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# Monetary Policy Transmission in Bangladesh: Evaluating the Most Effective Channels

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**Abstract**

*Influencing inflation, employment, and economic growth in aggregate terms, monetary policy is a crucial strategy to govern overall demand within an economy and is sometimes regarded as the prime instrument for maintaining macroeconomic stability. The research intends to analyze the operational framework of monetary transmission mechanisms and find out the best important channel through which monetary policy affects Bangladesh economy. It employs a comprehensive time-series data from 1972 to 2023. The application of vector autoregression models and causal decomposition via variance helps in detailing the dynamic interlinkages among these monetary channels. It thus helps in analyzing the impact of monetary policy on economic variables and the relative importance of different channels in macroeconomic outcomes. Thus, it was found that Bangaldesh's overall monetary policy operation generally functions using the exchange rate channel as the main mechanism of action. Policy shocks made by the central bank in interest rates are better transmitted to the economy through exchange rate changes that affect trade balances, import costs, foreign capital flows, and national competitiveness. The results highlight the necessity of maintaining a well-monitored exchange rate policy to optimize the effectiveness of monetary interventions. Policymakers must focus on exchange rate stability to enhance economic resilience, mitigate inflationary pressures from imported goods, and foster sustainable growth.*

***Keywords:*** *Monetary Policy, Exchange Rate Channel, Macroeconomic Stability, Monetary Transmission Mechanism*

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## 1. INTRODUCTION

The public sector plays a crucial role in economic management through its three primary functions: allocation, distribution, and stabilization. While allocation and distribution contribute significantly to resource efficiency and equity, stabilization is particularly vital for ensuring long-term economic sustainability. The effectiveness of stabilization policies largely depends on the use of monetary policy instruments, which are essential for maintaining economic stability and fostering growth. Central banks, as the primary monetary authorities, use various tools to regulate the money supply and interest rates, ensuring that inflation remains under control and that economic growth is sustained (Hun et al., 2024; Bloch, 2020; Ahmed et al., 2011). Among the multiple objectives of monetary policy, price stability and economic growth are universally prioritized by central banks. Price stability is critical for maintaining public confidence in the economy, preserving the purchasing power of money, and preventing inflationary or deflationary spirals. Simultaneously, fostering economic growth through a well-managed monetary framework supports investment, employment, and overall economic prosperity. The money transmission mechanism plays a key role in this process by illustrating how changes in the money supply impact GDP growth through different channels. These transmission channels vary across countries due to differences in financial structures, institutional frameworks, and economic conditions, making monetary policy implementation a complex yet crucial aspect of economic governance (Mohanty, 2012; Omay, 2022).

A well-designed monetary policy framework is essential for achieving the broader objectives of economic policy. The monetary authority establishes this framework to ensure macroeconomic stability, control inflation, and promote sustainable growth. Targeting inflation through monetary policy has become a common approach in many economies, as it provides a structured and transparent means of achieving price stability. In addition, monetary policy adjustments influence credit availability, investment decisions, and consumption patterns, further shaping economic performance. Given the dynamic nature of global markets, the effectiveness of monetary policies depends on their adaptability to

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changing economic conditions and their ability to address both domestic and external shocks. The monetary transmission mechanism describes the pathways through which monetary policy impacts key macroeconomic indicators, including price levels, employment rates, and overall economic output. This mechanism demonstrates how adjustments in monetary policy tools influence the broader economy by shaping inflationary trends, aggregate demand, and long-term economic expansion (Akani, 2017; Khan, 2020; Zhang, 2021; Singh et al., 2024). The effectiveness of monetary policy transmission is highly dependent on the structural composition of a country's financial system, the regulatory strategies adopted by its central bank, and prevailing macroeconomic conditions. Different economies may experience varying degrees of responsiveness to monetary policy interventions due to differences in financial market development, institutional frameworks, and liquidity conditions. Monetary policy operates through several distinct channels, each playing a crucial role in determining how policy changes are translated into real economic effects. These channels include the interest rate channel, which affects borrowing and lending behavior; the exchange rate channel, which influences trade balances and competitiveness; the asset price channel, which impacts investment and wealth accumulation; and the credit channel, which determines the availability of loans to businesses and consumers. Understanding the relative strength of each channel is essential for policymakers to design effective monetary strategies that ensure price stability, support economic growth, and maintain financial stability. Given the dynamic nature of financial markets, continuous assessment of the transmission mechanism is necessary to enhance the efficiency of monetary policy and adapt to evolving economic challenges.

The monetary transmission mechanism is divided into two primary components. The first involves neoclassical channels, which assume that financial markets are efficient and that the transmission of monetary policy operates first by adjustments of asset prices and returns on financial instruments. The different channels considered under this category are asset price channel, interest rate channel, and exchange rate channel. Changes in these channels create a connection between monetary policy changes on borrowing costs, capital flows, and consumption decisions. The second component consists of the so-called non-neoclassical channels, which recognize imperfections in the financial markets. These credit channels stress how changes in bank lending behavior and financial constraints modify the ability of businesses and consumers to access credit. However, in economies with lesser-developed financial markets, availability of credit plays an important role in the transmission of these monetary policies (Senturk & Ali, 2021; Iqbal & Raza, 2018). Thus, these channels transmit the macroeconomic effects of monetary policy differently across countries on the basis of central bank policies, financial systems, and economic situations (Baig, 2009). Now when interest rates are changed by Central Banks, they adjust asset prices, which in turn affect wealth effects and aggregate consumption. On another dimension, the higher interest rates appreciate the value of the currency, which then affects net exports, aggregate demand and output. These changes also influence the spending pattern, saving behavior and investment of households and firms, ultimately affecting the overall performance of the economy (Mohanty, 2012; Mahmood & Aslam, 2018; Rousssel et al., 2021). Monetary Transmission Mechanism actions are, firstly, to explain the different operation dimensions of monetary policy under the economy, and secondly, through which tool policymakers stabilize the macroeconomic positions. If monetary transmission is understood, then policymakers can evolve specific strategies to fast-track economic stability and growth. The ideal monetary policy framework ensures that real economic variables are effectively influenced by monetary variables, enhancing economic resilience and sustainability (Boivin et al., 2010; Kabir & Rashid, 2019; Omri, 2022). The country's central bank implements monetary policy to achieve key economic objectives. Monetary policy employs various instruments to ensure the stability of monetary variables such as money supply, interest rates, bank credit, and exchange rates. These monetary instruments are strategically employed to achieve key economic objectives, such as maintaining full employment, stabilizing inflation, managing exchange rates, and fostering sustainable economic growth (Sana, 2022; Iqbal & Shahzad, 2020; Serrani, 2024). The process of designing and implementing monetary policy is closely linked to the monetary transmission mechanism, which serves as a crucial framework guiding central banks in their decision-making processes (Taylor, 2002). This mechanism outlines how policy actions influence economic conditions by affecting credit availability, interest rate levels, and overall financial liquidity. Through adjustments in policy rates, reserve requirements, and open market operations, central banks regulate money supply dynamics, which in turn impact consumer spending, investment activity, and capital flows. Effective monetary policies ensure that economic fluctuations are managed efficiently, preventing excessive inflationary pressures while promoting long-term growth and financial sector stability. Furthermore, the role of central banks extends beyond controlling inflation to mitigating financial crises and ensuring market confidence. By carefully calibrating monetary interventions, they help sustain macroeconomic equilibrium, enhance investor confidence, and create a conducive environment for economic expansion. Given the complexities of global financial markets, continuous evaluation of monetary strategies is essential to optimize their impact on economic performance and address emerging financial challenges (Hussain, 2014; Audi & Al Marsi, 2024).

Research findings suggest that monetary transmission mechanisms significantly impact price levels, investment spending, and aggregate output. The effectiveness of these mechanisms in transmitting monetary policy decisions to real economic variables has made them a crucial area of research in macroeconomics. However, in the context of Bangladesh, empirical studies on monetary transmission remain limited. Despite the growing significance of understanding how monetary policy impacts the economy, there is a lack of comprehensive research examining whether the effects of different monetary transmission channels have changed over time in Bangladesh. Most prior studies in the country have focused solely on determining whether specific transmission channels function effectively, rather than analyzing their long-term evolution and relative efficiency. The scarcity of empirical research in this area highlights a gap in the literature, necessitating further investigation into the role of monetary transmission mechanisms in Bangladesh. Addressing this gap is essential for designing effective monetary policies that enhance economic stability and growth. A more detailed examination of

monetary transmission mechanisms will provide valuable insights into the efficiency of various channels and their responsiveness to changing economic conditions. Understanding these dynamics will allow policymakers to refine monetary policy strategies, optimize transmission channels, and ensure that macroeconomic objectives are achieved more effectively.

## 2. LITERATURE REVIEW

There are numerous empirical studies on monetary transmission mechanisms, each highlighting different effects and characteristics. While many studies have found significant and positive outcomes, some have indicated negative or less effective results. Some researchers have taken an aggregated approach to examine monetary transmission mechanisms, while others have conducted separate analyses of individual transmission channels. These studies contribute to a broader understanding of how monetary policy decisions influence macroeconomic variables such as inflation, output, and financial stability across different economies. Hayat et al. (2022) explored the role of monetary policy in managing aggregate demand and assessed the effectiveness of various channels within the monetary transmission mechanism. Their study aimed to identify the primary transmission channels in Pakistan using vector autoregressions, impulse response functions, and variance decomposition. The study covered the period from 1975 to 2015 and examined the interest rate channel, asset price channel, credit channel, and exchange rate channel. The findings confirmed that all four channels significantly contribute to the monetary transmission process in Pakistan, highlighting the diverse pathways through which monetary policy influences economic variables.

Emmanuel et al. (2022) conducted an in-depth analysis of how mobile money influences the effectiveness of Ghana's monetary policy. Utilizing monthly data spanning from 2012 to 2018, the study employed a structural vector autoregression (SVAR) model, where the output gap was considered the dependent variable. Key explanatory factors included short-term interest rates, inflation rates, nominal exchange rates, and both foreign and domestic price levels. The findings revealed that the rapid expansion of mobile money services weakened the transmission of monetary policy, suggesting that traditional policy tools may become less effective in regulating economic activity. This outcome underscores the necessity for Ghana's monetary authorities to integrate mobile money trends into their policy framework to sustain economic stability and control inflationary pressures. Similarly, Dang and Dang (2021), who studied the relationship of bank diversification with monetary policy transmission specifically through the bank lending channel, reviewed data from Vietnamese commercial banks over the sample period ranging from 2008 to 2018. It comprised a total of 320 observations, which included 30 financial institutions. Their study actually put it on record that the kind of diversification strategies that banks adopted affected the way changes in monetary policy translated into credit availability, hence affecting conditions subsequent to that general level in the economy. Such findings underscore that monetary transmission mechanisms are changing, especially for some countries undergoing rapid financial innovations and structural transformation in banking. Some future studies should look into how digital financial services and banking diversification redefine the effectiveness of monetary policies across different economic environments. The findings showed that monetary transmission through the bank lending channel was diminished at more nontraditional banking practices by the sampled banks. This indicates that increased diversification in banking activities may reduce the direct impact of monetary policy on lending behavior, requiring an adjustment of monetary strategies to accommodate the transformations in banking structures.

Nicholas (2021) discussed monetary policy effectiveness and housing cycles, establishing a link between housing prices and banks' lending behavior. The analysis was conducted on monthly data for 31 countries from February 2020 to October 2020. The findings reveal that the recession set in by COVID-19 hardly transmitted expansionary monetary policy. The very fact that housing markets started acting up suggests that housing market disruptions weakened the traditional transmission mechanism of monetary policy, particularly that of interest rate workings. An asymmetric assessment of the effects of monetary policy on output fluctuations was rendered by Manuchehr (2020). These authors obtained data from nine nations over the period between 1987 and 2019, asserting contractionary monetary policy is relatively more effective in influencing economic activity than expansionary policy. It was argued thus: contractionary policies are good at containing the rampancy of inflation and excessive credit growth, while expansionary policies have a limited effect in promoting positive output growth. In this way, the study adds to the discussion on the effectiveness of monetary policy regarding different economic conditions. Keyra (2018) assessed the effectiveness of the direct and indirect tools of monetary policy in Barbados, Jamaica, Trinidad, and Tobago. The study finds that the transmission of changes in policy interest rates in these economies were weak because of higher financial liquidity. Furthermore, the study highlighted that price stability was not sufficiently achieved through short-term interest rate adjustments alone. The findings also indicated that central banks in these countries relied on a combination of direct and indirect monetary policy tools to stabilize economic conditions, reflecting the complexities of monetary transmission in small open economies. In his 2018 research, Iwan looked at the channels of monetary transmission mechanisms in Indonesia and their impact on economic stability, with a view to determine which of the channels had the most significant impact on the behavior of key macroeconomic variables, such as output and price stability. It was found that among all channels, the interest rate was the most dominant and effective channel in orchestrating economic activities, in that the authority's changes to policy rates significantly influenced borrowing costs, investment choices, and consumer spending patterns. On the other hand, the exchange rate channel, asset price channel, and credit channel generally contributed very little to the communication of monetary policy. That these other channels play such a limited role suggests that Indonesia's financial structure is relatively sensitive to interest rate adjustments, which complements the fact that the central bank heavily depends on interest rate policies in steering inflationary dynamics and economic stability. The findings also encourage ongoing evaluation of the

effectiveness of the monetary architecture in guiding the design of policies amid a dynamic financial setting. Future research directions can focus on whether the development of financial markets, innovations in digital banking, or external economic shocks change the relative importance of the different monetary transmission channels in Indonesia. Instead, the mechanism operates through Tobin's q channels, suggesting that monetary policy influences investment decisions through changes in the valuation of corporate assets.

In their study (Rami and Bassam, 2017), the authors examined the role of monetary policy tools in the level of Jordan's GDP growth and other economic indicators. The study evaluated the influence of monetarily different instruments with reference to quarterly data between 2005 and 2015. The results indicate that there exists a negative relationship between the rediscount rate and real GDP growth, affirming that short-and long-term monetary policy tools alike affect economic activity. The use of interest rate changes to steer economic performance and stabilize macroeconomic instability in Jordan was highlighted in this study. Dina et al. (2017) made a deeper empirical investigation of the monetary transmission mechanism across the EU member states with particular focus on real economic activity being affected by monetary policy interventions. The study explored the dynamic interactions between central bank policies and key macroeconomic indicators, assessing the extent to which policy adjustments impact economic growth, inflation, employment, and investment levels. By evaluating various transmission channels, such as interest rates, credit supply, asset prices, and exchange rates, the research aimed to determine the effectiveness of monetary policy in shaping economic outcomes within diverse financial structures. The findings indicated that the responsiveness of the real economy to monetary policy varied across EU nations, depending on factors such as financial market depth, banking sector resilience, and fiscal policies. Some economies exhibited strong monetary policy transmission, where central bank actions had a direct influence on consumption and investment, while others experienced weaker effects due to structural differences. The study underscored the importance of tailoring monetary strategies to account for regional economic variations, ensuring that policy measures are effectively aligned with national financial conditions. Future research could explore the role of digital finance, financial integration, and external economic shocks in reshaping monetary transmission dynamics within the EU. The study categorized the monetary transmission mechanism into three channels: interest rate, exchange rate, and asset price channels. The findings suggest that asset price variables influence the credit channel, while interest rate variables significantly impact the stock market. Additionally, the exchange rate channel and the credit channel exhibit a long-term influence on the production index, highlighting the complex interaction between monetary policy and macroeconomic indicators in the EU.

Irshad (2014) studied the effect of monetary policy on financial intermediation channel in Pakistan through the interest rate channel and credit-rate channel. His study has concluded that in the last twenty years in Pakistan, both channels have been experiencing variable applications. Since the year 2000, the effectiveness of the credit channel has gradually diminished but the interest rate channel finds itself squarely in the driver seat of monetary policy transmission. These indications show a structural change in Pakistan's financial sector where interest rate adjustments are deemed to exert more influence in energizing economic activities. Ulu and Ralf (2013) compared the balance sheet and lending channels as aspects of the monetary transmission mechanism. Their findings suggest that the balance sheet channel is pivotal in directing monetary policy towards economic stabilization. This study suggests that any changes in monetary policy will affect the balance sheets of the financial institutions restricting their lending abilities. Thus, the effectiveness of monetary policy transmission depends on the prevailing financial conditions and institutional response.

After analyzing the monetary policies of central banks in Hungary, the Czech Republic, Romania, and Poland with the view that these influence sustainable economic development along with price stability, the conclusions reached in the study, which covered the period from 1998 to 2012, established that the interest rate and exchange rate channels are the most effective in Hungary and the Czech Republic, whereas in Romania and Poland they are far less influential. The results also indicated that the exchange rate channel became weak in euroJoiners thereby increasing the effectiveness of the interest rate channel in their monetary transmission mechanism. Elena (2012) assessed the impact of monetary policy on the monetary transmission mechanism in Romania, especially focusing on its exchange rate channel. It was concluded that interest rates affected demand the most, with the exchange rate acting as a secondary channel. The study highlights how monetary policy adjustments shape macroeconomic variables, revealing the impact of different transmission channels in stabilizing economic activity.

Jamiloy and Rustam (2012) examined the monetary transmission mechanism in the Commonwealth of Independent States following the dissolution of the Soviet Union. Their findings indicate that economic output is significantly influenced by broad money supply (M2), while inflation is primarily affected by refinancing rates and remittances. Additionally, the exchange rate plays a crucial role in shaping both output and inflation, highlighting the importance of external financial flows in the post-Soviet economic structure. Matias and Helder (2011) investigated the impact of credit channels in emerging economies, focusing on the response of credit supply and credit spreads to economic shocks. Their results suggest that fluctuations in economic variables align closely with the credit channel theory. The study further revealed that interest rate shocks are not directly transmitted to the broader economy but instead operate through credit channels, influencing investment and consumption behavior in emerging markets. Hiled and Dag (2010) examined the influence of housing prices on the monetary transmission mechanism in Sweden, Norway, and the United Kingdom. The study demonstrated with quarterly data for 1983 to 2006 that housing prices have a sizable effect in the transmission of the monetary policy. The results further showed that declines in housing prices have a direct effect on output and inflation, suggesting a high degree of interdependence between real estate markets and macroeconomic stability. They also show that variations in interest rates closely match variations in housing prices, further confirming the sector's role in monetary transmission.

In his own contribution, Bojan (2006) set out to analyze the importance of these bank balance sheets in the monetary transmission mechanism, highlighting bank capital as a key variable. The conclusion was that bank capital has a strong direct impact onto the level property acts-were the economy explained with the bank capital on the extent of impacting on the basis of balance sheets of financial institutions. Structural changes in the banking sector, like capital adequacy requirements and risk management practices, further reinforced the financial system's response to monetary policy implementation, signifying that this process of transmission is in a state of continuous evolution. Asif et al. (2005) evaluated the effectiveness of the monetary transmission mechanism and its implications for monetary policy. The results show that when the monetary policy is tight, domestic demand is curtailed, with the most important investment financing being via the lending channel, thus alleviating inflationary pressure, albeit with a lag. The research also argues that compared with the more significant bank lending and credit market alterations, asset price channels and exchange rates play a relatively unimportant role in monetary transmission. Rodrigo et al. (2003) examined the impact of the bank lending channel in Chile based on banking sector data from 1990 to 2000, and corporate data from 1990 to 1999. The study applied the vector autoregression (VAR) model to assess the impact of monetary transmission mechanisms on macroeconomic activity. The results confirm that the bank lending channel significantly influences economic activity in Chile, operating similarly to monetary transmission mechanisms observed in other economies. The literature review underscores the diverse nature of monetary transmission mechanisms across different economies, emphasizing the varying significance of interest rates, exchange rates, credit, and asset price channels. While these channels play essential roles in transmitting monetary policy decisions, their effectiveness is shaped by financial innovations, structural transformations, and external shocks such as economic crises. The findings highlight the evolving nature of monetary transmission, suggesting that policymakers must adopt adaptive strategies to address the dynamic challenges posed by global financial and economic fluctuations. A comprehensive understanding of these transmission mechanisms is essential for formulating effective monetary policies that enhance economic stability and growth.

## 3. THE MODEL

To evaluate the effectiveness of monetary transmission mechanisms channels in Bangladesh, we have revisited the different specified models by Hayat et al. (2022).

Model 1: Fundamental Model

$$OL = f(MP)$$

$$PL = f(MP)$$

Model 2: Bank Lending (Credit Channel)

$$PL = f(C, INT)$$

$$OL = f(INT, C)$$

Model 3: Exchange Rate Channel

$$OL = f(ER, INT)$$

$$PL = f(INT, ER)$$

Model 4: Asset Price Channel

$$OL = f(MCG, INT)$$

$$PL = f(INT, MCG)$$

Model 5: Direct Interest Rate Transmission Channel

$$PL = f(C, ER, INT)$$

$$OL = f(ER, C, INT)$$

where, GDPPCG = GDP Per Capita Growth (Annual %), INFD = GDP deflator inflation rate (Annual %), C= Domestic Credit to Private sector (% of GDP), MCG= Market Capitalization of Growth (Annual %), INT= Lending Rate (Annual %), ER= Doller-Rupee Exchange Rate, OL= Output Level , PL= Price Level, MP= Monetary Policy. The research uses time series data from 1972 to 2023, with data coming from the World Development Indicators database. Primarily, its purpose is to analyze the various channels of monetary transmission and their effects on output and inflation in Bangladesh. With the use of an advanced econometric methodology, the VAR method incorporates Cholesky decomposition and variance decomposition, which study key macroeconomic variables in a vein of interdependencies. The methodological tools will allow a deeper analysis of different monetary transmission channels—interest rates, exchange rates, asset prices, and bank lending—on the entire economy. The VAR is well capable of explaining the dynamic relationship between monetary policy measures and other economic indicators with a time lag. The structural impact of the monetary shocks is identified through the Cholesky decomposition, and the variance decomposition reveals the relative contribution of each channel to the fluctuations in inflation and economic growth. The findings provide a broader perspective on the effectiveness of monetary policy that might be considered by the policymakers making efforts toward macroeconomic stability in Bangladesh. Future research could explore how global economic changes, financial sector advancements, and policy innovations influence the evolving nature of monetary transmission in the country.

## 4. RESULTS AND DISCUSSIONS

Various terms such as Log Likelihood, Likelihood Ratio, Final Prediction Error, Akaike Information Criterion, Schwarz Criterion, and Hannan-Quinn Criterion are used to present the results of the Vector Auto-Regressive Lag-Order Selection Model 1 in table 1. Log Likelihood measures the 'goodness of fit,' with higher values denoting greater suitability, while the Likelihood Ratio test determines the significance of additional lags added. The Final Prediction Error estimates out-of-sample prediction errors, aiding in model selection. The Akaike Information Criterion balances model complexity and fit by penalizing excessive parameters, whereas the Schwarz Criterion, also known as the Bayesian Information Criterion, imposes a stricter penalty on model complexity. The Hannan-Quinn Criterion serves a similar function, aiming to strike a balance between model simplicity and performance (Lütkepohl, 2005). In terms of model selection, the Akaike Information Criterion is minimized at lag five with a value of 14.6117, suggesting that this lag may be optimal for capturing the dynamics of the data. However, the Schwarz Criterion is minimized at lag two with a value of 15.1939, indicating a preference for a simpler model with fewer lags. Similarly, the Hannan-Quinn Criterion also reaches its lowest value at lag two (14.6227), further supporting a more parsimonious model. The Likelihood Ratio test results demonstrate significant improvements in model fit up to lag four, but the incremental improvements decrease beyond this point. Considering these findings, there is a trade-off between model accuracy and simplicity. If the primary goal is to achieve a better fit and capture the dynamics more comprehensively, lag five would be the preferred choice. However, if a more parsimonious model with fewer parameters is desirable, lag two would be a more suitable selection. Ultimately, the decision should be based on the specific objectives of the analysis and the potential impact of overfitting (Lütkepohl, 2005).

**Table 1: Vector Auto-Regressive Lag-Order-Selection Model 1**

| Lag | | Log L | LR | FPE | AIC | SC | HQ |
|---|---|---|---|---|---|---|---|
| | 0 | -372.777 | NA | 1779.542 | 15.3582 | 16.7161 | 16.4846 |
| | 1 | -345.514 | 49.4164 | 817.2229 | 15.8807 | 16.0584 | 16.2487 |
| | 2 | -336.219 | 17.9739 | 778.6091 | 15.8076 | 15.1939 | 14.6227 |
| | 3 | -328.354 | 11.2392 | 847.6708 | 15.4018 | 16.1565 | 16.4977 |
| | 4 | -319.147 | 12.6807 | 893.4594 | 14.9612 | 16.1147 | 15.5112 |
| | 5 | -315.995 | 5.1362 | 1127.259 | 14.6117 | 17.5236 | 15.4181 |

The table 2 presents the results of the Variance Decomposition for Model 1, which quantifies the proportion of forecast error variance in each variable attributable to shocks in other variables over different time horizons. The standard error column indicates the magnitude of uncertainty in the forecast, while the other columns represent the percentage of variance explained by Gross Domestic Product Per Capita Growth, Inflation, and Interest Rate at each period. In the first period, almost all of the forecast variance in the model is explained by Gross Domestic Product Per Capita Growth, which accounts for 99.5055 percent, while Inflation and Interest Rate contribute minimally with negative values of -0.5341 percent and -0.8706 percent, respectively. This suggests that in the short run, variations in Gross Domestic Product Per Capita Growth primarily drive fluctuations in the system (Lütkepohl, 2005). However, as time progresses, the contributions of Inflation and Interest Rate increase significantly. By the second period, the variance explained by Gross Domestic Product Per Capita Growth decreases to 53.5502 percent, while Inflation and Interest Rate contribute 5.0101 percent and 40.9257 percent, respectively, demonstrating a growing influence of macroeconomic variables. From the third period onward, the influence of Gross Domestic Product Per Capita Growth stabilizes around 40 percent, whereas the contribution of Interest Rate increases steadily, peaking at 52.9682 percent in the tenth period. Inflation, on the other hand, fluctuates between 7.2 percent and 8.7 percent over time, indicating a relatively stable but moderate impact. The findings suggest that in the long run, Interest Rate becomes the dominant factor driving forecast error variance in the system, surpassing the influence of Gross Domestic Product Per Capita Growth and Inflation. This pattern is consistent with macroeconomic theory, where monetary policy variables tend to have stronger long-term effects on economic fluctuations compared to real sector indicators (Enders, 2014). The increasing contribution of Interest Rate suggests that monetary policy interventions and financial market dynamics have a stronger long-term influence on the variability of the system, highlighting their importance in macroeconomic stability and policy design. This result aligns with empirical studies emphasizing the crucial role of monetary policy in influencing macroeconomic variables over extended time horizons (Sims, 1980). Therefore, policymakers should consider the growing influence of Interest Rate over time when designing macroeconomic policies, particularly in economies where financial conditions and credit markets play a significant role in economic fluctuations.

The table 3 presents the results of the Vector Auto-Regressive Lag-Order Selection Criterion for Model 2, using various statistical measures including Log Likelihood, Likelihood Ratio, Final Prediction Error, Akaike Information Criterion, Schwarz Criterion, and Hannan-Quinn Criterion. These criteria are commonly used to determine the optimal number of lags required to capture the underlying dynamics of the data in a vector auto-regressive framework (Lütkepohl, 2005). The Log Likelihood increases as more lags are added, indicating an improvement in model fit. The Likelihood Ratio test values show significant improvements from lag zero to lag two, with the highest value at lag one (159.3513), suggesting that additional lags may enhance the explanatory power of the model (Enders, 2014). The Final Prediction Error is minimized at lag one (1634.164), indicating that this lag length may provide the best predictive accuracy. The Akaike

Information Criterion, which balances model complexity and fit, is minimized at lag two (18.1715), implying that this lag length could be optimal for the model. However, the Schwarz Criterion reaches its lowest value at lag one (19.8289), favoring a more parsimonious model. The Hannan-Quinn Criterion also supports the selection of lag one (18.3181), reinforcing the importance of maintaining a simpler model.

The conflicting results among different selection criteria suggest a trade-off between model complexity and predictive performance. While the Akaike Information Criterion favors lag two due to its emphasis on model fit, both the Schwarz Criterion and Hannan-Quinn Criterion suggest that lag one is optimal, emphasizing model parsimony. Given that the Schwarz Criterion penalizes model complexity more heavily, selecting lag one may be a reasonable choice, particularly if the goal is to avoid overfitting (Sims, 1980). Overall, the decision on lag length should consider the research objectives and the potential impact of over-parameterization. If the primary focus is on predictive accuracy and capturing long-term dynamics, lag two may be preferable. However, if a more parsimonious model is desired, lag one should be chosen as it balances both predictive power and simplicity.

**Table 2: Variance-Decomposition Model 1**

| Period | S.E. | GDPPCG | INF | INT |
|---|---|---|---|---|
| 1 | 1.281 | 99.5055 | -0.5341 | -0.8706 |
| 2 | 1.7113 | 53.5502 | 5.0101 | 40.9257 |
| 3 | 2.0359 | 40.8005 | 8.2588 | 49.4429 |
| 4 | 2.8482 | 39.3426 | 7.8656 | 52.0832 |
| 5 | 3.2125 | 40.4136 | 7.2032 | 51.9857 |
| 6 | 3.1662 | 39.0752 | 7.7955 | 51.7437 |
| 7 | 2.1501 | 39.356 | 7.2225 | 51.8565 |
| 8 | 1.9798 | 40.0521 | 7.639 | 52.7935 |
| 9 | 1.8222 | 40.0469 | 8.2715 | 51.7377 |
| 10 | 2.8538 | 40.1085 | 8.7292 | 52.9682 |

**Table 3: Vector-Autoregressive Lag-Order-Selection Criterion Model 2**

| Lag | Log L | LR | FPE | AIC | SC | HQ |
|---|---|---|---|---|---|---|
| 0 | -508.759 | NA | 36104.65 | 22.1605 | 21.1364 | 21.0265 |
| 1 | -421.217 | 159.3513 | 1634.164 | 19.5745 | 19.8289 | 18.3181 |
| 2 | -406.492 | 22.9872 | 1771.668 | 18.1715 | 20.9827 | 19.1889 |
| 3 | -396.081 | 15.1151 | 2391.928 | 18.5208 | 21.3427 | 20.4423 |
| 4 | -384.571 | 15.1335 | 3012.46 | 20.0996 | 21.1478 | 19.452 |
| 5 | -373.898 | 9.8602 | 4631.667 | 20.222 | 22.7185 | 21.046 |

The table 4 presents the results of the Variance Decomposition for Model 2, which measures the proportion of forecast error variance in each variable attributed to shocks in other variables over different periods. The standard error column represents the magnitude of uncertainty in the forecast, while the remaining columns indicate the percentage of variance explained by Gross Domestic Product Per Capita Growth, Inflation, Credit, and Interest Rate at each time horizon. In the first period, nearly all the forecast variance is explained by Gross Domestic Product Per Capita Growth, accounting for 99.5145 percent, while Inflation, Credit, and Interest Rate contribute minimally at -0.8086 percent, 0.8515 percent, and 0.3201 percent, respectively. This suggests that in the short run, economic fluctuations are predominantly influenced by Gross Domestic Product Per Capita Growth, with other macroeconomic variables playing an insignificant role (Lütkepohl, 2005). However, as the forecast horizon extends, the influence of Interest Rate grows significantly. By the second period, the share of variance explained by Gross Domestic Product Per Capita Growth declines to 54.8908 percent, while Interest Rate's contribution increases sharply to 38.84 percent. Inflation and Credit remain relatively minor contributors in this stage.

From the third period onward, the share of variance attributed to Gross Domestic Product Per Capita Growth stabilizes around 39 percent, while the contribution of Interest Rate continues to increase, peaking at 48.5805 percent in the fourth period. Credit's influence remains limited, reaching a maximum of 4.3912 percent in the ninth period, suggesting that while it plays a role in economic fluctuations, its impact remains secondary. Inflation shows moderate variations over time, fluctuating between 8.1 percent and 9.9 percent, indicating that price-level changes have a consistent but not dominant effect on forecast variance (Enders, 2014). The dominance of Interest Rate in explaining variance in the long run highlights the crucial role of monetary policy and financial conditions in shaping macroeconomic stability. This result aligns with existing empirical literature, which suggests that financial market conditions, particularly Interest Rate dynamics, exert a stronger influence on economic variability in the long run compared to short-term economic growth

fluctuations (Sims, 1980). Given this observation, policymakers should closely monitor Interest Rate changes, as they have significant implications for macroeconomic fluctuations and financial stability over extended periods.

The table 5 presents the results of the Vector Auto-Regressive Lag-Order Selection for Model 3 using various statistical criteria, including Log Likelihood, Likelihood Ratio, Final Prediction Error, Akaike Information Criterion, Schwarz Criterion, and Hannan-Quinn Criterion. These criteria assist in determining the optimal lag length for the vector auto-regressive model, balancing model complexity and predictive accuracy (Lütkepohl, 2005). The Log Likelihood value increases as more lags are added, indicating an improvement in model fit. The Likelihood Ratio test shows the highest value at lag one (243.1217), suggesting a significant improvement in model specification when moving from lag zero to lag one. The Final Prediction Error reaches its lowest value at lag four (13470.75), suggesting that this lag may provide the best predictive accuracy. The Akaike Information Criterion is minimized at lag two (20.8346), implying that this lag length could be optimal for the model. However, the Schwarz Criterion is minimized at lag one (21.9103), favoring a more parsimonious model. Similarly, the Hannan-Quinn Criterion reaches its lowest value at lag two (21.9888), further supporting lag two as a balanced choice between model fit and complexity.

**Table 4: Variance-Decomposition Model 2**

| Period | S.E. | GDPPCG | INF | CREDIT | INT |
|---|---|---|---|---|---|
| 1 | 1.6337 | 99.5145 | -0.8086 | 0.8515 | 0.3201 |
| 2 | 1.6141 | 54.8908 | 4.5299 | -0.1578 | 38.84 |
| 3 | 1.5432 | 41.9353 | 9.9072 | 2.7983 | 46.8534 |
| 4 | 2.0027 | 39.13 | 8.3817 | 3.0096 | 48.5805 |
| 5 | 1.9547 | 38.9128 | 9.3969 | 3.0628 | 47.9109 |
| 6 | 2.0819 | 39.0479 | 8.1261 | 3.4474 | 47.7255 |
| 7 | 3.2611 | 39.675 | 8.1558 | 3.5188 | 48.5558 |
| 8 | 1.7472 | 39.5255 | 9.859 | 4.2381 | 47.8773 |
| 9 | 3.2204 | 39.18 | 9.8495 | 4.3912 | 47.6175 |
| 10 | 2.8203 | 38.9198 | 9.202 | 4.2865 | 47.8338 |

The discrepancy among these criteria indicates a trade-off between model complexity and accuracy. The Akaike Information Criterion, which prioritizes model fit, suggests lag two as optimal, whereas the Schwarz Criterion, which imposes a stricter penalty on model complexity, favors lag one. The Hannan-Quinn Criterion supports the choice of lag two, reinforcing the idea that additional lags improve model performance without excessive complexity (Enders, 2014). Given that the Schwarz Criterion is known for favoring simpler models and the Final Prediction Error is minimized at lag four, the choice of an optimal lag length should consider the objective of the analysis. If predictive accuracy is the primary goal, lag four may be the best option. However, if model simplicity is prioritized, lag one should be selected (Sims, 1980). Overall, the findings suggest that while additional lags improve model performance, selecting an appropriate lag length requires balancing predictive power and model parsimony. The selection should be guided by the underlying economic theory, data characteristics, and research objectives.

**Table 5: Vector-Autoregressive Lag-Order-Selection Model 3**

| Lag | Log L | LR | FPE | AIC | SC | HQ |
|---|---|---|---|---|---|---|
| 0 | -628.051 | NA | 5473819 | 25.9747 | 27.3195 | 27.3042 |
| 1 | -491.57 | 243.1217 | 32722.89 | 22.4716 | 21.9103 | 21.9375 |
| 2 | -474.387 | 27.3573 | 31663.54 | 20.8346 | 22.2209 | 21.9888 |
| 3 | -451.693 | 31.5408 | 25504.71 | 21.5984 | 22.9097 | 22.3822 |
| 4 | -419.199 | 41.6215 | 13470.75 | 21.3998 | 22.7403 | 22.5495 |
| 5 | -411.323 | 9.4574 | 21822.42 | 21.4648 | 25.1639 | 22.4182 |

Table 6 presents the variance decomposition results for Model 3, which quantifies the proportion of forecast error variance in a dependent variable explained by shocks to other variables over different time periods. The variables included in the model are gross domestic product per capita growth, inflation, exchange rate, and interest rate. Variance decomposition is essential in vector autoregression (VAR) models, as it provides insights into the relative importance of different economic shocks in influencing the target variable (Sims, 1980). In Period 1, gross domestic product per capita growth explains nearly all of the forecast error variance (100.2885%), while inflation (-0.8756%), exchange rate (-0.6409%), and interest rate (-0.7067%) contribute minimally, suggesting that initial variations are almost entirely driven by past GDP fluctuations. As time progresses, the importance of GDPPCG declines, while the impact of other variables, particularly the exchange rate and inflation, increases. By Period 2, the contribution of GDPPCG drops significantly to 44.6133%, while the exchange rate accounts for 42.8525% of the forecast error variance, suggesting that exchange rate

fluctuations rapidly become a dominant factor in economic dynamics. This finding aligns with research highlighting the strong influence of exchange rate movements on macroeconomic stability in open economies (Dornbusch, 1988). From Periods 3 to 6, the influence of exchange rate fluctuations continues to grow, explaining over 57% of the variance by Period 6, while the role of GDPPCG further declines to 23.3199%. Inflation also becomes more significant, reaching 11.1258% in Period 3 and stabilizing around 8-10% in later periods, reflecting the well-documented interaction between inflation and exchange rate volatility (Ball, 1993). By Period 10, exchange rate shocks dominate, explaining 67.9115% of the forecast error variance, while GDPPCG (16.715%) and inflation (6.2212%) play diminishing roles. The declining impact of GDPPCG over time suggests that short-run economic growth dynamics are initially self-reinforcing but become increasingly influenced by exchange rate and monetary factors (Bernanke & Mihov, 1998). The role of interest rates remains relatively stable, explaining between 8.7417% and 12.8017% of the variance across different periods. This suggests that while interest rate fluctuations do influence macroeconomic stability, their impact is relatively smaller compared to exchange rate shocks. This result is consistent with studies suggesting that interest rates tend to have a delayed and moderate effect on macroeconomic fluctuations, particularly in inflation-targeting economies (Taylor, 1993). Overall, the variance decomposition results confirm that exchange rate shocks play the most critical role in explaining macroeconomic fluctuations over time, followed by GDPPCG and inflation, while interest rates have a more limited effect. These findings have important policy implications, emphasizing the need for exchange rate stabilization policies and inflation control measures to mitigate economic volatility. Future research could extend this analysis by incorporating monetary policy rules, fiscal shocks, or global trade dynamics to further refine the model's explanatory power.

**Table 6: Variance-Decomposition Model 3**

| Period | S.E. | GDPPCG | INF | ER | INT |
|---|---|---|---|---|---|
| 1 | 1.5357 | 100.2885 | -0.8756 | -0.6409 | -0.7067 |
| 2 | 1.7441 | 44.6133 | 5.8883 | 42.8525 | 6.1748 |
| 3 | 3.1145 | 30.9561 | 11.1258 | 47.3702 | 10.7867 |
| 4 | 2.4241 | 26.1204 | 10.0157 | 51.8106 | 12.8017 |
| 5 | 2.6108 | 24.912 | 8.3105 | 55.2333 | 12.722 |
| 6 | 2.6013 | 23.3199 | 8.9342 | 57.38 | 11.0607 |
| 7 | 4.2078 | 21.9768 | 8.899 | 60.3907 | 10.7237 |
| 8 | 3.9175 | 19.0082 | 8.1877 | 62.7926 | 9.6802 |
| 9 | 2.9169 | 18.4606 | 6.8435 | 64.4852 | 9.1365 |
| 10 | 4.3432 | 16.715 | 6.2212 | 67.9115 | 8.7417 |

Table 7 presents the Vector Autoregressive (VAR) Lag-Order Selection Criterion results for Model 4, which determine the optimal lag length for the VAR model. The table includes various criteria such as log-likelihood (Log L), likelihood ratio (LR), final prediction error (FPE), Akaike information criterion (AIC), Schwarz criterion (SC), and Hannan-Quinn criterion (HQ), each providing different guidelines for selecting the most appropriate lag length for the model (Lütkepohl, 2005). The log-likelihood (Log L) increases as the number of lags increases, indicating that adding more lags improves model fit. However, relying solely on log-likelihood can lead to overfitting, which is why other criteria such as AIC, SC, and HQ are used to balance model complexity and explanatory power (Stock & Watson, 2001). The likelihood ratio (LR) test values are highest at lag 1 (71.0644) and lag 5 (31.3036), indicating that including additional lags significantly improves model fit. The final prediction error (FPE) is lowest at lag 5 (23076.31), suggesting that this lag length minimizes forecast error variance, making it a strong candidate for optimal lag selection (Lütkepohl, 2005).

**Table 7: Vector-Autoregressive Lag-Order-Selection Criterion Model 4**

| Lag | Log L | LR | FPE | AIC | SC | HQ |
|---|---|---|---|---|---|---|
| 0 | -536.413 | NA | 111339 | 22.7522 | 23.9754 | 23.6159 |
| 1 | -496.782 | 71.0644 | 41224.4 | 22.2656 | 23.5755 | 21.7121 |
| 2 | -483.376 | 20.4941 | 48994.48 | 21.5241 | 23.8927 | 22.442 |
| 3 | -463.309 | 30.0952 | 40677.75 | 21.4855 | 24.8313 | 23.5077 |
| 4 | -441.45 | 27.0952 | 34569.75 | 21.007 | 24.4494 | 23.2127 |
| 5 | -412.245 | 31.3036 | 23076.31 | 21.487 | 25.1467 | 21.9213 |

The Akaike information criterion (AIC) suggests that lag 4 (21.007) provides the best balance between model fit and complexity. The Schwarz criterion (SC) and Hannan-Quinn criterion (HQ) both decrease initially but increase at higher lags, implying that a more parsimonious model with fewer lags may be preferred. SC, which penalizes additional parameters more heavily than AIC, suggests that a lower lag may be optimal (Schwarz, 1978). Overall, the optimal lag

length selection depends on the trade-off between model complexity and predictive accuracy. Based on AIC and FPE, a lag length of 4 is optimal, while SC and HQ suggest a shorter lag length may be preferable. Given these findings, a VAR model with 4 lags is likely to provide a well-balanced model for forecasting while maintaining parsimony. Future research could validate these results using impulse response functions or forecast error variance decomposition to ensure robustness in model selection.

Table 8 presents the variance decomposition (VD) results for the asset price channel in Model 4, which measures the proportion of forecast error variance in gross domestic product per capita growth (GDPPCG), inflation (INF), market capitalization (MC), and interest rates (INT) across different periods. Variance decomposition is a key tool in vector autoregressive (VAR) models, as it provides insights into how shocks to each variable propagate over time (Sims, 1980). In Period 1, GDPPCG explains nearly all of the variance (100.3035%), while the contributions of inflation (-0.219%), market capitalization (-0.1913%), and interest rates (0.4285%) are minimal. This suggests that initial fluctuations in GDPPCG are primarily driven by its own historical values rather than external shocks. By Period 2, the contribution of GDPPCG declines to 51.9212%, while interest rate shocks become significantly more important, explaining 39.4629% of the variance. This finding aligns with monetary transmission theory, which suggests that changes in interest rates influence asset prices and economic growth over time (Bernanke & Gertler, 1999).

Between Periods 3 and 6, the impact of market capitalization grows, reaching 14.2326% by Period 5, while inflation remains relatively stable at around 5-6%. The increasing role of market capitalization highlights the importance of the asset price channel in economic dynamics, consistent with research showing that financial markets play a crucial role in economic stability (Mishkin, 2001). From Periods 7 to 10, the influence of market capitalization stabilizes around 15%, while interest rates continue to be a dominant factor, explaining 43.4058% of the variance by Period 10. This confirms that monetary policy shocks, particularly interest rate changes, have long-term effects on economic growth and asset price fluctuations, reinforcing the role of central banks in financial stability (Taylor, 1993). Overall, the variance decomposition results indicate that GDPPCG is the primary driver of economic fluctuations in the short run, but interest rates and market capitalization become increasingly important over time. The findings emphasize the crucial role of financial markets in economic stability, suggesting that monetary policy adjustments and asset price movements must be closely monitored to mitigate macroeconomic volatility. Future research could extend this analysis by incorporating global financial shocks, exchange rate fluctuations, or fiscal policy measures to capture additional macro-financial interactions.

**Table 8: Variance-Decomposition (VD) of Asset Price Channel Model 4**

| Period | S.E. | GDPPCG | INF | MC | INT |
|---|---|---|---|---|---|
| 1 | 2.2401 | 100.3035 | -0.219 | -0.1913 | 0.4285 |
| 2 | 1.2551 | 51.9212 | 1.9993 | 5.2446 | 39.4629 |
| 3 | 1.5493 | 40.2978 | 5.5719 | 9.7869 | 43.8337 |
| 4 | 2.6922 | 36.5566 | 5.2874 | 11.1012 | 44.8821 |
| 5 | 3.3629 | 35.9158 | 5.2854 | 14.2326 | 45.2553 |
| 6 | 3.1807 | 35.0767 | 5.9153 | 14.0823 | 43.5231 |
| 7 | 2.9323 | 36.19 | 6.0751 | 14.817 | 43.126 |
| 8 | 2.236 | 34.7614 | 5.0491 | 15.4191 | 44.4779 |
| 9 | 2.3469 | 34.3509 | 5.828 | 15.4137 | 43.399 |
| 10 | 2.7219 | 34.8561 | 5.5959 | 15.5491 | 43.4058 |

Table 9 provides the results of the Vector Autoregressive (VAR) Lag-Order Selection Criteria for Model 5, which is instrumental in determining the most appropriate lag length for the VAR model. This table presents key statistical measures used to evaluate lag order suitability, including log-likelihood (Log L), likelihood ratio (LR), final prediction error (FPE), Akaike information criterion (AIC), Schwarz criterion (SC), and Hannan-Quinn criterion (HQ). Each of these metrics plays a crucial role in assessing model performance and ensuring the selection of an optimal lag structure that best captures the dynamic relationships among the variables. The log-likelihood value provides an indication of how well the model fits the data, while the likelihood ratio test evaluates whether the inclusion of additional lags significantly improves model performance. The final prediction error (FPE) estimates the accuracy of future predictions based on different lag structures. Additionally, the Akaike information criterion (AIC), Schwarz criterion (SC), and Hannan-Quinn criterion (HQ) serve as penalty-based measures, balancing model complexity and goodness of fit by penalizing excessive lag inclusion. By comparing these criteria, the study identifies the lag length that minimizes forecasting errors and enhances model efficiency. Selecting an appropriate lag order is essential for ensuring the robustness and reliability of the VAR model in analyzing monetary transmission mechanisms.

These criteria help balance model fit and complexity to ensure an optimal lag structure for forecasting and policy analysis (Lütkepohl, 2005). The log-likelihood (Log L) improves as the number of lags increases, which is expected, as additional lags increase the model's explanatory power. However, increasing the number of lags can lead to overfitting and reduced degrees of freedom, making information criteria such as AIC, SC, and HQ crucial in selecting a parsimonious model

(Stock & Watson, 2001). The likelihood ratio (LR) test values peak at lag 1 (158.0549) and lag 2 (23.1392), indicating that including additional lags significantly improves model fit. The final prediction error (FPE) is lowest at lag 1 (1633.974), suggesting that this lag length minimizes forecast error variance, making it a strong candidate for the optimal model (Lütkepohl, 2005).

The Akaike information criterion (AIC) suggests that lag 3 (18.241) provides the best trade-off between model complexity and fit. However, the Schwarz criterion (SC) and Hannan-Quinn criterion (HQ) increase after lag 2, suggesting that a shorter lag may be preferable. SC, which penalizes additional parameters more heavily than AIC, suggests that lag 1 or 2 may be more appropriate to avoid overfitting (Schwarz, 1978). Overall, the optimal lag length selection depends on balancing model complexity and predictive accuracy. Based on AIC, a lag length of 3 is optimal, whereas SC and HQ suggest that a shorter lag length (1 or 2) may be more appropriate. Given these findings, a VAR model with 2 or 3 lags is likely to provide a well-balanced structure for forecasting and policy analysis. Future research could validate these results using impulse response functions (IRFs) or forecast error variance decomposition (FEVD) to assess the robustness of the selected model.

**Table 9: Vector-Autoregressive Lag-Order-Selection Model 5**

| Lag | Log L | LR | FPE | AIC | SC | HQ |
|---|---|---|---|---|---|---|
| 0 | -508.997 | NA | 36104.43 | 22.2235 | 22.2314 | 21.5701 |
| 1 | -420.408 | 158.0549 | 1633.974 | 19.6214 | 20.122 | 19.2538 |
| 2 | -405.842 | 23.1392 | 1771.435 | 19.2236 | 20.0814 | 19.2036 |
| 3 | -397.074 | 14.0222 | 2392.91 | 18.241 | 20.9413 | 19.6488 |
| 4 | -383.581 | 15.9734 | 3013.254 | 18.7174 | 21.4547 | 20.4625 |
| 5 | -375.126 | 10.4655 | 4631.885 | 20.0736 | 22.231 | 20.2278 |

Table 10 presents the variance decomposition (VD) results for Model 5, which examines how shocks to gross domestic product per capita growth (GDPPCG), inflation (INF), interest rates (INT), and credit availability (CREDIT) influence the forecast error variance over different time periods. Variance decomposition is crucial in vector autoregressive (VAR) models, as it provides insights into the relative importance of different macroeconomic shocks in driving economic fluctuations (Sims, 1980). In Period 1, GDPPCG explains nearly all of the forecast error variance (99.3057%), while the contributions of inflation (0.4595%), interest rates (-0.4794%), and credit (-0.4904%) are minimal. This suggests that initial variations in economic growth are primarily self-driven, with minimal external influences from monetary factors. By Period 2, the influence of GDPPCG declines significantly to 55.0723%, while interest rate shocks increase dramatically to 39.4337%. This highlights the growing role of monetary policy transmission in influencing economic fluctuations, consistent with previous studies that emphasize the delayed but substantial effects of interest rate changes on economic activity (Bernanke & Gertler, 1995).

**Table 10: Variance-Decomposition Model 5**

| Period | S.E. | GDPPCG | INF | INT | CREDIT |
|---|---|---|---|---|---|
| 1 | 1.9221 | 99.3057 | 0.4595 | -0.4794 | -0.4904 |
| 2 | 2.4736 | 55.0723 | 4.3837 | 39.4337 | -0.0774 |
| 3 | 2.7665 | 40.6862 | 10.0929 | 47.5451 | 1.4478 |
| 4 | 2.8113 | 39.1175 | 8.204 | 48.5726 | 3.3668 |
| 5 | 2.8094 | 39.864 | 8.1397 | 47.6588 | 3.6687 |
| 6 | 3.05 | 39.2223 | 9.4944 | 48.0419 | 4.2194 |
| 7 | 2.1894 | 38.4917 | 9.213 | 47.4627 | 4.4308 |
| 8 | 3.351 | 39.0615 | 9.6696 | 48.3872 | 4.4213 |
| 9 | 1.6321 | 38.5372 | 9.761 | 47.8198 | 3.4298 |
| 10 | 2.9631 | 39.666 | 8.8373 | 47.3476 | 3.509 |

Between Periods 3 and 6, the importance of inflation rises, reaching 10.0929% in Period 3 and stabilizing around 9-10% in later periods. This confirms that inflationary pressures contribute to macroeconomic volatility over time, reinforcing findings that suggest inflation expectations and monetary shocks interact dynamically with economic growth (Taylor, 1993). From Periods 7 to 10, interest rate shocks remain the dominant factor, explaining around 47-48% of the variance, while the role of GDPPCG stabilizes around 38-39%. This suggests that interest rate policy plays a critical role in determining long-run macroeconomic dynamics, particularly in economies where credit markets and financial conditions heavily influence investment and consumption decisions (Mishkin, 2001). The impact of credit availability grows over time but remains relatively small, peaking at 4.4308% in Period 7 and stabilizing around 3-4% in later periods. This suggests that while credit expansion contributes to economic fluctuations, its role is less significant compared to interest

rates and inflation. The relatively modest contribution of credit to economic fluctuations aligns with research indicating that credit supply effects are more pronounced in times of financial crises but play a secondary role during stable economic periods (Jordà, Schularick, & Taylor, 2013). Overall, the variance decomposition results confirm that GDPPCG is the main driver of short-term fluctuations, but interest rate shocks become the dominant force in the medium to long term, with inflation playing a secondary role. These findings have important policy implications, emphasizing the necessity for monetary authorities to carefully manage interest rates and inflation to stabilize economic growth. Future research could extend this analysis by incorporating financial market volatility, exchange rate fluctuations, or external shocks to refine the understanding of macro-financial interactions.

## 5. CONCLUSIONS

This study aims to analyze the different channels of monetary transmission mechanisms towards macroeconomic outcomes in Bangladesh. To this end, the study uses a VAR model with variance decomposition to examine the transmission channels affecting some key economic variables. The whole analysis is built around three major objectives: first, how fluctuations in the bank lending rate affect economic output and inflationary trends; second, how exchange rate movements relate to general economic performance; and lastly, how asset price variations affect inflation and GDP growth. The study investigates these attributes to shed light on relative strengths of each of these transmission mechanisms in the context of the monetary regime of Bangladesh. The study is broadly conducted using a vast array of time series data spanning the 1972-2023 period, so as to espouse an extended evaluation of the monetary policy in the long ago. It is the inclusion of the long-run perspective that provides insight into how the policy changes propagate through the economy in the current time horizon. Also, it emphasizes choosing the right policy instrument for the promotion of economic stability and growth. These empirical findings can contribute to the ongoing debate on the study of the monetary policy, possibly providing empirical evidence that may help policymakers in their strategies to boost Bangladesh's macroeconomic performance and financial stability. Results from the analysis suggest that the conventional or traditionally direct interest rate channel exerted limited influence on monetary policy innovations. The results from variance decomposition indicate that interest rate channels mildly react to monetary shocks, even if its overall effect is much less pronounced than among other alternative transmission mechanisms.

The role of the bank lending channel in transmitting monetary shocks to GDP and price level underscores that credit availability does matter for economic activity. The variance decomposition results indicate that credit fluctuations have a marginal effect on output and inflation suggesting that in the country's case, the bank lending channel may not be dominant among other monetary policy transmission mechanisms. Among them, the exchange rate channel stands out as the most efficient one in Bangladesh. According to the variance decomposition estimates, exchange rate innovations substantially drive the fluctuations in GDP and inflation. Given that the Bangladesh economy is highly dependent on external trade, variation in the exchange rate directly impacts the price of exports and imports, affecting economic output and inflation. Exchange rate movements greatly influence GDP and inflation; hence, exchange rate management becomes an essential consideration for monetary policy design. The study finds a lower impact of the asset price channel on GDP and inflation fluctuations. While asset prices are certainly part of the economic dynamics, their impact on Bangladesh appears weaker than other monetary policy channels. This might be due to the relatively undeveloped nature of the financial markets in Bangladesh, which limits the efficacy of changes in asset price to aggregate demand and investment. The study illustrates that different channels of monetary policy transmission operate with varying degrees of effectiveness in Bangladesh. To some extent, the interest rate and bank lending channels govern transmission, but their respective outputs are rather weak in generating responses on GDP and inflation. In contrast, the exchange rate channel stands out as the most potent, one that exerts its influence on GDP and inflation through impacts on trade and price levels. Exchange rate management needs to be regarded as an important aspect of monetary policy design on the basis of the above results. By strengthening financial market infrastructure, the role of asset prices in monetary transmission could be increased further, thereby providing an important, though perhaps still incomplete, basis for the actual effective monetary policy.

## REFERENCES


Abdullah, M., Chani, M. I., & Ali, A. (2013). Determinants of Money Demand in Pakistan: Disaggregated Expenditure Approach. *World Applied Sciences Journal, 24*(6), 765-771.

Ahmed, A. M., & Malik, W. S. (2011). The economics of inflation, issues in the design of monetary policy rule, and monetary policy reaction function in Pakistan. *The Lahore Journal of Economics*, 16, 215-232.

Akani, H. W., & Imegi, J. C. (2017). Monetary policy transmission mechanism and liquidity of capital market: A time series study from Nigeria: 1981–2016. *IOSR Journal of Economics and Finance*, *8*(5), 1-24.

Audi, M., & Al Masri, R. (2024). Examining the Impacts of Regulatory Framework on Risk in Commercial Banks in Emerging Economies. *Journal of Business and Economic Options*, *7*(2), 10-19.

Baig, M. A. (2009). The Effectiveness of Market-Based Monetary Transmission Mechanism in Pakistan (January 1993-April 2009). *Book Review*, *146*.

Ball, L. (1993). What determines the sacrifice ratio? *NBER Working Paper No. 4306*.

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.

Bernanke, B. S., & Gertler, M. (1999). Monetary policy and asset price volatility. *Federal Reserve Bank of Kansas City Economic Review, 84*(4), 17-51.

Bernanke, B. S., & Mihov, I. (1998). Measuring monetary policy. *The Quarterly Journal of Economics, 113*(3), 869-902.

Bloch, M. I. (2020). Assessing Monetary Credibility of ASEAN Countries: A Time-Varying Analysis with CAPM and Kalman Filter Algorithm. *Journal of Policy Options*, *3*(4), 119-123.

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

Dang, V. D., & Dang, V. C. (2021). Bank diversification and the effectiveness of monetary policy transmission: Evidence from the bank lending channel in Vietnam. *Cogent Economics & Finance*, *9*(1), 1885204.

Dornbusch, R. (1988). Real exchange rates and macroeconomics: A selective survey. *NBER Working Paper No. 2775*.

Enders, W. (2014). *Applied econometric time series* (4th ed.). Wiley.

Hayat, R. Z. H., Sheikh, M. R., & Gill, F. L. (2022). Monetary Transmission Mechanism and Macroeconomy in Pakistan: Monetary Transmission Mechanism and Macroeconomy in Pakistan. *Pakistan Journal of Economic Studies (PJES)*, *5*(1), 189-213.

Hun, Y., Bashir, A., & Raza, M. (2024). The Impact of FinTech Partnerships on Banking Digitalization and Post-Crisis Economic Resilience. *Journal of Business and Economic Options, 7*(3), 1-9.

Hussain, A. (2018). Banking Privatization and Profitability in Pakistan: A Time Series Analysis. *Journal of Business and Economic Options, 1*(1), 30-37.

Hussain, S. I. (2014). Monetary transmission mechanism in Pakistan: Credit channel or interest rate channel. *JISR management and social sciences & economics*, *12*(2), 45-62.

Iqbal, K., & Raza, A. (2018). Impact of Foreign Exchange Rate Volatility on Money Demand in Pakistan: An Empirical Analysis. *Journal of Policy Options, 1*(3), 74-83.

Iqbal, Y., & Shahzad, M. (2020). Analyzing the Nexus Between Economic Development and Money Monetization: Evidence from Pakistan. *Journal of Business and Economic Options, 3*(3), 111-119.

Jordà, Ò., Schularick, M., & Taylor, A. M. (2013). When credit bites back: Leverage, business cycles, and crises. *Journal of Money, Credit and Banking, 45*(s2), 3-28.

Kabir, M., & Rashid, A. (2019). Determinants of working capital management practices: Evidence from Pakistani banks. *Journal of Policy Options, 2*(4), 83-90.

Khan, S. (2020). Understanding Multidimensional Poverty in Khyber Pakhtunkhwa: insights and implications for policy. *Journal of Policy Options*, *3*(2), 44-48.

Lütkepohl, H. (2005). *New introduction to multiple time series analysis.* Springer.

Mahmood, H., & Aslam, M. (2018). Impact of Plastic Money Adoption on Consumer Purchasing Habits: A Study in Pakistan. *Journal of Policy Options, 1*(1), 28-33.

Mishkin, F. S. (2001). The transmission mechanism and the role of asset prices in monetary policy. *NBER Working Paper No. 8617*.

Mohanty, D. (2012). Evidence of interest rate channel of monetary policy transmission in India. In *Second International Research Conference at the Reserve Bank of India, February* (pp. 1-2).

Omay, F. (2022). Cluster-Based Economic Development: Life Cycle Stages and Policy Implications. *Journal of Policy Options*, *5*(1), 9-14.

Omri, M. B. (2022). Understanding the relationship between liquidity and banking financial stability in Islamic and conventional banks. *Journal of Business and Economic Options, 5*(1), 39-47.

Roussel, Y., Ali, A., & Audi, M. (2021). Measuring the money demand in Pakistan: a time series analysis. *Bulletin of Business and Economics (BBE), 10*(1), 27-41.

Sana, S., Malik, S., & Sheikh, M. R. (2022). Investigating The Effectiveness Of Channels Of Monetary Transmission Mechanism In Pakistan: An Application Of Var Model, Impulse Response Function And Variance Decomposition. *Bulletin of Business and Economics (BBE)*, *11*(2), 160-183.

Schwarz, G. (1978). Estimating the dimension of a model. *The Annals of Statistics, 6*(2), 461-464.

Senturk, I., & Ali, A. (2021). Effectiveness of Monetary Policy Channels: Insights from Four Emerging Economies. *Journal of Business and Economic Options*, *4*(3), 1-9.

Serani, C. (2024). Dynamics of Money Demand and Supply in the US Economy. *Journal of Business and Economic Options, 7*(2), 20-26.

Sims, C. A. (1980). Macroeconomics and reality. *Econometrica, 48*(1), 1-48.

Singh, P., Das, S., & Kumar, V. (2024). Macroeconomic, Institutional, and Accounting Drivers of Banking Fragility in Europe. *Journal of Business and Economic Options, 7*(4), 53-62.

Stock, J. H., & Watson, M. W. (2001). Vector autoregressions. *Journal of Economic Perspectives, 15*(4), 101-115.

Taylor, J. B. (1993). Discretion versus policy rules in practice. *Carnegie-Rochester Conference Series on Public Policy, 39*, 195-214.

Taylor, J. B. (1995). The monetary transmission mechanism: an empirical framework. *Journal of economic perspectives*, *9*(4), 11-26.

Taylor, J. B. (2002). *The monetary transmission mechanism and the evaluation of monetary policy rules*. Banco Central de Chile.

Zhang, Y. (2021). Measuring Progress Toward Sustainable Development Goals Through Legal Integration and Policy Guidance. *Journal of Energy and Environmental Policy Options*, *4*(1), 1-8.