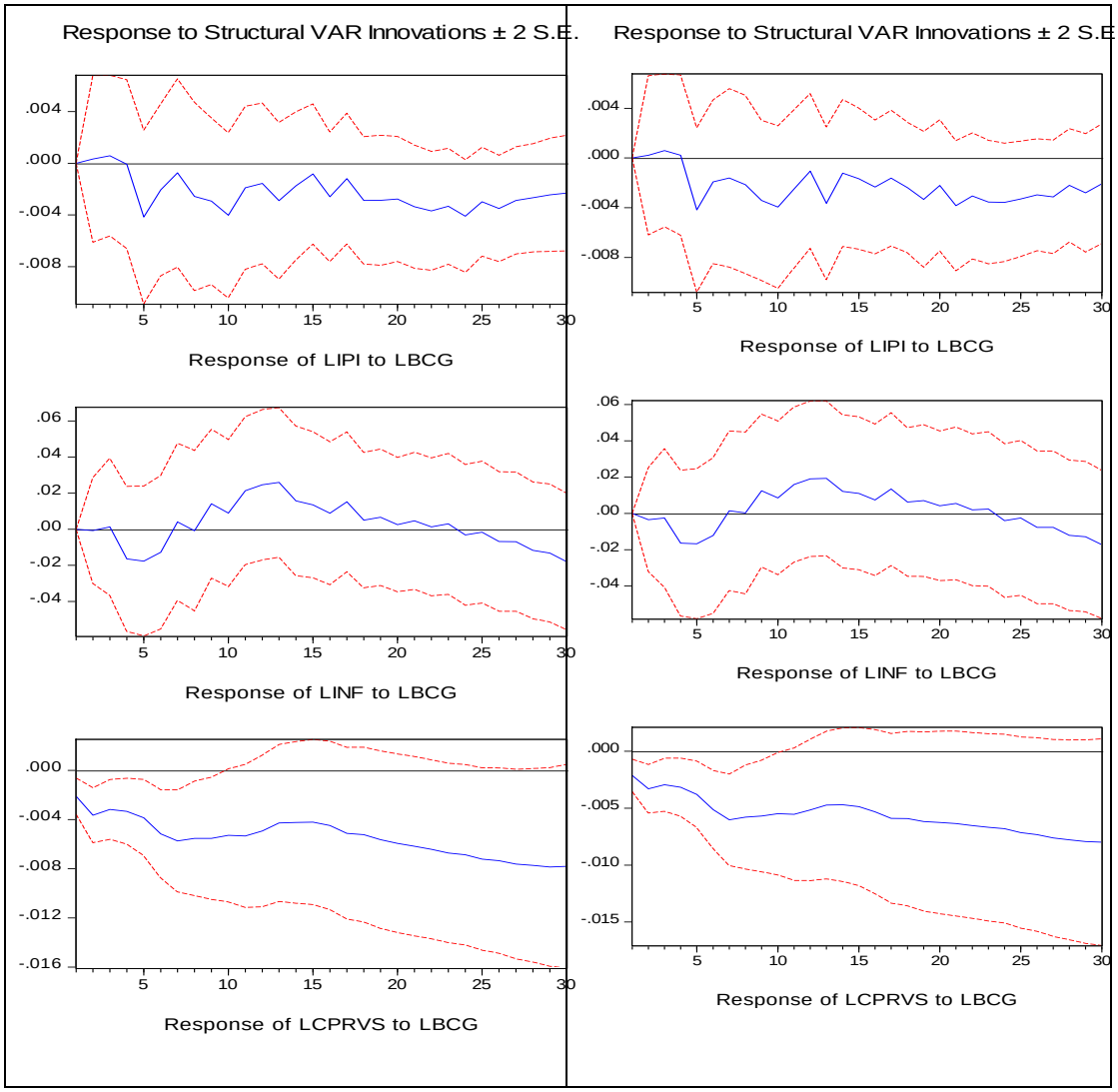


Figure 4.8 **The Response of Output, Inflation, and Credit to Private Sector to the shock of Credit to the Government Sector**

Note: left panel reports the results of Model 2 A, and the right panel reports the results of Model 2B.

The one SD shock to LBCG significantly crowds out LCPRVS as shown in Figure 4.9. Further, study notes that LBCG is insignificant in explaining output and inflation. Although banks devote a large chunk of resources to the government sector, it does not significantly increase production. Similarly, one SD shock to LCPRVS has insignificant impact on all the variables in the system as shown in figure 4.10.

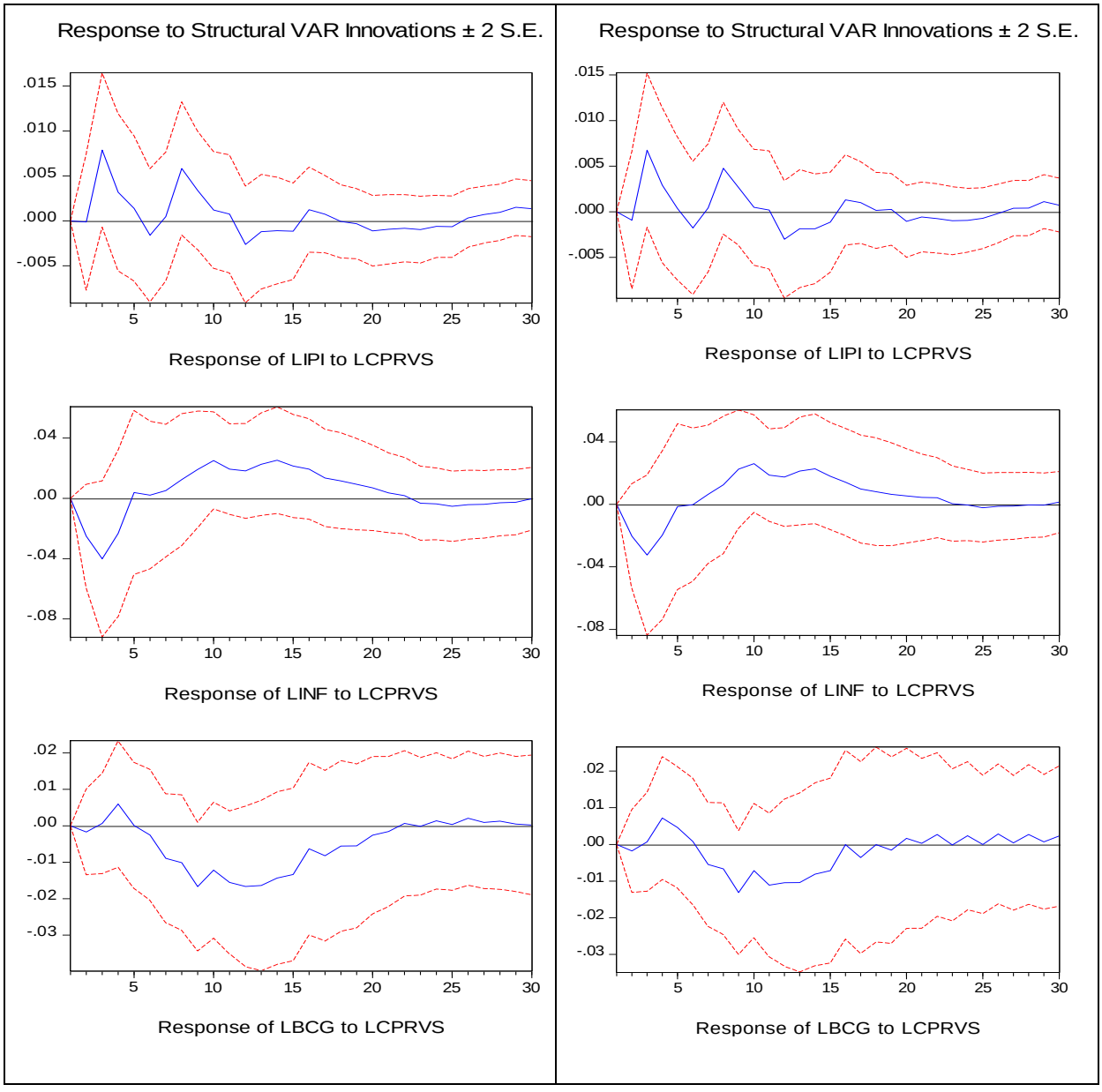


Figure 4.9 **The Response of Output, Inflation, and Credit to the Government Sector to the Shock of Credit To the Private Sector**

Note: The first panel shows the results of model 2A, while the second panel depicts the results of model 2B

However, using LIPI as a proxy for monthly GDP is a serious limitation. Because LIPI only accounts for 21% of the GDP, but it is the most used proxy in the literature, so that's why we use LIPI. Similarly, the shock to LCPRVS does not affect output, inflation, and bank credit to the government sector. Therefore, it also implies that FD does not lead to EG. Further, the CRC is ineffective in Pakistan.

Figure 4.8 depicts the response of credit to the government and private sector to one SD shock to LIPI. The SIRF shows that in response to the shock to LIPI, LCPRVS increases significantly. Thus, the financial sector develops in the process of EG. On the other hand, LBCG decreases, and the response is significant after almost seven months. Hence, when an economy grows, output increases, and resources shift from the public sector to the private sector. Banks lend more credit to the private sector.

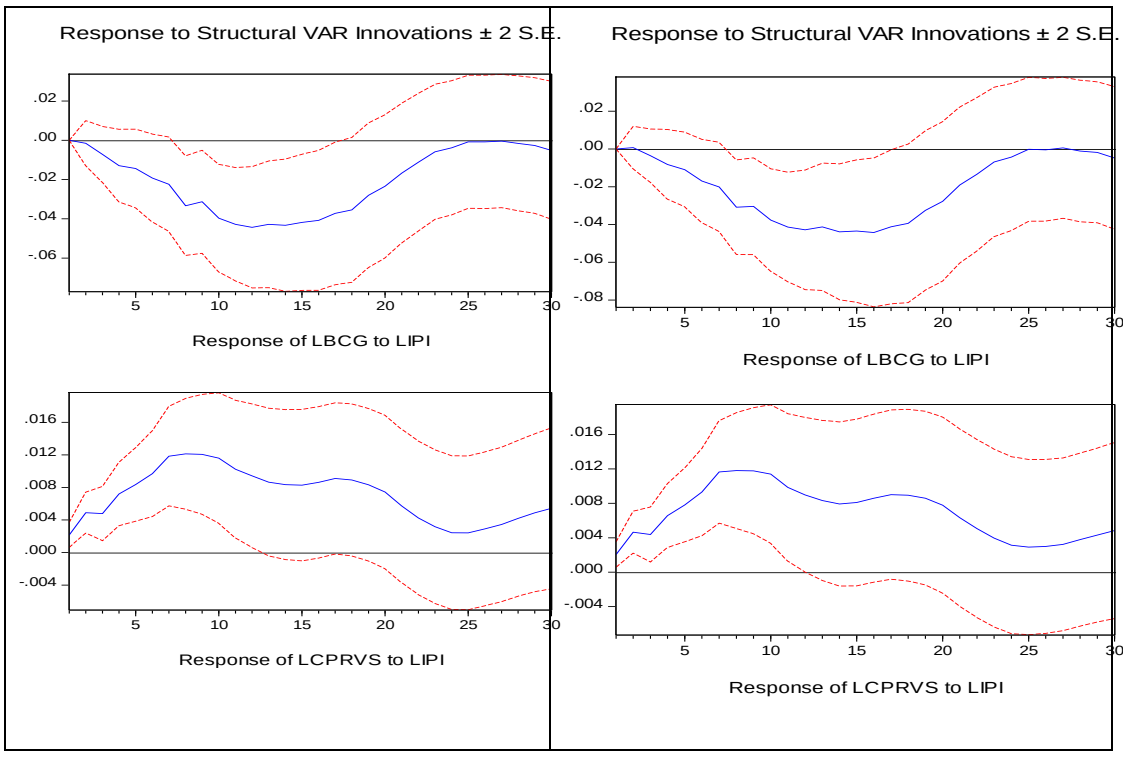


Figure 4.10 **The Response of Credit to the Government and the Private Sector to the Shock to Output**

Note: The first panel shows the results of model 2A, while the second panel depicts the results of model 2B

4.4.2.3. Forecast Variance Decomposition of Model 2

The results of FVD are reported in The FVD of LINF shows that RDR plays a major role in explaining the variation in LINF. In the first period, almost 60% of the variation in LINF is explained by RDR, and nearly 40% of the variation in LINF is explained by itself. However, over time, the share of RDR has decreased. In the 30th period, RDR explains 29%, LIPI explains 17% of the variation in LINF, and LINF itself elucidates 41% of the variation, while the role of other variables remains very minimal.

Similarly, in Model 2B, 34% of the variation in LINF is explained by itself, and the remaining 64% of the variation is explained by the RLR. However, over time, the share of RLR shock decreases in explaining the variation in LINF, but still, the main chunk of variation in LINF is defined by RLR. In the 30th period, almost 31% of the variation in LINF is explained by itself, 42% of the variation is explained by RLR, and 17% is explained by LIPI.

In model 2B, the FVD of LBCG shows that the main chunk of variation in LBCG is explained by itself in the initial period, i.e., 92% of the variation in LBCG is explained by itself, and the remaining 8% of the variation is explained by LM2. However, over time, the share of LBCG in explaining its variation decreased, and the share of RLR and LIPI increased. In the 30th period, 27% of the variation in LBCG is explained by LIPI, and 30% of the variation is explained by RLR, 13% of the variation is explained by LM2, and 21% of the variation in LBCG is explained by itself. Moreover, the same behavior persists in model 2A.

In model 2B, the FVD of LCPRVS shows that LIPI explains 5% of the variation, LBCG explains 6% of the variation, and 89% of the variation is explained by the LCPRVS in the first period. Over time, the share of LIPI increases in explaining the

variation in LCPRVS. In the 10th period, 48% of the variation in LCPRVS is explained by LIPI, while 13% of the variation is explained by each LINF, and LBCG, only 10% of the variation in LCPRVS is explained by itself.

Table 4.16 and Table 4.17. The FVD of LINF shows that RDR plays a major role in explaining the variation in LINF. In the first period, almost 60% of the variation in LINF is explained by RDR, and nearly 40% of the variation in LINF is explained by itself. However, over time, the share of RDR has decreased. In the 30th period, RDR explains 29%, LIPI explains 17% of the variation in LINF, and LINF itself elucidates 41% of the variation, while the role of other variables remains very minimal.

Similarly, in Model 2B, 34% of the variation in LINF is explained by itself, and the remaining 64% of the variation is explained by the RLR. However, over time, the share of RLR shock decreases in explaining the variation in LINF, but still, the main chunk of variation in LINF is defined by RLR. In the 30th period, almost 31% of the variation in LINF is explained by itself, 42% of the variation is explained by RLR, and 17% is explained by LIPI.

In model 2B, the FVD of LBCG shows that the main chunk of variation in LBCG is explained by itself in the initial period, i.e., 92% of the variation in LBCG is explained by itself, and the remaining 8% of the variation is explained by LM2. However, over time, the share of LBCG in explaining its variation decreased, and the share of RLR and LIPI increased. In the 30th period, 27% of the variation in LBCG is explained by LIPI, and 30% of the variation is explained by RLR, 13% of the variation is explained by LM2, and 21% of the variation in LBCG is explained by itself. Moreover, the same behavior persists in model 2A.

In model 2B, the FVD of LCPRVS shows that LIPI explains 5% of the variation, LBCG explains 6% of the variation, and 89% of the variation is explained by the LCPRVS in the first period. Over time, the share of LIPI increases in explaining the variation in LCPRVS. In the 10th period, 48% of the variation in LCPRVS is explained by LIPI, while 13% of the variation is explained by each LINF, and LBCG, only 10% of the variation in LCPRVS is explained by itself.

Table 4.16 Forecast Variance Decomposition of Model 2A

Period	LIPI Shock	LINF Shock	LBCG Shock	LCPRVS Shock	LM2 Shock	RDR Shock
Variance Decomposition of LIPI:						
1	100.000	0.000	0.000	0.000	0.000	0.000
2	99.288	0.002	0.008	0.001	0.678	0.024
5	92.866	0.102	1.073	4.492	1.058	0.408
10	76.188	1.517	2.594	5.968	3.996	9.737
15	69.710	1.522	2.963	5.567	4.469	15.768
20	67.610	2.228	4.036	5.368	4.651	16.107
25	64.715	3.418	6.102	5.225	5.100	15.440
30	62.214	3.294	7.166	5.166	7.051	15.109
Variance Decomposition of LINF:						
1	0.000	40.470	0.000	0.000	0.000	59.530
2	0.001	51.655	0.001	1.260	0.129	46.954
5	0.154	51.357	0.754	3.611	0.276	43.848
10	1.666	52.466	1.081	4.120	0.817	39.850
15	13.831	45.342	2.631	5.157	1.006	32.034
20	16.540	43.938	2.606	5.163	1.660	30.093
25	15.959	42.375	2.522	4.983	4.222	29.938
30	16.550	41.470	2.946	4.880	5.001	29.152
Variance Decomposition of LBCG:						
1	0.000	0.000	91.605	0.000	8.395	0.000
2	0.062	3.700	88.415	0.077	6.359	1.388
5	4.560	2.052	75.808	0.413	16.288	0.878
10	24.189	2.776	45.262	3.188	19.359	5.225
15	35.815	2.332	26.780	4.599	17.434	13.041
20	37.413	2.210	22.173	3.770	13.878	20.555
25	34.868	3.674	22.311	3.444	12.653	23.049
30	32.002	6.636	23.514	3.166	12.310	22.373
Variance Decomposition of LCPRVS:						
1	5.387	0.000	5.046	89.104	0.462	0.000
2	15.536	0.829	9.592	71.550	2.338	0.155
5	35.427	5.180	10.968	33.094	14.810	0.521
10	51.137	8.063	12.387	12.967	8.452	6.994
15	44.828	7.873	11.148	10.349	7.290	18.512
20	42.488	5.856	11.910	8.125	5.601	26.020
25	38.204	5.364	15.341	7.076	5.186	28.830
30	34.457	5.438	18.856	6.124	6.203	28.922

Moreover, LM2 explains 10% of the variation, and RLR explains 8% of the variation in LCPRVS. In the 30th period, 29% variation in LCPRVS is explained by LIPI, and 34% variation is explained by RLR, where only 18% variation in LCPRVS is explained by itself, and 7% variation is explained by LM2. Almost the same behavior persists in model 2A. LIPI explains the major chunk of variation in LCPRVS. However, in the later periods, RDR also explains almost 29% of the variation in LCPRVS.

Table 4.17 depicts the FVD for models 2A and 2B, respectively. The FVD of LIPI shows the same behavior, as we have observed in model 1. The major chunk of variation in LIPI is explained by itself. However, over the horizon, the interest rate also explains some portion of the variation. In contrast, the share of other variables remains very small. For instance, in the 30th period, LIPI itself explains 62% of the variation, and RDR explains 15% of the variation in Model 2A. Whereas in model 2B, LIPI explains 60 % of the variation, and RLR explains 19 % of the variation in LIPI.

The FVD of LINF shows that RDR plays a major role in explaining the variation in LINF. In the first period, almost 60% of the variation in LINF is explained by RDR, and nearly 40% of the variation in LINF is explained by itself. However, over time, the share of RDR decreased. In the 30th period, RDR explains 29%, LIPI explains 17% of the variation in LINF, and LINF itself elucidates 41% of the variation, while the role of other variables remains very minimal.

Similarly, in Model 2B, 34% of the variation in LINF is explained by itself, and the remaining 64% of the variation is explained by the RLR. However, over time, the share of RLR shock decreases in explaining the variation in LINF, but still, the main chunk of variation in LINF is defined by RLR. In the 30th period, almost 31% of the

variation in LINF is explained by itself, 42% of the variation is explained by RLR, and 17% is explained by LIPI.

Table 4.17 Forecast Variance Decomposition of Model 2B

Period	LIPI Shock	LINF Shock	LBCG Shock	LCPRVS schlock	LM2 Shock	RLR Shock
Variance Decomposition of LIPI:						
1	100.000	0.000	0.000	0.000	0.000	0.000
5	92.996	0.778	1.097	3.375	0.914	0.840
10	74.385	2.663	2.651	4.181	4.397	11.723
15	66.104	2.432	3.174	4.151	4.476	19.665
20	64.185	2.836	4.091	4.057	4.603	20.228
25	61.816	3.716	6.044	3.996	4.901	19.528
30	59.847	3.608	7.008	3.907	6.509	19.121
Variance Decomposition of LINF:						
1	0.000	34.220	0.000	0.000	0.000	65.780
2	0.001	45.230	0.023	0.822	0.111	53.812
5	0.210	36.198	0.709	2.331	0.292	60.259
10	1.185	33.957	0.922	3.163	1.015	59.757
15	12.578	32.029	1.679	3.950	2.005	47.759
20	17.121	32.046	1.623	3.581	2.011	43.618
25	16.604	31.049	1.584	3.437	4.119	43.207
30	17.401	30.531	1.947	3.313	5.136	41.671
Variance Decomposition of LBCG:						
1	0.000	0.000	92.302	0.000	7.698	0.000
2	0.013	2.066	88.122	0.088	5.517	4.194
5	2.228	1.448	76.760	0.848	16.414	2.301
10	20.785	5.040	45.780	1.859	21.016	5.520
15	29.826	6.698	24.902	1.873	19.441	17.261
20	31.052	6.902	19.118	1.301	14.705	26.922
25	28.882	6.654	19.474	1.193	13.328	30.468
30	27.094	7.782	20.891	1.145	12.868	30.220
Variance Decomposition of LCPRVS:						
1	5.176	0.000	5.553	88.807	0.463	0.000
2	15.184	1.834	9.051	71.625	1.803	0.503
5	33.375	7.644	10.836	32.618	14.389	1.139
10	47.906	12.874	12.716	10.012	8.974	7.519
15	39.576	13.913	11.381	6.681	8.526	19.923
20	35.814	10.921	11.917	4.747	6.762	29.839
25	32.172	9.341	14.502	4.017	6.167	33.801
30	29.302	8.227	17.775	3.504	6.837	34.355

In model 2B, the FVD of LBCG shows that the main chunk of variation in LBCG is explained by itself in the initial period, i.e., 92% of the variation in LBCG is explained by itself, and the remaining 8% of the variation is explained by LM2.

However, over time, the share of LBCG in explaining its variation decreased, and the share of RLR and LIPI increased. In the 30th period, 27% of the variation in LBCG is explained by LIPI, and 30% of the variation is explained by RLR, 13% of the variation is explained by LM2, and 21% of the variation in LBCG is explained by itself. Moreover, the same behavior persists in model 2A. The FVD of LCPRVS shows that LIPI explains 5% of the variation, LBCG explains 6% of the variation, and 89% of the variation is explained by the LCPRVS in the first period. Over time, the share of LIPI increases in explaining the variation in LCPRVS. In the 10th period, 48% of the variation in LCPRVS is explained by LIPI, while 13% of the variation is explained by each LINF, and LBCG, only 10% of the variation in LCPRVS is explained by itself. Moreover, LM2 explains 10% of the variation, and RLR explains 8% of the variation in LCPRVS. In the 30th period, 29% variation in LCPRVS is explained by LIPI, and 34% variation is explained by RLR, where only 18% variation in LCPRVS is explained by itself, and 7% variation is explained by LM2. Almost the same behavior persists in model 2A. LIPI explains the major chunk of variation in LCPRVS. However, in the later periods, RDR also explains almost 29% of the variation in LCPRVS.

4.5. Discussion and Policy Implication

The current study applies the SVAR-DAG approach and yields the following intriguing results:

1. It is widely believed that FD causes EG. However, the DAG analysis shows that EG causes FD. Moreover, the SIRF and FVD also complement our findings and support the DFH of FD. Our results complement some earlier studies like Ahmed (2016); Gurgul and Lach (2012); Hasan (2015); Rehman and Cheema (2013); Zang and Kim (2007), among others.

2. The study also finds that the CRC remain unsuccessful at disseminating the impact of MP in Pakistan. Our findings add to the findings of our previous essay. Furthermore, it is consistent with the findings of Baig (2011); Hussain (2014); Imran and Nishat (2013), who all conclude that the CRC is ineffective in Pakistan. Hussain (2014) observes that the CRC was beneficial before the year 2000. However, the IRC became increasingly effective after 2000. Similarly, Cheema and Naeem (2019) note that the CRC is not providing any additional leverage to the monetary authorities for conducting MP in Pakistan.
3. The present study also emphasizes that one of the reasons for the ineffectiveness of the CRC of MTM is the substantial public sector borrowing from the commercial banks, which crowds out CPRVS. This implies that commercial banks are risk-averse, preferring to invest in risk-free government assets over lending to the private sector. Further, our results support the lazy banks' hypothesis, which states that if banks are lazy, one extra dollar of BCG leads to crowding out of CPRVS.
4. The study also notes that BCG does not significantly affect output. Hence, the public sector is inefficient at accelerating EG. Intuitively, government spending has a weak connection with IPI, so this might be one reason for the insignificant impact of BCG on EG. Overall, our results complement the several reports by SBP in which SBP emphasizes that the government should cut its excessive borrowing from commercial banks. Further, it shows that banks are forgetting their core objective of providing funds to the private sector. One possible reason is the high number of non-performing loans banks have accumulated over time. Banks are risk-averse and prefer to invest in risk-free assets as compared to risky private ventures. In the SBP financial stability report of 2019, it is observed that the correlation between public and private sector credit is -0.64. Further, our results complement the earlier work

by Ahmed (2016) and Zaheer et al. (2019), that excessive BCG crowd out CPRVS in Pakistan.

Hence, the current study recommends that the government should focus on alternative sources of financing and lower its reliance on commercial banks in order to make more resources accessible to the private sector. Additionally, the government should engage in programs that speed EG, reduce corruption, and misallocate resources so that the funds that are dragged away from the private sector can be used to facilitate the private sector for new productive investment ventures.

4.6. Conclusion

In this chapter, the study uses monthly data from June 2006 to June 2018 in a closed economy SVAR model to reexamine the Finance-Growth Nexus and the effectiveness of the CRC of MTM. The influence of bank credit distributed to the public and private sectors, as well as its impact on output and inflation, are also investigated in the study. Both the SIRF and the FVD indicate that EG induces FD. As a result, our findings corroborate the demand-following hypothesis. We find no evidence to support the supply-leading hypothesis or that FD causes EG in Pakistan. Excessive bank lending to the public sector could be the biggest impediment, squeezing money available for the private sector. Furthermore, the study indicates no substantial effect of BCG on output. Commercial banks, on the other hand, lend more to the public sector to protect their profits, but BCG does not contribute to EG. As a result, the government should prioritize alternate funding sources while avoiding excessive borrowing from commercial banks. As a result, additional funding may be available for the private sector.

CHAPTER 5

CONCLUSION

The role of money, interest rate, and credit on economic activities always remain controversial. This controversy is as old as the foundations of macroeconomics. Using the SVAR-DAG approach, the current dissertation seeks to empirically analyze the role of money, credit, and interest rates on aggregate demand and inflation. SVAR is a common method used in the literature to examine the MTM. It aids in comprehending the dynamic effects of MP shocks on various macroeconomic indicators. Furthermore, DAG is used in the study to identify the covariance matrix and to comprehend the contemporaneous causal relationships among the variables.

The study is divided into three interconnected essays. In the first essay, the effectiveness of MTM in a small open economy is investigated by using monthly data from Jan 1996 to June 2018. We find that oil prices are a key contributor to inflation in Pakistan, and that the SBP can effectively control inflation by using interest rates. Our findings back up the SBP's stance of tight MP (high discount rate) to manage inflation. Furthermore, no pricing or ER riddles are found due to the identification limits suggested by DAG for the covariance matrix. In terms of money, we find little evidence to support the use of money to boost output. ERC and CRC, on the other hand, are ineffectual in attaining MP objectives.

We continue our hunt for a suitable MP to accelerate AD in the second essay. To examine how MP affects different areas of the economy, we use GDP and its various components rather than IPI in this essay. IPI solely reports the growth in the industrial sector, which accounts for only 23% of Pakistan's GDP. The study uses the SVAR-

DAG approach to collect annual data on GDP and its various components, including PI, GC, and PC, from 1976 to 2019. Our findings support our previous findings that tight MP is useful in limiting inflation and MS is effective in increasing AD over time.

The storey, on the other hand, does not end here. When we examine at how MP affects other parts of AD, we find that a positive interest rate shock has a negative impact on investment and government spending. As a result, the conventional IRC still maintains sway in Pakistan. The interest rate, on the other hand, is not playing a substantial role in boosting PC, which is the most common cause of AD in Pakistan. The informal sector is the primary contributor to EG in Pakistan, according to the SBP's numerous reports. Furthermore, the financial sector is still in its infancy. People prefer to conduct transactions using cash rather than through financial channels. As a result, the PC is unaffected by interest rate changes.

On the other hand, MS is highly effective at stimulating PC in both the short and long run. Further, we also observe that MS significantly affects GC and PI in the long run. Hence, money and interest rates both play a significant part. If the SBP wants to increase PI in the short run, then it should decrease interest rates. Similarly, if it wants to boost consumption, then it should use MS as an instrument of MP. Further, to control inflation, tight MP (by increasing RDR) can be effectively used.

The study also observes that a positive shock to the PC significantly impacts PI. When consumers demand more, producers produce more, hence demand creates supply. In Pakistan, the PC is the primary driver of AD. For a long time, SBP is struggling to boost AD through PC, and our analysis suggests that SBP is successful in achieving this goal. However, it is surprising to note that data on the PC is a residual term. The Pakistan Bureau of Statistics does not collect data on PC, which is the largest component of AD. We also observe that GC does not significantly crowd out PI. IRFs

suggest that it crowds-in PI. However, the response is not significant. With this unresolved controversy, we move one step forward. In the third essay, we re-investigate this issue along with the effectiveness of the CRC of MTM by using the latest available data from June 2006 to June 2018. With this latest data, our results are consistent with earlier findings that the CRC is ineffective in Pakistan. We also notice that EG leads to FD. Further, in Pakistan, the government is squeezing financial resources from the private sector. As a result, the private sector is crowded out due to excessive government borrowing. Moreover, BCG is inefficient at accelerating output. Banks are also more inclined to invest in safe assets and prefer to lend to the government instead of the private sector. Hence, we suggest that the government and monetary authorities should focus on measures that facilitate investors, create an investment-friendly environment, and the government should decrease its reliance on commercial banks for borrowing. The government should take the necessary steps to generate finance from other sources. However, we are not suggesting that the government should not invest. The government should spend on projects that create a positive externality for investors, like spending on infrastructure, roads, and telecommunication services, the power sector, health, and the education sector. Which, in turn, creates a positive externality for investors and encourages them to invest in new projects.

Hence, we can conclude that SBP can use interest rates to control inflation and to increase PI in the short run. However, there is a trade-off; either interest rates can be used to control inflation or to boost investment. However, with a single MP instrument, both objectives are challenging to achieve. Moreover, SBP can use MS to stimulate PC, GC, and PI.

It is also worth mentioning that there is always room for improvement and more research. As previously stated, the data on the PC is not the "real data." Monthly

statistics on national income accounts are likewise unavailable; as a result, we relied on yearly GDP data and the IPI as a proxy for monthly GDP. For MTM analysis, however, high-frequency data is recommended. IPI, on the other hand, does not reflect expansion across all sectors of the economy. As a result, it is possible that genuine relationships are not depicted. As a result, we propose that the government gather monthly statistics on national income accounts in order to help scholars and policymakers better grasp the real dynamics.

REFERENCES

Abdel-Baki, M. (2010). The effects of bank reforms on the monetary transmission mechanism in emerging market economies: evidence from Egypt. *African Development Review, 22*(4), 526-539. doi:10.1111/j.1467-8268.2010.00247.x

Abiad, A., Almansour, A., Furceri, D., Granados, C., & Topalova, P. (2014). Is it time for an infrastructure push? The macroeconomic effects of public investment. *World Economic Outlook*, 75-114.

Adugna, H. (2013). Determinants of private investment in Ethiopia. *Journal of Economics and Sustainable Development, 4*(20), 186-194. doi:10.1.1.842.2677&rep=rep1&type=pdf

Afandi, A. (2005). *Monetary policy transmission and structural breaks in Indonesia.* PhD Dissertation. University of Wollong, New South Wales, Retrieved from https://ro.uow.edu.au/cgi/viewcontent.cgi?article=1640&context=theses

Afrin, S. (2017). Monetary policy transmission in Bangladesh: Exploring the lending channel. *Journal of Asian Economics, 49*, 60-80. doi:10.1016/j.asieco.2016.10.003

Aftab, N., Jebran, K., Ullah, I., & Awais, M. (2016). Impact of interest rate on private sector credit; Evidence from Pakistan. *Jinnah Business Review, 4*(1), 47-52.

Agha, A. I., Ahmed, N., Mubarik, Y. A., & Shah, H. (2005). Transmission mechanism of monetary policy in Pakistan. *SBP-Research Bulletin, 1*(1), 1-23.

Ahmad, E., & Malik, A. (2009). Financial sector development and economic growth: An empirical analysis of developing countries. *Journal of economic cooperation and development, 30*(1), 17-40.

Ahmad, S., Pasha, F., & Rehman, M. (2016). The Role of Money in Explaining Business Cycles for a Developing Economy: The Case of Pakistan. *State Bank of Pakistan Working Paper, 74*.

Ahmed, J. (2016). Credit conditions in Pakistan: supply constraints or demand deficiencies? *The Developing Economies, 54*(2), 139-161.

Ahmed, S., & Islam, M. E. (2004). The monetary transmission mechanism in Bangladesh: Bank lending and exchange rate channels. *The Bangladesh Development Studies*, 31-87.

Ahmed, S. M., & Ansari, M. I. (1998). Financial sector development and economic growth: The South-Asian experience. *Journal of Asian Economics, 9*(3), 503-517. doi:10.1016/S1049-0078(99)80100-6

Alam, M. R. (2015). Effectiveness of monetary policy in Bangladesh. *The Journal of Developing Areas*, 363-372.

Ali, A., Ahmad, F., & Ur-Rahman, F. (2016). Impact of Government Borrowing on Financial Development (A case study of Pakistan).

Ali, S., Irum, S., & Ali, A. (2008). Whether fiscal stance or monetary policy is effective for economic growth in case of South Asian Countries? *The Pakistan Development Review*, 791-799.

Alichi, A., Shibata, I., & Tanyeri, K. (2019). Fiscal Policy Multipliers in Small States. In: INTERNATIONAL MONETARY FUND.

Angeloni, I., Kashyap, A. K., Mojon, B., & Terlizzese, D. (2003). *The output composition puzzle: a difference in the monetary transmission mechanism in the euro area and US* (0898-2937). Retrieved from https://www.nber.org/papers/w9985.pdf

Anghelache, C., Marinescu, A. I., Avram, D., & Burea, D. (2017). Model analysis of the correlation between GDP and final consumption components. *Romanian Statistical Review Supplement, 65*(2), 84-95.

Arby, M. F. (2008). *Some Issues in the National Income Accounts of Pakistan (Rebasing, Quarterly and Provincial Accounts and Growth Accounting)*. Retrieved from https://mpra.ub.uni-muenchen.de/32048/1/MPRA_paper_32048.pdf

Arfanuzzaman, M. (2014). The Long-run Dynamic Relationship between Broad money supply and GDP of Bangladesh: A VECM approach. *Developing Country Studies, 4*(14), 167-178.

Arwatchanakarn, P. (2017). Structural vector autoregressive analysis of monetary policy in Thailand. *Sociology Study, 7*(3), 133-145.

Asghar, Z., & Jahandad, N. (2010). Causal order between money, income and price through graph theoretic approach for Pakistan. *Economics Bulletin, 30*(3), 2515-2523.

Aslam, A. L. M. (2016). Impact of money supply on Sri Lankan economy: An econometric analysis. *International Letters of Social and Humanistic Sciences, 67*, 11-17. doi:10.18052/www.scipress.com/ILSHS.67.11

Aslanidi, O. (2007). The optimal monetary policy and the channels of monetary transmission mechanism in CIS-7 countries: the case of Georgia. *CERGE-EI Discussion Paper, 12*.

Audu, S., Yaaba, B. N., & Ibrahim, H. (2018). Money supply, output and inflation dynamics in Nigeria: The case of new higher order monetary aggregates. *American Journal of Economics, 8*(6), 289-302. doi: 10.5923/j.economics.20180806.08

Awokuse, T. O., & Bessler, D. A. (2003). Vector autoregressions, policy analysis, and directed acyclic graphs: an application to the US economy. *Journal of Applied Economics, 6*(1), 1-24.

Ayub, S., & Shah, F. M. (2015). Impact of monetary policy on gross domestic product (GDP). *Asian Journal of Business and Management, 3*(6).

Babatunde, M. A., & Shuaibu, M. I. (2011). Money supply, inflation and economic growth in Nigeria. *Asian-African Journal of Economics and Econometrics, 11*(1), 147-163. doi:10.5923/j.economics.20180806.08

Baig, M. A. (2011). The effectivenss of market-based monetary transmission mechanism in PAkistan (January 1993-April 2009). *Pakistan Business Review*, 146.

Ball, L., & Croushore, D. (1995). *Expectations and the effects of monetary policy* (0898-2937). Retrieved from https://www.nber.org/papers/w5344.pdf

Bano, S. S. (2018). The Dynamic Relationship between Real Interest Rate and Investment: An Empirical Analysis for Selected Pacific Island Countries. *International Journal of Economics and Financial Issues, 8*(5), 131.

Barnett, W. A., Bhadury, S. S., & Ghosh, T. (2016). An SVAR Approach to Evaluation of Monetary Policy in India: Solution to the Exchange Rate Puzzles in an Open Economy. *Open Economies Review, 27*(5), 871-893. doi:10.1007/s11079-016-9403-2

Barran, F., Coudert, V., & Mojon, B. (1996). *The transmission of monetary policy in the European countries* (Vol. 3): CEPII.

Bashir, U., Ahmed, M., & Khan, M. A. (2018). *Interest Rate and Economic Growth Nexus in Pakistan: An Investigation using Maximum Entropy Bootstrap Approach.* Paper presented at the 34th Annual Conference of the Pakistan Society of Development Economists (PSDE), Islamabad.

Batu, M. M. (2016). Determinants of private investment: A systematic review. *International Journal of Economics, Finance and Management Sciences, 4*(2), 52-56. doi: 10.11648/j.ijefm.20160402.13

Beck, T., Demirgüç-Kunt, A., & Maksimovic, V. (2005). Financial and legal constraints to growth: does firm size matter? *The Journal of Finance, 60*(1), 137-177.

Beck, T., Levine, R., & Loayza, N. (2000). Finance and the Sources of Growth. *Journal of financial economics, 58*(1-2), 261-300.

Benes, J., & Kumhof, M. (2012). *The Chicago plan revisited*: International Monetary Fund Washington, DC.

Bernanke, B. S. (1986). *Alternative Explanations of the Money-Income Correlation*. Retrieved from www.nber.org/papers/w1842.pdf

Bernanke, B. S., & Gertler, M. (1995). Inside the black box: the credit channel of monetary policy transmission. *Journal of Economic perspectives, 9*(4), 27-48. doi:10.1257/jep.9.4.27

Bessler, D. A., & Lee, S. (2002). Money and prices: US data 1869–1914 (a study with directed graphs). *Empirical Economics, 27*(3), 427-446.

Bessler, D. A., & Yang, J. (2003). The structure of interdependence in international stock markets. *Journal of international money and finance, 22*(2), 261-287.

Bezemer, D., Grydaki, M., & Zhang, L. (2014). *Is financial development bad for growth?* Retrieved from

Bezemer, D., & Zhang, L. (2014). *From Boom to Bust in the Credit Cycle: The Role of Mortgage Credit*: University of Groningen, Faculty of Economics and Business.

Bilquees, F., Mukhtar, T., & Sohail, S. (2012). Dynamic causal interactions of money, prices, interest rate and output in Pakistan. *Journal of Economic Cooperation & Development, 33*(3), 37.

Binswanger, H. P. (1982). Empirical estimation and use of risk preferences: Discussion. *American Journal of Agricultural Economics, 64*(2), 391-393.

Blanchard, O., & Perotti, R. (2002). An empirical characterization of the dynamic effects of changes in government spending and taxes on output. *The Quarterly Journal of Economics, 117*(4), 1329-1368. doi:10.1162/003355302320935043

Blanchard, O. J., & Watson, M. W. (1986). Are business cycles all alike? In *The American business cycle: Continuity and change* (pp. 123-180): University of Chicago Press.

Boivin, J., Kiley, M. T., & Mishkin, F. S. (2010). How has the monetary transmission mechanism evolved over time? In *Handbook of monetary economics* (Vol. 3, pp. 369-422): Elsevier.

Bon, N. V. (2015). Effects of fiscal deficit and money M2 supply on inflation: evidence from selected economies of Asia.

Bouakez, H., & Rebei, N. (2007). Why does private consumption rise after a government spending shock? *Canadian Journal of Economics/Revue canadienne d'économique, 40*(3), 954-979. doi:10.1111/j.1365-2966.2007.00438.x

Briotti, G. (2005). Economic reactions to public finance consolidation: a survey of the literature. *ECB occasional paper*(38).

Burney, N. A., Yasmeen, A., & Niazi, M. K. (1989). Government Budget Deficits and Interest Rates: An Empirical Analysis for Pakistan [with Comments]. *The Pakistan Development Review, 28*(4), 971-980.

Cecchetti, S. G., Mohanty, M., & Zampolli, F. (2011). *Achieving growth amid fiscal imbalances: the real effects of debt.* Paper presented at the Economic Symposium Conference Proceedings.

Céspedes, B., Lima, E., & Maka, A. (2008). Monetary policy, inflation and the level of economic activity in Brazil after the Real Plan: stylized facts from SVAR models. *Revista Brasileira de Economia, 62*(2), 123-160.

Céspedes, B., Lima, E., Maka, A., & Mendonça, M. (2015). *Measuring Monetary Policy Stance in Brazil*. Retrieved from http://repositorio.ipea.gov.br/bitstream/11058/4937/1/DiscussionPaper_160.pdf

Chaitip, P., Chokethaworn, K., Chaiboonsri, C., & Khounkhalax, M. (2015). Money supply influencing on economic growth-wide phenomena of AEC open region. *Procedia Economics and Finance, 24*, 108-115. doi:10.1016/S2212-5671(15)00626-7

Chang, T., & Caudill, S. B. (2005). Financial development and economic growth: the case of Taiwan. *Applied Economics, 37*(12), 1329-1335. doi:10.1080/0003684042000338702

Chaudhry, I. S., Ayub, M., & Akhtar, M. H. (2016). Factors Affecting Domestic Investment in Pakistan: An Empirical Analysis. *Pakistan Journal of Social Sciences (PJSS), 36*(1).

Chaudhry, I. S., Qamber, Y., & Farooq, F. (2012). Monetary policy, inflation and economic growth in Pakistan: Exploring the co-integration and causality relationships. *Pakistan Journal of Commerce and Social Sciences (PJCSS), 6*(2), 332-347.

Checherita-Westphal, C., & Rother, P. (2012). The impact of high government debt on economic growth and its channels: An empirical investigation for the euro area. *European economic review, 56*(7), 1392-1405. doi:10.1016/j.euroecorev.2012.06.007

Cheema, A. S., & Naeem, M. (2019). Credit Channel of Monetary Policy Transmission: Evidence from Pakistan. *Journal of Managerial Sciences, 13*(2).

Choudhri, E. U., Jan, A., & Malik, H. (2015). Monetary Policy in Pakistan: Effectiveness in

Inflation Control and Stabilization. *International Growth centre*.

Chowdhury, A. R. (1988). Monetary policy, fiscal policy and aggregate economic activity: Some further evidence. *Applied Economics, 20*(1), 63-71. doi:10.1080/00036848800000036

Christiano, L. J., Eichenbaum, M., & Evans, C. L. (1996). Identification and the effects of monetary policy shocks. *Financial factors in economic stabilization and growth, 36*.

Christiano, L. J., Eichenbaum, M., & Evans, C. L. (1999). Monetary policy shocks: What have we learned and to what end? *Handbook of macroeconomics, 1*, 65-148.

Chude, N. P., & Chude, D. I. (2016). Impact of broad money supply on Nigerian economic growth. *International Journal of Banking and Finance Research, 2*(1), 46-53.

Clavero, B. (2017). *A contribution to the Quantity Theory of Disaggregated Credit*. Retrieved from

Cushman, D. O., & Zha, T. (1995). *Identifying monetary policy in a small open economy under flexible exchange rates*. Retrieved from https://www.econstor.eu/handle/10419/100814

Cushman, D. O., & Zha, T. (1997). Identifying monetary policy in a small open economy under flexible exchange rates. *Journal of Monetary economics, 39*(3), 433-448. doi:10.1016/S0304-3932(97)00029-9

Dakin, N. J. (2015). *The effects of interest rates on investment spending: An empirical analysis of South Africa.* Masters' thesis, Rhodes University, South Africa, Retrieved from https://core.ac.uk/download/pdf/145055485.pdf

Demiralp, S., & Hoover, K. D. (2003). Searching for the causal structure of a vector autoregression. *Oxford Bulletin of Economics and statistics, 65*, 745-767. doi:10.1046/j.0305-9049.2003.00087.x

Demirgüç-Kunt, A., & Levine, R. (2004). *Financial structure and economic growth: A cross-country comparison of banks, markets, and development*: MIT press.

Di Giovanni, J., & Levchenko, A. A. (2012). Country size, international trade, and aggregate fluctuations in granular economies. *Journal of Political Economy, 120*(6), 1083-1132.

Di Giovanni, J., McCrary, J., & Von Wachter, T. (2009). Following Germany's lead: Using international monetary linkages to estimate the effect of monetary policy on the economy. *The Review of Economics and Statistics, 91*(2), 315-331.

Dingela, S., & Khobai, H. (2017). *Dynamic Impact of Money Supply on Economic Growth in South Africa. An ARDL Approach*. Retrieved from https://mpra.ub.uni-muenchen.de/82539/1/MPRA_paper_82539.pdf

Disyatat, P., & Vongsinsirikul, P. (2003). Monetary policy and the transmission mechanism in Thailand. *Journal of Asian Economics, 14*(3), 389-418. doi:10.1016/S1049-0078(03)00034-4

Douthwaite, R. (2012). Degrowth and the supply of money in an energy-scarce world. *Ecological Economics, 84*, 187-193.

Duchi, F., & Elbourne, A. (2016). Credit supply shocks in the Netherlands. *Journal of Macroeconomics, 50*, 51-71. doi:10.1016/j.jmacro.2016.09.001

Dungey, M., & Pagan, A. (2000). A structural VAR model of the Australian economy. *Economic record, 76*(235), 321-342. doi:10.1111/j.1475-4932.2000.tb00030.x

Ecevit, E., & Kayhan, S. (2011). Impact of exchange rate on monetary policy decisions in an inflation targeting regime: SVAR analysis. *Journal of Money, Investment and Banking, 19*.

Ejaz, M., & Iqbal, J. (2019). *Estimation and Forecasting of Industrial Production Index*. Retrieved from www.sbp.org.pk/publications/wpapers/2018/wp103.pdf

Ellahi, N., & Khan, M. A. (2011). Testing finance growth nexus: an auto regressive distributed lag (ARDL) methodology approach for selected SAARC countries. *South Asian Journal of Management, 18*(2), 76-91.

Fatas, A., & Mihov, I. (2001). *The Effects of Fiscal Policy on Consumption and Employment: Theory and Evidence*. Retrieved from EconPapers.repec.org/RePEc:cpr:ceprdp:2760

Fatima, A., & Iqbal, A. (2003). The relative effectiveness of monetary and fiscal policies: An econometric study. *Pakistan Economic and Social Review*, 93-116.

Feldmann, H. (2006). Government size and unemployment: Evidence from industrial countries. *Public Choice, 127*(3-4), 443-459. doi:10.1007/s11127-005-9003-y

Fisher, I. (1935). *100% money*: Adelphi Publication, New York.

Forhad, A. R., Homaifar, G. A., & Salimullah, A. (2017). Monetary Policy Transmission Effect On The Real Sector Of The Bangladesh Economy: An Svar Approach. *Economia Internazionale/International Economics, 70*(1), 25-46.

Fragetta, M., & Melina, G. (2013). Identification of monetary policy in SVAR models: a data-oriented perspective. *Empirical Economics, 45*(2), 831-844. doi:10.1007/s00181-012-0632-y

Friedman, M. (1968). The role of monetary policy. *American economic review, 58*(1), 1-17.

Galí, J., López-Salido, J. D., & Vallés, J. (2007). Understanding the effects of government spending on consumption. *Journal of the european economic association, 5*(1), 227-270. doi:10.1162/JEEA.2007.5.1.227

Garratt, A., Lee, K., Hashem Pesaran, M., & Shin, Y. (2003). A long run structural macroeconometric model of the UK. *The Economic Journal, 113*(487), 412-455.

Gelb, A. H. (1989). *Financial policies, growth, and efficiency* (Vol. 202): World Bank Publications.

Geng, M. N., & N'Diaye, M. P. (2012). *Determinants of corporate investment in china: Evidence from cross-country firm level data*: International Monetary Fund.

Goodfriend, M., & King, R. G. (1997). The new neoclassical synthesis and the role of monetary policy. *NBER macroeconomics annual, 12*, 231-283.

Gozgor, G. (2013). Stochastic properties of the consumption-income ratios in central and eastern European countries. *Zbornik radova Ekonomskog fakulteta u Rijeci: časopis za ekonomsku teoriju i praksu, 31*(2), 193-207.

Greene, J., & Villanueva, D. (1991). Private investment in developing countries: an empirical analysis. *Staff papers, 38*(1), 33-58.

Gurgul, H., & Lach, Ł. (2012). Financial Development and Economic Growth in Poland in Transition: Causality Analysis. *Czech Journal of Economics and Finance (Finance a uver), 62*(4), 347-367.

Hachicha, A., & Lee, C.-F. (2009). Are structural vars with Long-Run restrictions useful for developing monetary policy strategy in Egypt? *Review of Pacific Basin Financial Markets and Policies, 12*(03), 509-527. doi:10.1142/S0219091509001721

Hailu, D. B., & Debele, F. (2015). The Effect of Monetary Policy on the Private Sector Investment in Ethiopia: ARDL Co-Integration Approach. *Economics, 4*(2), 22-33. doi:10.11648/j.eco.20150402.12

Hameed, I., & Ume, A. (2011). *Impact of monetary policy on gross domestic product (GDP)*. Retrieved from https://mpra.ub.uni-muenchen.de/35562/1/MPRA_paper_35562.pdf

Hamilton, J. (1994). Time series econometrics. *Princeton U. Press, Princeton*.

Hanif, M. N. (2014). *Monetary Policy Experience of Pakistan*. Retrieved from

Hanif, M. N., Iqbal, J., & Malik, M. J. (2013). *Quarterisation of National Income Accounts of Pakistan*. Retrieved from https://mpra.ub.uni-muenchen.de/45334/1/MPRA_paper_45334.pdf

Hasan, R. (2015). Financial development and economic growth: Evidence from a panel study on South Asian countries. *Asian Economic and Financial Review, 5*(10), 1159-1173.

Holmes, A. (1969). Operational constraints on the stabilization of money supply growth. *Controlling Monetary Aggregates*, 65-77.

Hossain, M., & Ibon, M. W. F. (2020). Assessing the Effectiveness of Monetary Policy in Bangladesh. In *Bangladesh's Macroeconomic Policy* (pp. 135-162): Springer.

Huang, Y., Panizza, U., & Varghese, R. (2019). Public debt and private investment. *VOX CEPR Policy Portal*. Retrieved from https://voxeu.org/article/public-debt-and-private-investment

Huber, J. (2014). Modern money theory and new currency theory. *A Comparative Discussion, real-world economics review*(66), 38-57.

Huber, J., & Robertson, J. (2000). *Creating new money: A monetary reform for the information age*: New Economics Foundation London.

Hur, S.-K., Mallick, S., & Park, D. (2014). Fiscal policy and crowding out in developing Asia. *Environment and Planning C: Government and Policy, 32*(6), 1117-1132. doi:10.1068/c12185r

Hussain, A., Muhammad, S. D., Akram, K., & Lal, I. (2009). Effectiveness of government expenditure crowding-in or crowding-out: empirical evidence in case of Pakistan. *European Journal of Economics, Finance and Administrative Sciences*(16).

Hussain, K. (2009). *Monetary policy channels of Pakistan and their impact on real GDP and inflation*. Retrieved from https://www.hks.harvard.edu/sites/default/files/centers/cid/files/publications/fellow_graduate_student_working_papers/041-2.pdf

Hussain, M. E., & Haque, M. (2017). Empirical analysis of the relationship between money supply and per capita GDP growth rate in Bangladesh. *Journal of Advances in Economics and Finance, 2*(1), 54-66. doi:10.22606/jaef.2017.21005

Hussain, S. I. (2014). Monetary transmission mechanism in Pakistan: Credit channel or interest rate channel. *Management and Social Sciences & Economics, 12*(2), 1-19.

Hyder, K., & Ahmed, Q. M. (2004). Why private investment in Pakistan has collapsed and how it can be restored.

Hye, Q. M. A., & Lau, W.-Y. (2018). Does Financial and Trade liberalization Drive Private Investment in Pakistan? *History, 112*, 120. doi:10.20448/journal.501.2018.52.112.120

Idris, M. (2019). Macroeconomic Analysis of Interest Rate and Economic Growth in Nigeria: A Time Series Approach. *International Journal of Finance and Banking Research, 5*(4), 91.

Ihsan, I., & Anjum, S. (2013). Impact of money supply (M2) on GDP of Pakistan. *Global Journal of Management and Business Research*.

Imran, K., & Nishat, M. (2013). Determinants of bank credit in Pakistan: A supply side approach. *Economic Modelling, 35*, 384-390. doi:10.1016/j.econmod.2013.07.022

Jakab, Z. M., Várpalotai, V., & Vonnák, B. (2006). *How does monetary policy affect aggregate demand? A multimodel approach for Hungary*. Retrieved from https://www.econstor.eu/bitstream/10419/83590/1/514562943.pdf

Jalil, A., & Feridun, M. (2011). Impact of financial development on economic growth: empirical evidence from Pakistan. *Journal of the Asia Pacific Economy, 16*(1), 71-80. doi:10.1080/13547860.2011.539403

Jalil, A., & Ma, Y. (2008). Financial development and economic growth: time series evidence from Pakistan and China. *Journal of Economic Cooperation, 29*(2), 29-68. doi:10.1111/j.1749-124X.2008.00140.x

Jalloh, M. (2002). An Analysis of the Macroeconomic Determinants of Private Investment in Sierra Leone. *Addis Ababa University School of Graduate Studies, 1*, 78-81.

Javid, M., & Munir, K. (2010). The price puzzle and monetary policy transmission mechanism in Pakistan: Structural vector autoregressive approach. *The Pakistan Development Review*, 449-460.

Jawaid, S. T., Qadri, F. S., & Ali, N. (2011). Monetary-fiscal-trade policy and economic growth in Pakistan: Time series empirical investigation. *International Journal of Economics and Financial Issues, 1*(3), 133-138.

Ji, Q., & Fan, Y. (2016). How do China's oil markets affect other commodity markets both domestically and internationally? *Finance Research Letters, 19*, 247-254. doi:10.1016/j.frl.2016.08.009

Jones, B., & Bowman, J. (2019). *China's Evolving Monetary Policy Framework in International Context*. Retrieved from https://rba.gov.au/publications/rdp/2019/pdf/rdp2019-11.pdf

Jordà, Ò., Schularick, M., & Taylor, A. M. (2014). Private credit and public debt in financial crises. *FRBSF Economic Letter*, 07.

Jorgenson, D. W. (1963). Capital theory and investment behavior. *The American economic review, 53*(2), 247-259.

Kaldor, N. (1970). The new monetarism. *Lloyds Bank Review, 97*(1), 18.

Kaminsky, G. L., & Reinhart, C. M. (1999). The twin crises: the causes of banking and balance-of-payments problems. *American economic review*, 473-500.

Kaputo, C. C. (2012). *Macroeconomic Policy and Domestic Private Investment: The Case of Zambia, 1980-2008.* Retrieved from http://palevel.unza.zm/handle/123456789/1060

Karim, Z. A., & Karim, B. A. (2014). Interest rates targeting of monetary policy: an open economy SVAR study of Malaysia. *Gadjah Mada International Journal of Business, 16*(1), 1.

Keho, Y. (2019). An econometric analysis of the determinants of private consumption in Cote d'Ivoire. *Theoretical Economics Letters, 9*(4), 947-958. doi:10.4236/tel.2019.94061

Kelikume, I. (2014). Interest Rate Channel of Monetary Transmission Mechanism: Evidence from Nigeria. *The International Journal of Business and Finance Research, 8*(4), 97-107.

Kemal, A., & Arby, M. F. (2004). *Quarterisation of annual GDP of Pakistan*: Pakistan Institute of Development Economics.

Keynes, J. M. (1936). The general theory of interest, employment and money. In: london: MacMillan.

Khan, A. S. R. L. (2020). Exploring the link between Public Investment and long Run Economic Growth. *Public finance Quarterly, 2*, 151. doi:10.35551/PFQ_2020_2_1

Khan, M. A. (2008a). Financial development and economic growth in Pakistan: evidence based on autoregressive distributed lag (ARDL) approach. *South Asia Economic Journal, 9*(2), 375-391. doi:10.1177/139156140800900206

Khan, M. A., & Ahmed, A. (2011). Macroeconomic effects of global food and oil price shocks to the Pakistan economy: A structural vector autoregressive (SVAR) analysis. *The Pakistan Development Review*, 491-511.

Khan, M. A., & Qayyum, A. (2007). *Trade, financial and growth nexus in Pakistan*. Retrieved from http://hdl.handle.net/10419/43428

Khan, M. A., Qayyum, A., Sheikh, S. A., & Siddique, O. (2005). Financial development and economic growth: The case of Pakistan [with Comments]. *The Pakistan Development Review*, 819-837.

Khan, M. H. (2008b). Short run effects of an unanticipated change in monetary policy: Interpreting macroeconomic dynamics in Pakistan. *State Bank of Pakistan Working Paper, 22*.

Khan, R. E. A., & Gill, A. R. (2009). Crowding Out Effect of Public Borrowing: A Case of Pakistan. *Cell, 92*(0345), 8724744.

Khan, S. (2016). *The Dominant Borrower Syndrome: The Case of Pakistan*. Retrieved from www.esocialsciences.org/Download/repecDownload.aspx?fname=A201681613328_20.pdf&fcategory=Articles&AId=11218&fref=repec

Khan, S., Pasha, F., Rehman, M., & Choudhary, A. (2016). *The Dominant Borrower Syndrome: The Case of Pakistan*. Retrieved from http://www.sbp.org.pk/publications/wpapers/2016/wp77.pdf

Khundrakpam, J. K. (2012). *Estimating Impacts of Monetary Policy on Aggregate Demand in India*. Retrieved from mpra.ub.uni-muenchen.de/50902/1/MPRA_paper_50902.pdf

Kim, S., & Roubini, N. (2000). Exchange rate anomalies in the industrial countries: A solution with a structural VAR approach. *Journal of Monetary economics, 45*(3), 561-586. doi:10.1016/S0304-3932(00)00010-6

King, R. G., & Levine, R. (1993a). Finance and growth: Schumpeter might be right. *The Quarterly Journal of Economics, 108*(3), 717-737.

King, R. G., & Levine, R. (1993b). Finance, entrepreneurship and growth. *Journal of Monetary economics, 32*(3), 513-542.

Kohn, D. L. (2009). Monetary policy and asset prices revisited. *Cato J., 29*, 31.

Krouso, A. I. O., Dinç, D. T., Gökmen, A., & Yazıcı, M. (2019). Money supply, inflation and economic growth in Libya. *African Journal of Economic and Sustainable Development, 7*(2), 89-119. doi:10.1504/AJESD.2019.103561

Kubo, A. (2009). The effects of a monetary policy shock: Evidence from India. *Economic Bulletin, 29*(3), 1530-1541.

Kumhof, M. M., & Tanner, M. E. (2005). *Government debt: A key role in financial intermediation*: International Monetary Fund.

Kuttner, K. N., & Mosser, P. C. (2002). The monetary transmission mechanism: some answers and further questions. *Federal Reserve Bank of New York Economic Policy Review, 8*(1), 15-26.

Lauritzen, S. L. (2001). Causal inference from graphical models. *Complex stochastic systems*, 63-107.

Lavoie, M. (1984). The endogenous flow of credit and the post Keynesian theory of money. *Journal of Economic Issues, 18*(3), 771-797. doi:10.1080/00213624.1984.11504274

Leamer, E. E. (1985). *Vector autoregressions for causal inference?* Paper presented at the Carnegie-rochester conference series on Public Policy.

Lee, K.-S., & Werner, R. A. (2018). Reconsidering monetary policy: An empirical examination of the relationship between interest rates and nominal GDP growth in the US, UK, Germany and Japan. *Ecological Economics, 146*, 26-34.

Levine, R. (2005). Finance and growth: theory and evidence. *Handbook of economic growth, 1*, 865-934.

Levine, R., Loayza, N., & Beck, T. (2000). Financial intermediation and growth: Causality and causes. *Journal of Monetary economics, 46*(1), 31-77.

Litterman, R. B., & Weiss, L. (1983). *Money, real interest rates, and output: A reinterpretation of postwar US data* (0898-2937). Retrieved from https://www.nber.org/papers/w1077.pdf

MacKinnon, J. G., Haug, A. A., & Michelis, L. (1999). Numerical distribution functions of likelihood ratio tests for cointegration. *Journal of applied Econometrics, 14*(5), 563-577. doi:10.1002/(SICI)1099-1255(199909/10)14:5<563::AID-JAE530>3.0.CO;2-R

Madni, G. R. (2014). Role of fiscal policy for private investment in Pakistan. *International Journal of Economic Sciences and Applied Research, 7*(2), 139-152.

Mahmood, H., Waheed, A., & Khalid, S. (2017). The impact of monetary strategies on economic growth: An empirical analysis for Pakistan. *Asian Journal of Empirical Research, 7*(10), 260-268.

Maitra, B. (2011). Anticipated Money, Unanticipated Money and Output Variations in Singapore. *Journal of Quantitative Economics, 9*(1), 118-133.

Mangla, I. U., & Hyder, K. (2017). Global Uncertainty and Monetary Policy Effectiveness in Pakistan. *The Lahore Journal of Economics, 22*, 111-134.

Mbaye, E. Z. (2014). *Determinants of domestic private investments in Kenya.* University of Nairobi, Retrieved from http://erepository.uonbi.ac.ke/handle/11295/75611

McKinnon, R., & Shaw, E. (1973). Financial deepening in economic development. *Washington, Brookings Institution*.

Minsky, H. P. (1992). The financial instability hypothesis. *The Jerome Levy Economics Institute Working Paper*(74).

Mishkin, F. S. (1996). *The channels of monetary transmission: lessons for monetary policy* (0898-2937). Retrieved from https://www.nber.org/papers/w5464.pdf

Mizon, G. E. (1995). Progressive Modeling of Macroeconomic Time Series The LSE Methodology. In *Macroeconometrics* (pp. 107-180): Springer.

Mohanty, D. (2012). *Evidence of interest rate channel of monetary policy transmission in India.* Paper presented at the Second International Research Conference at the Reserve Bank of India, February.

Moinuddin. (2007). Choice of Monetary Policy Regime: Should SBP Adopt Inflation Targeting. *State Bank of Pakistan Working Paper, 19*.

Molapo, S., & Damane, M. (2015). Determinants of private investment in Lesotho. *European Scientific Journal, 11*(34), 473-491.

Moneta, A. (2004). Identification of monetary policy shocks: a graphical causal approach. *Notas Económicas*(20).

Mountford, A., & Uhlig, H. (2009). What are the effects of fiscal policy shocks? *Journal of applied Econometrics, 24*(6), 960-992. doi:10.1002/jae.1079

Muhammad, S. D., Lakhan, G. R., Zafar, S., & Noman, M. (2013). Rate of Interest and its Impact on Investment to the Extent of Pakistan. *Pakistan Journal of Commerce and Social Sciences (PJCSS), 7*(1), 91-99.

Muhammad, S. D., Wasti, S. K. A., Hussain, A., & Lal, I. (2009). An empirical investigation between money supply government expenditure, output & prices: The Pakistan evidence. *European Journal of Economics, Finance and Administrative Sciences*(17), 60.

Muhammadpour, B., Behravan, N., & Espahbodi, S. (2012). Study of Association between Monetary Policy and GDP: An Econometric Perspective in Malaysia. *Australian Journal of Basic & Applied Sciences, 6*(8), 307-315.

Mukherjee, S., & Bhattacharya, R. (2011). Inflation targeting and monetary policy transmission mechanisms in emerging market economies. *IMF Working Papers*, 1-27.

Mukhtar, T., & Younas, M. Z. (2019). Monetary Policy Transmission Mechanism of Pakistan: Evidence from Bank Lending and Asset Price Channels. *Asian Journal of Economic Modelling, 7*(3), 121-139.

Munir, K., & Qayyum, A. (2014). Measuring the effects of monetary policy in Pakistan: a factor-augmented vector autoregressive approach. *Empirical Economics, 46*(3), 843-864. doi:10.1007/s00181-013-0702-9

Munir, K., & Riaz, N. (2019). Macroeconomic effects of fiscal policy in Pakistan: a disaggregate analysis. *Applied Economics, 51*(52), 5652-5662. doi:10.1080/00036846.2019.1616074

Munir, R., Awan, R. U., & Hussain, Z. (2010). Investment, savings, interest rate and bank credit to the private sector nexus in Pakistan. *International Journal of Marketing Studies, 2*(1), 140.

Mushtaq, S., & Siddiqui, D. A. (2016). Effect of interest rate on economic performance: evidence from Islamic and non-Islamic economies. *Financial Innovation, 2*(1), 9.

Mutinda, D. M. (2014). The effect of lending interest rate on economic growth in Kenya. *A Research Project, The University Of Nairobi, Kenya*.

Naa-Idar, F., Ayentimi, D. T., & Frimpong Magnus, J. (2012). A time series analysis of determinants of private investment in Ghana (1960-2010). *Journal of Economics and Sustainable Development, 3*(13).

Naqvi, N. (2018). Finance and industrial policy in unsuccessful developmental states: The case of Pakistan. *Development and Change, 49*(4), 1064-1092. doi:10.1111/dech.12424

Nasir, S., & Khalid, M. (2004). Saving-investment behaviour in Pakistan: An empirical investigation *The Pakistan Development Review, 43*(4 Part II), 665-682.

Nizamani, A. R., Gilal, M. A., Khushik, A. G., Shah, S. M., & Abid, A. (2017). External Shocks and the Macroeconomic Response of Small Open Economy: A Structural-VAR Approach for Pakistan. *Asian Journal of Scientific Research, 10*(4), 336-344. doi:10.3923/ajsr.2017.336.344

Nizamani, A. R., Karim, Z. A., Zaidi, M. A. S., & Khalid, N. (2016). The Effectiveness of Monetary Policy in Small Open-Economy: An SVAR Study for Pakistan. *International Journal of Economics & Management, 10*(2).

Ogunmuyiwa, M., & Ekone, A. F. (2010). Money supply-economic growth nexus in Nigeria. *Journal of Social Sciences, 22*(3), 199-204. doi:10.1504/AJESD.2019.103561

Ono, S. (2013). The effects of foreign exchange and monetary policies in Russia. *Economic Systems, 37*(4), 522-541. doi:10.1016/j.ecosys.2013.03.003

Onwumere, J., Okore, O. A., & Ibe, I. G. (2012). The impact of interest rate liberalization on savings and investment: Evidence from Nigeria. *Research journal of Finance and Accounting, 3*(10), 130-136.

Otolorin, G. E., & Akpan, P. E. (2017). Effectiveness of Monetary Policy Transmission Channels in a Recessed Economy. *Otolorin EG and Akpan EP (2017) Effectiveness of Monetary Policy Transmission Channels in a Recessed Economy: Uyo Journal of Sustainable Development, 2*(2), 80-98.

Pakistan Economic Survey 2018-19. Retrieved from http://www.finance.gov.pk/survey/chapters_19/Economic_Survey_2018_19.pdf

Pakistan Economic Survey 2019-20. Retrieved from http://www.finance.gov.pk/survey_1920.html

Park, H., & Oh, C. J. (2017). Interdependency of Business Cycle between Turkey and the Selected Central Asian Countries. *Bilig, 81*, 79.

Pattanaik, S., Behaa, H., Kavendiya, S., Das, A., Shrivastava, A., & Joshi, H. (2013). *Real interest rate impact on investment and growth–what the empirical evidence for India suggests.* Paper presented at the DEPR Annual Research Conference. Kolkata: Department of Communication, Reserve Bank of India.

Pearl, J. (2000a). Causal inference without counterfactuals: Comment. *Journal of the American Statistical Association, 95*(450), 428-431.

Pearl, J. (2000b). Causality: Models, reasoning and inference cambridge university press. *Cambridge, MA, USA, 9*, 10-11.

Peersman, G., & Smets, F. (2001). *The monetary transmission mechanism in the euro area: more evidence from VAR analysis*. Retrieved from https://www.econstor.eu/bitstream/10419/152525/1/ecbwp0091.pdf

Pelipas, I., Shymanovich, G., & Kirchner, R. (2016). International linkages and external shocks: A Global VAR perspective for Belarus. Evidence from different model specifications. *Policy Study PS/02/2016, IPM Research Centre*.

Perera, A., & Wickramanayake, J. (2013). *Monetary transmission in the emerging country context: The case of Sri Lanka.* Paper presented at the Central Bank of Sri Lanka International Research Conference.

Petrović, P., Arsić, M., & Nojković, A. (2020). Increasing public investment can be an effective policy in bad times: Evidence from emerging EU economies. *Economic Modelling*. doi:10.1016/j.econmod.2020.02.004

Pham, B. T., & Sala, H. (2020). The macroeconomic effects of oil price shocks on Vietnam: Evidence from an over-identifying SVAR analysis. *The Journal of International Trade & Economic Development*, 1-27. doi:10.1080/09638199.2020.1762710

Prabheesh, K., & Rahman, R. E. (2019). Monetary Policy Transmission and Credit Cards: Evidence from Indonesia. *Buletin Ekonomi Moneter dan Perbankan, 22*(2), 137-162. doi:10.21098/bemp.v22i2.1039

Rafiq, M. A., & Kazmi, S. M. (2017). Impact of Sectorial Value Addition on the Growth on the Industrialied countries (Panel data Analysis of three Industrialized Countries). *Journal of ISOSS, 3*(1), 63-72.

Raghavan, M., Silvapulle, P., & Athanasopoulos, G. (2012). Structural VAR models for Malaysian monetary policy analysis during the pre-and post-1997 Asian crisis periods. *Applied Economics, 44*(29), 3841-3856. doi:10.1080/00036846.2011.581360

Rahman, A., Khan, M. A., & Charfeddine, L. (2020). Financial development–economic growth nexus in Pakistan: new evidence from the Markov switching model. *Cogent Economics & Finance, 8*(1), 1716446. doi:10.1080/23322039.2020.1716446

Rahman, A. A. (2015). External shock, monetary policy and the domestic economy: A structural VAR approach for Bangladesh. *The Journal of Developing Areas, 49*(6), 305-320. doi:10.1353/jda.2015.0081

Rahman, M. H. (2004). Financial development—economic growth nexus: A case study of Bangladesh. *The Bangladesh Development Studies, 30*(3/4), 113-128.

Rahman, M. U., Ullah, I., & Jebran, K. (2015). Effects of government expenditure on private investment: Evidence from Pakistan. *Journal of Basic and Applied Scientific Research, 5*(2), 14-23.

Ramey, V. A., & Zubairy, S. (2018). Government spending multipliers in good times and in bad: evidence from US historical data. *Journal of Political Economy, 126*(2), 850-901. doi:10.1086/696277

Rana, E., & Abid, R. (2009). Crowding out effect of public borrowing: A Case of Pakistan, MPRA Paper No. 16292 presented in 8th National Research Conference on Management and Computer Sciences. 29th January 2009 at

Szabist Islamabad, Pakistan. Available athttp. *mpra. ub. unimuenchen. de/16292*.

Rashid, A., & Ahmad, I. (2005). Public/private investment linkages: A multivariate cointegration analysis. *The Pakistan Development Review*, 805-817.

Rashid, A., & Jehan, Z. (2014). The response of macroeconomic aggregates to monetary policy shocks in Pakistan. *Journal of Financial Economic Policy*. doi:10.1108/JFEP-04-2013-0016

Rehman, A., & Cheema, A. R. (2013). Financial development and real sector growth in Pakistan. *Interdisciplinary Journal of Contemporary Research in Business, 5*(1), 618-636.

Roberts, J. M. (1998). Inflation expectations and the transmission of monetary policy. *Federal Reserve Board FEDS Paper*(98-43).

Robinson, J. (2013). *The accumulation of capital*: Palgrave Macmillan.

Robinson, J. (2016). *The accumulation of capital*: Springer.

Romar, D. (2012). *Advanced Macroeconomics* (4th ed.). New York: McGraw-Hill.

Romer, C. D., & Romer, D. H. (1989). Does monetary policy matter? A new test in the spirit of Friedman and Schwartz. *NBER macroeconomics annual, 4*, 121-170.

Romero-Avila, D., & Strauch, R. (2008). Public finances and long-term growth in Europe: Evidence from a panel data analysis. *European Journal of Political Economy, 24*(1), 172-191. doi:10.1016/j.ejpoleco.2007.06.008

Rousseau, P. L., & Wachtel, P. (2011). What is happening to the impact of financial deepening on economic growth? *Economic inquiry, 49*(1), 276-288. doi:10.1111/j.1465-7295.2009.00197.x

Saeed, N., Hyder, K., Ali, A., & Ahmad, E. (2006). The Impact of Public Investment on Private Investment: A Disaggregated Analysis [with Comments]. *The Pakistan Development Review*, 639-663.

Sakr, M. K. (1993). *Determinants of private investment in Pakistan*: International Monetary Fund.

Salahuddin, M., Islam, R., & Salim, S. A. (2009). Determinants of investment in Muslim developing countries: an empirical investigation. *International Journal of Economics and Management, 3*(1), 100-129.

Sargent, T. J., & Sims, C. A. (2012). Empirical macroeconomics. *The Indian Economic Journal, 59*(4), 3-33.

Schclarek, A. (2007). Fiscal policy and private consumption in industrial and developing countries. *Journal of Macroeconomics, 29*(4), 912-939. doi:10.1016/j.jmacro.2006.03.002

Schumpeter, J. A. (1934). The Theory of Economic Development, An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle, Cambridge, Mass.

Scutaru, C., Saman, C., & Pauna, B. (2015). The dynamics of household consumption in romania during economic crisis. *Procedia Economics and Finance, 22*, 820-827. doi:10.1016/S2212-5671(15)00316-0

Shaheen, R. (2020). Credit market conditions and impact of monetary policy in a developing economy context. *International Economics and Economic Policy*, 1-17. doi:10.1007/s10368-020-00461-7

Shaheen, S., Awan, M. S., Waqas, M., & Aslam, M. A. (2011). *Financial Development, International Trade and Economic Growth: Empirical Evidence from Pakistan*. Retrieved from https://mpra.ub.uni-muenchen.de/32876/

Shokr, M. A., Karim, Z. A., & Zaidi, M. A. S. (2019). Monetary policy and macroeconomic responses: non-recursive SVAR study of Egypt. *Journal of Financial Economic Policy*. doi:10.1108/JFEP-07-2018-0103

Sims, C. A. (1972). Money, income, and causality. *The American economic review, 62*(4), 540-552.

Sims, C. A. (1980). Macroeconomics and reality. *Econometrica: journal of the Econometric Society*, 1-48.

Sims, C. A. (1986). Are forecasting models usable for policy analysis? *Quarterly Review*(Win), 2-16.

Sims, C. A. (1992). Interpreting the macroeconomic time series facts: The effects of monetary policy. *European economic review, 36*(5), 975-1000. doi:10.1016/0014-2921(92)90041-T

Sims, C. A., & Zha, T. (2006). Does monetary policy generate recessions? *Macroeconomic Dynamics, 10*(2), 231-272. doi:

10.1017/S136510050605019X

Soddy, F. (1926). Virtual wealth and debt: the solution of the economic paradox. In: George Allen & Unwin, London.

Spirtes, P., Glymour, C. N., Scheines, R., & Heckerman, D. (2000). *Causation, prediction, and search*: MIT press.

Spirtes, P., Scheines, R., Glymour, C., & Meek, C. (1993). *TETRAD II. Documentation for Version 2.2*. Retrieved from

Stiglitz, J. E. (2011). *A Balanced Debate about Reforming Macroeconomics*. Paper presented at the iIMFdirect, The International Monetary Fund's Global Economic Forum.

Stock, J. H., & Watson, M. W. (2001). Vector autoregressions. *Journal of Economic perspectives, 15*(4), 101-115.

Subagyo, A., & Witjaksono, A. (2017). Impact of Some Overseas Monetary Variables on Indonesia: SVAR Approach. *Economics, 5*(2), 117-123. doi:10.1515/eoik-2017-0027

Sutherland, D., & Hoeller, P. (2012). Debt and macroeconomic stability: An overview of the literature and some empirics.

Svensson, L. E. (1999). *Monetary policy issues for the Eurosystem* (0898-2937). Retrieved from https://www.nber.org/papers/w7177.pdf

Swanson, N. R., & Granger, C. W. (1997). Impulse response functions based on a causal approach to residual orthogonalization in vector autoregressions. *Journal of the American Statistical Association, 92*(437), 357-367. doi:10.1080/01621459.1997.10473634

Taylor, J. B. (1995). The monetary transmission mechanism: an empirical framework. *Journal of Economic perspectives, 9*(4), 11-26.

Tobin, J. (1965). Money and economic growth. *Econometrica: journal of the Econometric Society*, 671-684. doi:10.2307/1910352

Tobin, J. (1970). Money and income: post hoc ergo propter hoc? *The Quarterly Journal of Economics*, 301-317.

Tokuoka, K. (2012). *Does the Business Environment Affect Corporate Investment in India?* : International Monetary Fund.

Urbanovský, T. (2017). Granger Causalities Between Interest Rate, Price Level, Money Supply and Real Gdp in the Czech Republic. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis, 65*(2), 745-757.

Usman, M., & Miraj-ul-Haq. (2016). Growth Effects of Fiscal and Monetary Policies in Pakistan. *The Pakistan Development Review*, 529-552.

Vinayagathasan, T. (2013). Monetary policy and the real economy: A Structural VAR Approach for Sri Lanka. *National Graduate Institute for Policy Studies, 13*(13), 1-31.

Walsh, C. E. (2017). *Monetary theory and policy*: MIT press.

Werner, R. A. (1997). Towards a new monetary paradigm: A quantity theorem of disaggregated credit, with evidence from Japan. *Kredit und Kapital, 30*(2), 276-309.

Werner, R. A. (2005). *New Paradign in Macroeconomics* (Vol. 213): Springer.

Werner, R. A. (2009). Applying the Quantity Theory of Credit: The role of the ECB in the propagation of the European financial and sovereign debt crisis and the policy implications. *link at: www2. euromemorandum. eu/uploads/werner_ qtc_ ecb_and_policy. pdf*.

Werner, R. A. (2012). Towards a new research programme on 'banking and the economy'—Implications of the Quantity Theory of Credit for the prevention and resolution of banking and debt crises. *International Review of Financial Analysis, 25*, 1-17.

Woo, J., & Kumar, M. S. (2015). Public debt and growth. *Economica, 82*(328), 705-739. doi::10.1111/ecca.12138

Yien, L. C., Abdullah, H., & Azam, M. (2017). Monetary Policy Inclusive Growth: Empirical Evidence from Malaysia. *International Journal of Academic Research in Accounting, Finance and Management Sciences, 7*(1), 225-235.

Yıldırım, M. O., & Yıldırım, A. E. (2017). The Influence of Consumption and Investment on Unemployment in Turkey: A Svar Approach. *Ekonomika (Economics), 96*(1), 74-92. doi:10.15388/Ekon.2017.1.10???

Younus, S. (2004). The impact of monetary policy on the bank portfolio in Bangladesh. *Bank Parikrama, 27*, 29.

Zaheer, S., Khaliq, F., & Rafiq, M. (2017). Does government borrowing crowd out private sector credit in Pakistan. *State Bank of Pakistan, Working paper, 83*. doi:: 10.20547/jfer1904203

Zaheer, S., Khaliq, F., & Rafiq, M. (2019). Does government borrowing crowd out private sector credit in Pakistan. *Journal of Finance & Economics Research, 4*(2), 30-41. doi:10.20547/jfer1904203

Zaidi, M. A. S., & Fisher, L. A. (2010). Monetary policy and foreign shocks: A SVAR analysis for Malaysia. *Korea and the world economy, 11*(3), 527-550.

Zang, H., & Kim, Y. C. (2007). Does financial development precede growth? Robinson and Lucas might be right. *Applied Economics Letters, 14*(1), 15-19. doi:10.1080/13504850500425469

Zapodeanu, D., & Cociuba, M. I. (2010). Linking money supply with the gross domestic product in Romania. *Annales Universitatis Apulensis: Series Oeconomica, 12*(1), 501.