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The Operational Aspects of Monetary Policy in Controlling the Demand and Supply of Money

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ABSTRACT

Purpose: The primary aim of this research is to examine how monetary policy operationally manages the demand and supply of money within Bangladesh's economy.

Methodology: This analysis is based on structured interviews conducted with 207 respondents from Bangladesh Bank and 19 listed private conventional commercial banks. The data were interpreted using percentages, descriptive statistics, and varimax rotated factor analysis.

Findings: Based on adjusted mean scores, the research identified and ranked 14 factors influencing Bangladesh's control of money supply and demand. The most impactful tools identified were interest rate-related instruments, reserve instruments, open market operations, and credit control tools, as determined by varimax rotated factor analysis. The rankings accurately represent the current state of the money market in Bangladesh.

Practical Implications: The study fills a gap in the literature and tests existing theories on monetary policy in Bangladesh. The findings are valuable for regulators, commercial banks, academics, and policymakers, providing insights that could enhance the effectiveness and goal orientation of central bank policies.

Research Limitations: The small sample size of 207 respondents limits the study's scope. Additionally, restricted access to previous studies and data limitations posed challenges. The research focused solely on Bangladesh Bank and listed private commercial banks, excluding non-bank financial institutions (NBFIs) and the capital market.

1.0 Introduction

Bangladesh is experiencing rapid economic growth, positioning it as one of the world's most rapidly developing economies as well as within the South Asian region. Several policy factors have contributed to this economic success, with monetary policy being a key one. Monetary policy is a fundamental aspect of a nation's economy, affecting people, large

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financial institutions (local and foreign), and the whole economy (Good friend and King, 1988). It plays a crucial role in macroeconomic management, exerting influence on important economic factors such as employment, price stability, economic growth, and agricultural prices (Anowor & Okorie, 2016). The Bangladesh Bank has considered critical aspects of managing the economy's demand and supply of money. The main goals of the Bangladesh Bank are to ensure the stability of the financial and monetary systems, increase the national monetary value, maintain a competitive external value of the taka, and foster the development and growth of the country's productive resources in the best interest of the nation (Bank, 2021). The primary function of the central bank is to develop and execute monetary policy, with the Bangladesh Bank releasing its monetary policy statement (MPS) twice a year in January and July. In Bangladesh, the implementation of monetary policy involves the use of several instruments and techniques, such as the bank rate, open market operations (OMO), repurchase agreements (Repo) and reverse repo, and reserve requirements (SLR and CRR) (Bank, 2021). There are three main ways that central banks handle monetary policy: they either look at market liquidity and use open market operations to control short-term interest rates, they look at liquidity positions and use open market operations to target bank reserves while letting interest rates change, or they control monetary conditions by controlling both the amount and cost of liquid assets (Reddy, 2005).

1.1 Objectives of the Study:

The study's primary objective is to analyze the operational aspects of monetary policy in regulating the demand and supply of money in Bangladesh's economy. To achieve this main objective, the study has addressed the following specific objectives:

i. To identify the variables related to the operational aspects of monetary policy through a review of the literature and content analysis.

ii. To determine the impact level of various factor variables in controlling the demand and supply of money in Bangladesh's economy.

iii. To examine the many aspects of the operating components of monetary policy in Bangladesh.

2. Review of Literatures on Operational Aspects of Monetary Policy

The researcher conducted a review of existing literature on monetary policy, both domestic and international, to understand the nature of the study and identify the research gaps or problems as follows:

2.1 Prior Evidence: Foreign Context

Bernanke (2020) has examined the limitations on conventional monetary policy presented by the practical lower limit on short-term interest rates. The research examines the Fed’s new monetary instruments, with an emphasis on quantitative easing (QE) and forward guidance, the two most important new powers. The new instruments have proved successful at

alleviating the economic position when policy rates are limited by the lower bound, even when central banks are operating properly, according to the researchers, and they could be made even more useful in the future. As a result, these new technologies should become part of the conventional toolbox for central banks. Simulations of the Fed's FRB/US model show that if the nominal neutral interest rate is in the range of 2–3%, as most analysts predict for the US, the combined effect of QE and forward supervision can provide an average of roughly three percentage points of regulatory policy, mainly reducing the influence of the lower bound.

Maehle (2020) has addressed practical difficulties for nations interested in reforming their monetary policy regimes. It contends that day-to-day stabilization of short-term interest rates offers substantial benefits and those short-term interest rates, not reserves money, and should be the daily operational goal in most instances, even for nations using a money-targeting policy approach. The article explores ways to improve policy transmission by combining a policy development approach based on monetary variables with an operational framework that guarantees more stable and predictable short-term rates. It also goes through how to set up an interest-rate-based operational framework while markets are still developing, and liquidity management capability is limited.

Sourigna, Zhu, and Chanthavieng (2018) have discussed the money related arrangements that have been created and executed by the Bank of Lao PDR (BOL). This article presents the money related arrangement structure in Laos which incorporates the approach instruments and execution component. Researchers applied the actual implementation and the existing hypotheses to show the Lao money related apparatuses, for example, interest rate, open market activity, hold proportion, exchange rate, credit control, cash management, and applicable guidelines. Just as the approach execution component has been introduced in strategy choice, operation department, and operation instrument. It applies the descriptive examination on the money related strategy execution challenge and tending to. They dependent on money related approach speculations, writing consideration, and viable experience from the activity authority. The investigation has discovered the difficulties as the restricted market activity; the dollarization and products monetary standards shopper inclination; the test in Kip price, and Kip lending; the remote capital outflow. At that point, the examination pushed ahead to the test tending to. These measures are taken to keep up the productive administration of the fiscal framework, guarantee adequacy of the money related strategy execution in the long haul

Maehle (2014) has discussed some major practical issues focused on money, which are aimed at countries that want to reform their monetary policy regime. In line with previous advanced financial targeting procedures in the country, the report states that short-term interest rates, rather than reserve money, should be an operational target for day-to-day liquidity activities as well as for countries that rely primarily on financial aggregates to guide policy formulation. This article discusses how the framework for formulating monetary policy can be combined with an operational framework in interest rates; The use of short-term

accumulators as information variables in guiding short-term interest rate determination; Advantages and disadvantages of alternative liquidity management configurations; And the need for a clear and explicit numerical inflation target, even if it relies on the monetary aggregates model.

Kashiap and Stein (2012) have noted that in October 2008, the US Government reserve system declared that it might begin paying intrigued on required and abundance reserves of deposit-taking teach after Congress had fair authorized them. The Bolstered hence joined an outsized number of other central banks which had as of now applied intrigued rates on reserves (IOR) sometime the onset of the around the world budgetary emergency. Given the Fed's current approach of keeping government subsidizing rates on the brink of zero, the IOR has in this way distant not been a quantitatively imperative device; as of this composing, the rate paid is simply 25 premise focuses. In any case, the IOR can demonstrate monstrously valuable underway, given the development of the Fed's record much obliged to its quantitative facilitating.

Kayum (2016) has proposed to analyze the connection between the repo rate and lending rate. Utilizing month to month information from June 2011 to June 2016, just as practicing Schwarz Bayesian Information Criterion, this paper found that there is a positive correlation between the loaning rate and repo rate. Hence, there is an asymmetry in this relationship. Banks' lending rate influences the repo rate essentially a positive way however the repo rate doesn't influence the lending rate in a critical manner. This discovery represents that the market lending rate is influenced by the central banks' policy rate by the same line..

2.2 Prior Evidence: Bangladeshi Context

Sayed (2018) has shown that high CRR and SLR values in reserve money contribute to maintaining the historical average inflation rate and determining interest rates and exchange rates in Bangladesh. To complete this research paper, a monetary analysis model was used that takes into account the RM, the interest rate, and the NEER, which is responsible for inflation. This document reveals that the RM affects the M2 money multiplier through the money multiplier; in addition, it reveals that the effects of the money supply are crucial to the calculation and change all the time.

Kashem (2015) has presented by the occasional dynamic relationship between key currency variables in Bangladesh. The main purpose of this article is to examine the dynamic and occasional relationship between the reserve funds and the net foreign assets of the Bangladesh Bank and government loans from the Bangladesh Bank between 1975 and 2014. However, the researcher uses unit root tests, Granger causality tests, error-correction models, and Johansen co-integration tests to execute this paper. This article attempts to fill an existing gap in the literature on the process of implementing monetary policy in Bangladesh.

Ahmed, Muzib, and Saha (2015) have quantitatively assessed the Bangladesh supply of money function using time series yearly data from 1986-1987 to 2008-2009 using the conventional linear regression methodology. It also investigates how the speed of adjustment,

which is proportional to the difference between all the deposit interest rates and the nominal interest rate, would impact on M1 and M2. The study discovered that remittances are the most important factor influencing Bangladesh's narrow and wide money supply. However, the functioning of the indicators, deposit interest rate and interest rate spread revealed unexpectedly negative results. These anomalies may be ascribed, at least in part, to the existence of significant Multicollinearity in the response variable and/or data issues. Because these components, M1 and M2, restrict the Bangladesh Bank's degree of control over the money supply, effective monetary policy would rely heavily on considering the consequences of changes in these important components.

Rahman (2014) has investigated whether using M3 rather than M2 in the Bangladesh Bank's monetary programming would result in a more accurate explanation of consumer price index inflation and a reduction in errors when targeting monetary growth. The estimated results of the studies show that M2 has a comparatively higher correlation with price and that using M2 in monetary targeting results in a relatively lower deviation between actual and planned money growth. As a result, the Bangladesh Bank may continue to use M2 in its yearly monetary programming, as it already does, while monitoring the connection between M3 and prices.

Sayed (2014) has explored the financial aggregates such as M2, RM, and balance of payments accounts are appropriate for analyzing economic factors in the development of Bangladesh's monetary and credit policies. Taking the Bangladesh GDP growth model and the quantitative theory of money into consideration, participative and judgmental methods are eventually utilized to facilitate the development of M2, RM, and BOP. The study discovered that wise monetary policy impacts supply, whereas income and interest rates mostly affect demand and money.

Islam (2010) has examined how the Bangladesh Bank controls the money supply via its various operational tools utilizing different ratio analysis from 1994 to 2010. BB strives to keep its balance sheet in good shape. However, the components of BB's balance sheet fluctuate, which has an impact on the money supply. M1 and M2 behavior suggests that they are changing owing to changes in the NFA, NDA, RM, and GDP, as well as inflation of the targets of M1 and M2. Deposits are also not required at all times. The system's contribution to the sources of money supply is inconsistent. The BB must take more effective steps to control its operational equipment.

Ali and Islam (2010) have examined Bangladesh's money supply mechanism employing yearly series data for the period. The authors note that the Bangladeshi money supply grew especially rapidly via the influence of higher-powered money (i.e. currency in circulation plus bank deposits), which supported the monetarist paradigm. Thus, beyond the monetarist perspective, other factors such as bank rates, financial factors, and economic innovation are needed to explain the supply of money operations. Additional abovementioned factors were

discovered to affect the wide money supply in Bangladesh. Even with the large money model, the predicted findings had to be taken very carefully.

Younus and Akhtar (2009) have investigated the SLR as a monetary policy tool in Bangladesh. Although the SLR has rarely fluctuated a little since the 1970s, the data suggests that lower SLRs had a beneficial effect on bank lending and investment, particularly prior to the 1990s. The direct credit control strategy was abandoned when the FSRP was implemented in 1990, and the Bangladesh Bank (BB) has been utilizing OMOs as an indirect monetary policy tool to manage money supply and credit in Bangladesh since then. Changes in the SLR and CRR in recent years have helped to decrease inflation to some degree in FY05 and FY06. The SLR also aids in the reduction of interest rate differentials, which boosts investment and economic activity.

Bank (2005) has written to comment on the Bangladesh Bank's monetary policy approach. The primary goal of the Monetary Policy Planning Paper is to explain the Bangladesh Bank's (BB) monetary policy planning and execution, as well as to convey its evaluation of current and anticipated financial and inflation trends to members of the public. During this time, monetary policy was managed via direct control of different instruments, such as the amount and direction of loans and interest rates. Simultaneously, efforts to split administrative imports were required in order to justify the need for surplus foreign currency. Taka's international efficiency has been measured against a weighted international currency basket and corrected for Real Effective Exchange Rate inflation since 1985. (REER). Since the implementation of the banking sector policy framework in 1989, wider monetary policy has progressively moved toward managing indirect inflation via cumulative fiscal targeting. The changes resulted in the discontinuation of direct lending as well as the progressive liberalization of the interest rate system.

Hossain (1993) has developed and tested the stability of a quarterly short-run monetary policy framework for Bangladesh from 1976q4 to 1989ql. The main drivers of money demand in Bangladesh are determined to be real income, interest rates, and the anticipated rate of inflation. The Chow, CUSUM, and CUSUMSQ stability tests indicate that, although the wide money demand function was generally stable during much of the 1980s, the narrow money demand function showed instability from 1982 to 1987. This instability in the money demand function may have been induced by Bangladesh's financial reforms during the early 1980s.

2.3 Identification of Variables of Operational Aspects of Monetary Policy

Several scholars have conducted research to examine the practical aspects of monetary policy in managing the supply and demand of money in the economy of Bangladesh (MPS, 2009-2020; Maehle, 2020; Sourigna, Zhu & Chanthavieng, 2018; Sun, 2013; Kashyap & Stein, 2012; Mohanty, 2011; Younus & Akhtar, 2009; Reddy, 2005; Bank, 2005). A thorough review of the literature, the monetary policy statement, and content analysis has identified numerous operational factors that effectively control the demand and supply of money within

the monetary policy of the central bank of Bangladesh. The researcher has compiled the results and findings from previous literature reviews in Table 1.

Table-1: Identification of Variables of Operational Aspects of Monetary Policy

Factor Variables		Research Study									
		MPS (2009-2020)	Maehle (2020)	Sourigna, Zhu & Chanthavieng (2018)	Alvarez, Casavecchia, De Luca, Duering, Eser, Helmus & Vergote (2017)	Sun (2013)	Kashyap & Stein (2012)	Mohanty (2011)	Younus & Akhtar (2009)	Reddy (2005)	Bank (2005)
Factor Variables	Bank Rate	✓	✓			✓	✓	✓	✓	✓	✓
	Interest Rate	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Cash Reserve Ratio	✓	✓		✓	✓	✓	✓	✓	✓	✓
	Statutory Liquidity Ratio	✓	✓		✓	✓		✓	✓	✓	✓
	Open Market Operations	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Exchange Rate	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Repo Rate	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Reserve Repo Rate	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Moral Suasion	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Selective Credit Control Methods	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Interest on Reserves	✓	✓				✓				
	BB Bill Auctions	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Deposit Ratio	✓	✓		✓				✓		
	Lending Ratio	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Cash Flow Management	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Bangladesh Government Islamic Investment Bond	✓									
	Monetary Policy Strategies	✓		✓							
Model Used	Descriptive Analysis	✓		✓	✓			✓	✓		
	Content Analysis	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Regression Analysis	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

3. Methodology of the Study

The researcher collected primary data through structured interviews with 207 sample respondents. The research specifically examined Bangladesh Bank and 19 private conventional commercial banks that are mentioned (see Appendix-I) in order to obtain data conveniently. We deliberately chose 36 personnel from certain divisions inside Bangladesh Bank, including the Monetary Policy, Regulatory, Inspection, and Foreign Exchange Policy and Investment departments. We deliberately chose 171 bank professionals, with nine individuals picked from each sample bank, namely from the Treasury, Risk Management, and Credit departments. We used purposive sampling to guarantee precise views from officials who are actively engaged in the implementation of monetary policy inside their individual institutions. The study is structured into multiple phases. Firstly, we examine the operational tools employed in monetary policy. Next, we identify variables associated with the operational aspects of monetary policy by conducting a thorough review of relevant literature and performing content analysis. Subsequently, we rank these variables based on their impact on regulating the demand and supply of money, utilizing mean scores to identify key factors

affecting money demand and supply at Bangladesh Bank using varimax rotated factor analysis, analyze and interpret these factors, rank the factors based on weighted scores, and summarise the findings The researcher utilized percentage, descriptive statistics, and varimax rotated factor analysis to analyze and interpret respondents' opinions.

4. Analysis of Operational Tools for Effectiveness of Monetary Policy

The efficient use of operational tools is essential for the effectiveness of monetary policy in controlling the demand and supply of money in the economy of Bangladesh.

Table-2: Application of Monetary Policy Statement (MPS)

Sl. No.	Application of MPS	Respondents	Percentage
i.	Outline the Position of Monetary Policy	177	85.5%
ii.	Supporting Government Policies and Initiatives for Quicker Inclusive Economic Development	192	92.8%
iii.	Poverty Reduction	144	69.6%
iv.	Maintaining Price Stability	183	88.4%

In table-2, 92.8% of the respondents are of the view that monetary policy is used to support government policies and initiatives for quicker inclusive economic development. Moreover, 88.4% of the respondents' opinion that maintaining price stability is the other most significant use of monetary policy, and 85.5% of the respondents' view that outlining the position of monetary policy is one of the uses of monetary policy. In the study, the minimum number of respondents but satisfactory levels of respondents are of the opinion that reducing poverty is using monetary policy, accounting for 69.6% of the total. As a result, the study has found that supporting government policies and initiatives for quicker inclusive economic development, maintaining price stability, outlining the position of monetary policy and reducing poverty have significant implications for the Bangladesh Bank's monetary policy because more than half of the respondents agreed with the above set of uses.

Table-3: Target of Monetary Policy Framework

Sl. No.	Targeted Framework	Respondents	Percentage
i.	Monetary Aggregate Targeting	117	56.5%
ii.	Interest Rate Targeting	174	84.1%
iii.	Inflation Targeting	126	60.9%
iv.	Exchange Rate Targeting	75	36.2%

In table-3, the majority of the sample respondents are of the view that the central bank's monetary policy is framed targeting interest rate (84.10%) and targeting inflation rate (60.90%). 56.5% of the respondents are of the view that monetary aggregate targeting is the one of the monetary policy frameworks. These respondents' views reflect actual practices of

the monetary policy framework in Bangladesh. As a result, the study has found that the set of monetary policy frameworks chosen by the researchers has significant implications for the Bangladesh Bank's monetary policy because more than half of the respondents agreed to the above set of monetary policy frameworks, except for the exchange rate targeting.

4.1 Ranking of Variables in Controlling the Demand and Supply of Money

The research has determined the impact of factor factors on regulating the demand and supply of money in the economy of Bangladesh, using adjusted factor variables. The discovered levels of influence are as follows:

Table-4: Ranking of Variables in Controlling the Demand and Supply of Money

Sl. No.	Variables Factors	Mean Score ($\bar{x}$)	Standard Deviation (σ)	Adjusted Factor Variable ($\bar{x}/\sigma$)	Ranks
X_1	Bank rates can influence money supply and demand by changing the central bank's rate of loans to commercial banks.	4.145	.928	4.467	**V**
X_2	The Cash Reserve Ratio (CRR) is the main component of monetary policy, which regulates the money supply, level of inflation, and liquidity in Bangladesh.	4.203	.867	4.846	**IV**
X_3	The Statutory liquidity ratio (SLR) is used to control inflation by increasing and decreasing the money supply.	4.058	.765	5.306	**II**
X_4	Open market operations (OMO) manipulate the short-term interest rates and the supply of base money in an economy and indirectly control the total money supply.	4.275	.802	5.329	**I**
X_5	The Repo Rate is a powerful arm of the Bangladeshi monetary policy that can regulate the country's money supply, inflation levels, and liquidity.	3.797	.867	4.378	**VI**
X_6	The Reserve Repo Rate is a monetary policy instrument that can control the money supply.	3.667	.934	3.925	**VII**
X_7	Moral suasion is a psychological phenomenon that controls credit in the economy.	2.870	1.175	2.443	**XIV**

X_8	Selective Credit Control Methods can be used to favor exports over imports or essential over non-essential credit supply.	3.275	1.013	3.234	**IX**
X_9	Interest in Reserves can control the money supply of Bangladesh.	3.348	1.198	2.794	**XIII**
X_{10}	BB Bill Auctions are a policy instrument that can control the money supply.	3.768	1.045	3.605	**VIII**
X_{11}	By measuring the deposit and lending ratio, the Bangladesh bank can control the money supply.	4.058	.802	5.058	**III**
X_{12}	Cash Flow Management is an essential tool for controlling the money supply and demand in Bangladesh.	3.565	1.156	3.083	**X**
X_{13}	The central bank has fixed the rate based on the Bangladesh Government Islamic Investment Bond, which can control the money supply.	3.275	1.069	3.063	**XI**
X_{14}	Monetary policy strategies effectively ensure the flow of funds without affecting the inflation rate.	3.507	1.184	2.963	**XII**

The analysis of Table-4 reveals that the key factors influencing the demand and supply of money are open market operations, statutory liquidity ratio, deposit and lending ratio, cash reserve ratio, bank rate, and repo rate. These factors are ranked as I, II, III, IV, V, and VI, respectively. On the other hand, moral suasion is the least influential factor, ranked at 14, in controlling the demand and supply of money. As a result, the study has concluded that the researchers' choice of monetary policy factor variables significantly impacts the implementation of monetary policy by Bangladesh Bank.

4.2 Identification of Factors in Controlling the Demand and Supply of Money

The research gathered comments from 207 participants on 14-factor factors pertaining to the regulation of money's demand and supply. This was done using five-point Likert scales. In order to evaluate the appropriateness of the factor model, the research used the Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity. The KMO measure obtained was 0.679, which indicates that the data is suitable for factor analysis since it above the suggested threshold of 0.50 (Hair, et al., 1995; Tabachnick, et al., 2007). The Bartlett's Test resulted in a chi-square statistic of about 259.853, with 91 degrees of freedom and a significance level of 0.000. This confirms that Bartlett's Test is adequate for factor analysis, since its significance level is less than 5% (Hair et al., 1995; Tabachnick et al., 2007). Afterwards, the research used a Varimax Rotated Factor Analytical Model to thoroughly examine the data. The subsequent examination is meticulously outlined in the next paragraph:

The zero-order correlation matrix derived from the study on the operational elements of monetary policy in the economy of Bangladesh is shown in Appendix-II. This matrix demonstrates the connections between variables (Williams, et al., 2010). The correlation matrix is often used in academic contexts and is a conventional method in factor analysis (Henson, et al., 2006). The data shows that there are 25 coefficients that have correlations greater than 0.30, which is regarded to be appropriate for Factor Analysis (Sarbabidya, 2015; Tabachnick, et al., 2007). This indicates robust linkages among all variables in the matrix, suggesting their relationships with analogous underlying causes.

According to the correlation analysis, the variables under study have developed various groups based on the relationship inherent between variables. Variables within the group have been discovered to have significant relationships at different significance levels, such as 1%, 5%, and 10%. Firstly, there was a significant positive association between variables x_1 and x_2, x_3, and x_{13} at the 1% level of significance and a substantial positive relationship between variables x_1 and x_{12}, x_{14} at the 5% level of significance. Additionally, at the 10% significance level, a significant positive correlation appeared between the variables x_1 and x_{11}. Second, there was a significant positive link between variables x_2 and x_3, x_4 at the 1% level of significance, and a significant positive relationship between variables x_2 and x_{10}, x_{11}, and x_{12} at the 10% level of significance. Thirdly, there was a significant positive association between variables x_3 and x_{12} at the 1% level of significance and a significant positive relationship between variables x_3 and x_4 at the 5% level of significance. Additionally, at the 10% significance level, a significant positive correlation appeared between the variables x_3 and x_9, x_{14}. Fourthly, at the 10% significance level, a significant positive correlation occurred between the variables x_4 and x_7. Fifthly, there was a significant positive association between variables x_5 and x_6, and x_{11} at the 1% level of significance and a significant positive relationship between variables x_5 and x_8 at the 5% level of significance. Additionally, at the 10% significance level, a significant positive correlation appeared between the variables x_5 and x_{10}. Sixth, there was a significant positive association between variables x_6 and x_7, x_{11} at the 1% level of significance, and a significant positive relationship between variables x_6 and x_8 at the 5% level of significance. Seventhly, at the 1% significance level, there was a significant positive association between the variables x_7 and x_8, x_{10}, x_{11}, and x_{13}. Eighth, there was a significant positive association between variables x_8 and x_9 at the 1% level of significance and a significant positive relationship between variables x_8 and x_{11} at the 10% level of significance. Ninthly, there was a significant positive association between variables x_9 and x_{14} at the 1% level of significance and a significant positive relationship between variables x_9 and x_{11} at the 5% level of significance. Additionally, at the 10% significance level, a significant positive correlation appeared between the variables x_9 and x_{12}. Tenthly, there was a significant positive association between variables x_{10}, x_{11}, and x_{12} at the 1% level of significance and a significant positive relationship between variables x_{10} and x_{13} at the 10% level of significance. Eleventh, at a 1% significance level, there was a significant positive association between the variables x_{11} and x_{12}, x_{13}. Twelfth, at a 5% significance level, there was a significant positive association between the variables x_{12} and x_{13}, x_{14}. Finally, at a 5%

significance level, there was a significant positive association between the variables x_{13} and x_{14}. The underlying significant relationships between these variables are going to form orthogonal factors.

5. Identification of Principal Factors

The research uses factor analysis's 'Principal Components Varimax Rotated Method' to look at how monetary policy works in Bangladesh to control the money supply and demand. More variance may be explained by the major component factor than by any factoring loading. By deducing a structure from the input data's correlation structure alone, an algorithm may determine group membership. We then used Kaiser's (1958) criterion of Eigenvalue > 1 to determine how many primary components to keep in the study. The associated elements are more trustworthy in principal components with higher reliability coefficients since they can be reproduced in other research of the same sort. The community, which quantifies how much each variable can be explained by the underlying factors, is then calculated. After that, we averaged the relevant group variables and the weighted average of the primary factor loadings to get factor scores. In order to decide if a certain variable should be included in the components, James Wheeler (2005) makes use of similarities in principle component analysis. According to Tabaknick and Fidell (2007), Principal Components Analysis (PCA) is able to break down large sets of variables into their component parts. Predictions of the variance in each component or element that substantially contributes to each variable are known as initial communalities. According to Carol and Michael (2011), if we isolate the primary factors, the correlations always come out as 1.0. This data demonstrates that all components have a substantial mean community higher than 0.50 upon removal. Inability to identify consistent and particular elements would result from failing to meet this requirement (Yong & Pearce, 2013). Finding the number of significant variables is done by calculating the total variance explained. Only the data that has been extracted and rotated is useful for interpretation. Based on their ability to explain variation in the data, we rank the variables from most to least significant. The extraction sums of squared loadings reflect the original eigenvalues, except for components with eigenvalues less than one. Before rotation, the variance and eigenvalues are displayed in the Extraction Sums of Squared Loadings. After rotation, the Rotation Sums of Squared Loadings show the adjusted eigenvalues and variance. Yong and Pearce (2013) suggest that the rotated eigenvalues may be used to identify significant components. An eigenvalue greater than 1.0 serves as the first step for extracting five components, as shown in Appendix-III. This is a widely used criteria for determining the usefulness of a component. A component sends less information than a single item when its eigenvalue is less than 1.0 (Loewen, et al., 2015).

5.1 Examination of Variables

The Rotated Factor Matrix table aids in interpreting the analysis results by simplifying variables through rotation. This method helps identify distinct underlying factors that can more effectively explain or predict various phenomena. As a result, each component can

account for multiple variables (Loewen et al., 2015). According to Sarbabidya (2015), loadings of 0.50 or higher are considered significant in this study. According to Appendix-IV, the factor matrix has been rotated to arrange the variables being studied into five factors. The interpretation of these factors will be discussed in the subsequent parts of the research.

Factor-1: Interest Rate Related Operational Tool

Sl. No.	Factor Variables	Factor Loading
X_5	The Repo Rate is a powerful arm of the Bangladeshi monetary policy that can regulate the country's money supply, inflation levels, and liquidity.	.825
X_6	The Reverse Repo Rate is a monetary policy instrument that can control the money supply.	.840
X_7	Moral suasion is a psychological phenomenon that controls credit in the economy.	.685
Variance Explained		**23.96%**

This factor has three variables with loadings ranging from 0.685 to 0.825. These variables have a positive correlation and together explain 23.96% of the total variation. These findings suggest that the repo rate, reverse repo rate, and moral suasion have a substantial impact on the design and efficacy of monetary policy in attaining its goals. This cluster is designated as the "Interest Rate Related Operational Tool."

Factor-2: Instrument for Liquidity Control of Banks

Sl. No.	Factor Variables	Factor Loading
X_2	Bank rates can influence money supply and demand by changing the central bank's rate of loans to commercial banks.	.814
X_3	The Cash Reserve Ratio (CRR) is the main component of monetary policy, which regulates the money supply, level of inflation, and liquidity in Bangladesh.	.781
X_1	The Statutory liquidity ratio (SLR) is used to control inflation by increasing and decreasing the money supply.	.628
X_4	Open market operations (OMO) manipulate the short-term interest rates and the supply of base money in an economy and indirectly control the total money supply.	.552
Variance Explained		**17.34%**

The factor consists of three variables with loadings between 0.552 and 0.814. These variables show a positive correlation and account for 17.34% of the total variance. This suggests that the bank rate, cash reserve ratio, and open market operations play a crucial role in the formulation and effectiveness of monetary policy in reaching its objectives. This group has been labeled as the "Instruments for Liquidity Control of Banks."

Factor-3: Reserve Instrument Tools

Sl. No.	Factor Variables	Factor Loading
X_{13}	The central bank has fixed the rate based on the Bangladesh Government Islamic Investment Bond, which can control the money supply.	.718
X_{14}	Monetary policy strategies effectively ensure the flow of funds without affecting the inflation rate.	.598
Variance Explained		**11.22%**

This factor comprises two variables with loadings between 0.598 and 0.718. These positively correlated variables account for 11.22% of the total variance. It is evident that the fixed rate set by the central bank, which is determined by the Bangladesh government Islamic investment bond, has a substantial impact on the design and efficacy of monetary policy in attaining its goals. A substantial cluster has been established, which is referred to as "Reserve Instrument Tools."

Factor-4: Open Market Operational Tool

Sl. No.	Factor Variables	Factor Loading
X_{10}	BB Bill Auctions are a policy instrument that can control the money supply.	.845
X_{11}	By measuring the deposit and lending ratio, the Bangladesh bank can control the money supply.	.587
X_{12}	Cash Flow Management is an essential tool for controlling the money supply and demand in Bangladesh.	.632
Variance Explained		**8.25%**

This factor includes three variables with loadings ranging from 0.632 to 0.845. These positively correlated variables account for 8.25% of the total variance. These findings indicate that BB bill auctions, the deposit and lending ratio, and cash flow management have a substantial impact on the development and efficacy of monetary policy in attaining its goals. As a consequence, a notable cluster called the "Open Market Operational Tool" has been formed.

Factor-5: Credit Controlling Operational Tool

Sl. No.	Factor Variables	Factor Loading

X_9	Interest in Reserves can control the money supply of Bangladesh.	.784
X_8	Selective Credit Control Methods can be used to favor exports over imports or essential over non-essential credit supply.	.773
Variance Explained		**7.19%**

This factor comprises two variables with loadings ranging from 0.773 to 0.784. These positively correlated variables explain 7.19% of the total variance. This suggests that interest on reserves and selective credit control methods significantly impact the development and effectiveness of monetary policy in achieving its goals. Consequently, this group has been named the "Credit Controlling Operational Tool."

5.2. Ranking of Factors

The ranking of tools used to control the demand and supply of money in Bangladesh's economy is based on their weighted scores. These scores are computed by multiplying the factor loadings with the mean scores of the variables, summing these products, and then dividing by the total number of variables. This method provides a quantitative measure of the relative importance and effectiveness of each operational tool in influencing monetary conditions within the economy.

Table-5: Ranking of Factors

Factors	Names	Score	Position
1	Interest Rate Related Operational Tool	2.726	**II**
2	Instrument for Liquidity Control of Banks	2.888	**I**
3	Reserve Instrument Tools	2.225	**V**
4	Open Market Operational Tool	2.606	**III**
5	Credit Controlling Operational Tool	2.578	**IV**

As shown in Table 5, ranks different factors based on their weighted scores, indicating their relative importance in monetary policy implementation. Topping the list is the "Instrument for Liquidity Control of Banks" with a weighted score of 2.888, highlighting its critical role in managing bank liquidity through tools like the bank rate and cash reserve ratio. Following closely is the "Interest Rate Related Operational Tool" at 2.726, emphasizing the significant impact of interest rate policies. Open market operations are ranked third with a score of 2.606, underscoring their pivotal role in monetary operations. The "Credit Controlling Operational Tool" ranks fourth (2.578), focusing on methods such as interest on reserves and selective credit controls. Lastly, "Reserve Instrument Tools" are ranked fifth (2.225), indicating their importance but lesser influence compared to other factors. Together, these

rankings provide insights into which tools are perceived as most crucial for achieving monetary policy objectives, reflecting their weighted contributions to policy effectiveness.

5.3 Summary of the Findings

The study has identified various applications of monetary policy by the central bank of Bangladesh to regulate the economy's money demand and supply, based on responses from participants. A significant majority, 92.8% of respondents, agree that monetary policy supports government initiatives for rapid inclusive economic development. Additionally, 88.4% highlight the importance of maintaining price stability, while 85.5% recognize the role of monetary policy in defining economic positioning. A substantial, though smaller, proportion (69.6%) believes monetary policy can contribute to reducing poverty. These findings underscore the significant implications of Bangladesh Bank's monetary policy in fostering economic stability and growth. Regarding monetary policy frameworks, a large majority of respondents endorse targeting the interest rate (84.10%) and inflation rate targets (60.90%). Additionally, 56.5% support monetary aggregate targeting as a framework. These views reflect the prevailing practices and preferences within Bangladesh's monetary policy framework, indicating widespread agreement among respondents on the efficacy of these approaches.

The study further evaluates the effectiveness of factors influencing money supply and demand control, based on mean scores adjusted from opinions gathered on a 5-point Likert scale. Factors such as open market operations, statutory liquidity ratio, deposit and lending ratios, cash reserve ratio, bank rate, and repo rate are ranked highest, affirming their critical roles in monetary policy effectiveness. Conversely, moral suasion is ranked least influential among the factors examined. Lastly, operational tools for controlling money supply and demand are ranked based on weighted scores. Factor-2 (Instrument for Liquidity Control of Banks) emerges as the most significant with a score of 2.888, encompassing variables such as bank rates, CRR, SLR, and OMO. Factor-1 (Interest Rate-Related Operational Tool) follows closely with a score of 2.726, focusing on repo rates, reserve repo rates, and moral suasion. This ranking accurately reflects the real-world dynamics of Bangladesh's money market, highlighting the pivotal role of these operational tools in shaping monetary policy outcomes.

6. Policy Implications:

The finding of the present study has been found to have implications for policy makers, regulators, professional, practitioners, researchers, economists etc. in the money market of Bangladesh. On the basis of findings and implications thereof, following suggestions have been put forwarded as follows:

i) The central bank should use following operational tools in order of their importance in controlling demand and supply of money with a view to accomplish MPS objectives and goals:

   a) Instrument for Liquidity Control of Banks

b) Interest Rate Related Operational Tool

c) Open Market Operational Tool

d) Credit Controlling Operational Tool

e) Reserve Instrument Tools

ii) Robust operational policy and tools of MPS are required to be ensured. To accomplish this, the central bank should set targets, objectives and strategies through proper planning and following due process without taken interest of bad forces of money market. This might prevent the central bank from frequent changes of provisions of MPS.

iii) The central bank should use different operational tools of MPS so that investment target cannot be subject to a risk due to ineffective credit control.

iv) Monetary policy should be framed by including relevant operational tools for exerting an expected and positive influence in underlying internal strength of commercial bank so that they can withstand against potential abnormal risk with profitable niche.

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- **Availability of data and materials:** The datasets comprising respondents' opinions collected through a structured questionnaire will be made available upon reasonable request.
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Appendix-I: List of Selected Listed Conventional Private Commercial Banks in Bangladesh

Sl. No.	Name of Listed Conventional Private Commercial Banks
i.	City Bank Limited
ii.	Dhaka Bank Limited
iii.	BRAC Bank Limited
iv.	AB Bank Limited
v.	Bank Asia Limited
vi.	Dutch-Bangla Bank Limited
vii.	United Commercial Bank Ltd
viii.	IFIC Bank Limited
ix.	Prime Bank Limited
x.	National Bank Limited
xi.	National Credit & Commerce Bank Limited
xii.	One Bank Limited
xiii.	Premier Bank Limited
xiv.	Trust Bank Limited
xv.	Uttara Bank Limited
xvi.	Southeast Bank Limited
xvii.	Mercantile Bank Limited
xviii.	Pubali Bank Limited
xix.	Eastern Bank Limited

Appendix-II: Zero Order Correlation Matrix for Operational Aspects of Monetary Policy

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}	X_{14}
X_1	1													
X_2	.383*	1												
	.001													
X_3	.485*	.514*	1											
	.000	.000												
X_4	.104	.341*	.237**	1										
	.397	.004	.050											
X_5	.001	-.003	.040	-.130	1									
	.997	.980	.743	.288										
X_6	.040	.157	.027	-.170	.623*	1								
	.747	.197	.823	.162	.000									
X_7	-.077	-.075	.009	-.211***	.450*	.496**	1							
	.530	.542	.944	.082	.000	.000								
X_8	-.106	-.098	.055	-.058	.299**	.269**	.426*	1						
	.388	.423	.653	.633	.013	.025	.000							
X_9	.179	.016	.202***	-.132	.041	.079	.179	.344*	1					
	.142	.896	.095	.281	.740	.520	.141	.004						
X_{10}	.065	.231***	.127	.112	.223***	.221***	.322*	.033	.112	1				
	.593	.056	.297	.358	.065	.068	.007	.785	.358					
X_{11}	.226***	.236**	.114	-.094	.419*	.321*	.367*	.215***	.300**	.437*	1			
	.062	.050	.350	.444	.000	.007	.002	.076	.012	.000				
X_{12}	.293**	.207***	.312*	.052	.131	.095	.088	-.059	.217***	.353*	.392*	1		
	.015	.089	.009	.673	.285	.436	.474	.627	.074	.003	.001			
X_{13}	.344*	.034	.268**	-.090	.172	.049	.322*	-.003	.188	.216***	.238**	.288**	1	
	.004	.781	.026	.464	.157	.689	.007	.980	.122	.075	.049	.016		
X_{14}	.294**	.013	.227***	-.087	-.099	-.111	.006	.017	.340*	.144	.123	.292**	.306*	1
	.014	.916	.061	.476	.419	.365	.961	.892	.004	.238	.312	.015	.010	

*. Correlation is significant at the 0.01 level (2-tailed).

**. Correlation is significant at the 0.05 level (2-tailed).

***. Correlation is significant at the 0.10 level (2-tailed).

Appendix-III: Analysis of Total Variance Explained for Operational Aspects of Monetary Policy

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings			
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Extraction
1	3.355	23.962	23.962	3.355	23.962	23.962	2.423	17.306	17.306	.711
2	2.428	17.343	41.305	2.428	17.343	41.305	2.084	14.883	32.189	.726
3	1.570	11.217	52.522	1.570	11.217	52.522	1.781	12.718	44.907	.719
4	1.156	8.255	60.777	1.156	8.255	60.777	1.734	12.386	57.294	.638
5	1.007	7.193	67.970	1.007	7.193	67.970	1.495	10.676	67.970	.699
6	.839	5.995	73.965							.719
7	.631	4.508	78.473							.640
8	.612	4.374	82.847							.798
9	.555	3.968	86.814							.717
10	.472	3.374	90.189							.753
11	.428	3.054	93.243							.606
12	.400	2.860	96.103							.580
13	.321	2.291	98.394							.592
14	.225	1.606	100.000							.618

Appendix-IV: Rotated Factor Matrix for Operational Aspects of Monetary Policy

Variables	Component				
	1	2	3	4	5
X_5	.825				
X_6	.840				
X_7	.685				
X_2		.814			
X_3		.781			
X_1		.628			
X_4		.552			
X_{13}			.718		
X_{14}			.598		
X_{10}				.845	
X_{11}				.587	
X_{12}				.632	
X_9					.784
X_8					.773