IRANIAN ECONOMIC REVIEW
Print ISSN: 1026-6542
Online ISSN: 2588-6096
https://ier.ut.ac.ir/
University of Tehran

# The Effects of Monetary Shocks in Sri Lankan Economy

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## Article Info

**Article Type:** Research Article

**Article History:**
Received: 02 October 2021
Received in revised form: 15 December 2021
Accepted: 17 January 2022
Published online: 01 October 2023

**Keywords:**
*Economic Growth, GDP, Monetary Policy, Monetary Variables, SVAR Model.*

**JEL Classification:**
*E42, C32, C52.*

## ABSTRACT

Monetary policy tools change from one country to another based on their legal and fiscal status. It is necessary to have models to understand monetary variables that affecting the economy of the country. This research study aims to evaluate the monetary variable shocks which affect the Sri Lankan economy. Five Structural Vector Autoregressive models called generic model, bank lending model, money effect model, exchange rate model and composite model were generated to evaluate the impacts of Sri Lankan Economy by the monetary variables Gross Domestic Product, Consumer Price Index, Reserve Money, Commercial Bank Loan, Money Supply, Bank Rate and Exchange Rate. It was found that, necessary action to be taken to implement appropriate monetary policies to keep gross domestic product in a progressive path. And keeping gross domestic product in a progressive path will lead Sri Lankan currency to appreciate against US dollar. Implementation of strong monetary policies to monitor bank rates and commercial bank loans closely will lead progressive economic growth.

**Cite this article:** Jahufer, A., & Hanainy, M. F. (2023). Effects of Monetary Shocks in Sri Lankan Economy. *Iranian Economic Review*, *27*(3), 1103-1133. DOI: https://doi.org/10.22059/ier.2022.85442

 **Publisher:** University of Tehran Press.
DOI: https://doi.org/10.22059/ier.2022.85442

## 1. Introduction

The research problem of this study is to develop time series models to understand how monetary variables affect the economy of Sri Lanka. And for this purpose, five Structural Vector Autoregressive (SVAR) models namely: Generic Model, Bank Lending Model, Money Effect Model, Exchange Rate Model and Composite Model were utilized.

In Sri Lanka, the Central Bank of Sri Lanka (CBSL) is the state authority, which is in charge for executing monetary policy and administrating currency within the country. As revealed, the key objective of monetary policy is to encourage a high and continuous level of output growth while maintain the inflation at a tolerable rate and the CBSL sets price consistency as its key monetary policy objective.

Monetary policy in Sri Lanka has experienced major fluctuations in the last few decades. Since 1977, the CBSL has gradually progressed to the use of market-based monetary policy tools. In the 1980s, the CBSL officially implemented a monetary aiming policy framework. Under this policy framework, the CBSL pursues to achieve its final objectives, by guiding monetary policy so as to maintain reserve money. Though, in 2002, the CBSL reviewed its monetary policy objectives, based on global developments and objectives that are now oriented toward economic and price stability and financial system stability. The new monetary policies implemented by CBSL aimed to maintain the reserve money at an acceptable level while maintaining interest rate and inflation rate compatible with target reserve money (Perera and Jayawickrema, 2014; Abeygunawardana et al., 2017).

Monetary policy is widely used by respective governing banks in various countries as an equilibrium instrument to manage their economic status, to achieve continuous and high output growth rates and to maintain low inflation rates. The efficiency of monetary policy depends on the policy-makers' capability to administrate correct valuations of the effects of monetary policy on price solidity and economic activities, as well as those of the timing of policy execution (Vinayagathasan, 2013).

Predictions from monetary policy models using monetary variables deliver significant understandings into how respective governing banks have maintained their monetary policy in the past, while guiding governing banks to set suitable interest rates in numerous macroeconomic environments. With the shift to inflation aimed frameworks, a considerable number of governing banks have implemented a more rule based tactic to monetary policy decision making (Perera and Jayawickrema, 2014).

Monetary policy tools change from one country to another based upon their legal and fiscal status. Monetary policies in developing countries are influenced by the world's major governing banks, i.e., the Federal Reserve Bank, the European Central Bank etc. Therefore, it is necessary to have models to understand monetary variables affecting the economy of the country (Cazacu, 2015).

This study aims to evaluate the monetary variable shocks which affect the Sri Lankan economic activities. Based on the extensive literature review, a set of factors such as Gross Domestic Product (GDP), Consumer Price Index (CPI), Commercial Bank Loans (CBL), Exchange Rate (ER), Aggregate Money Supply (M2), Bank Rate (BR) and Reserve Money (RM) were selected as monetary variables for the study. This paper is composed of five sections. Section two gives the review of empirical literature. In section three methodology is described. Section four illustrates the results and discussions. Conclusion is given in the last section.

## 2. Literature Review

Money is demanded and supplied similar to any other market products, and the law of demand and supply applies to it as well (Lashkary and Kashani, 2011). Governments use monetary policies to influence the level of aggregate demand in the economy, in an effort to attain economic aims of price solidity, full employment and economic development (Noman and Khudri, 2015). Assessing monetary variables is essential to observe the fluctuations in economic growth and impacts of monetary policies (Korauš et al., 2017).

GDP growth has continuously been treated as present issue which is studied by many scholars. Irregularity in growth of GDP per capita within a country will cause to higher rate of deficiency as well as delay the evolution in health, education, crime and ultimately the economic development. The factors towards GDP growth are fairly significant to avoid occurrence of socio-political instability (Kira, 2013).

CPI replicates fluctuations in the cost to the typical consumer of purchasing an amount of goods and services that may be fixed or altered at definite intervals, such as annually (Saravanan, 2015). Ahmed and Suliman (2011) evaluated the relationship between GDP and CPI in Sudan using unit root tests, Co-integration analysis and Granger Causality test. From the analysis, GDP and CPI are co-integrated suggesting an existence of long-run relationship. Ngalawa and Viegi (2011) used SVAR models to find the impacts of CPI in Malawi economy and found that CPI responds weakly to monetary impulses suggesting that inflation in Malawi may not be predominated by monetary factors. Iyiola and Adetunji (2014) investigated effects of CPI in Nigeria and found that CPI increases inflation rate.

Bank rate (BR) is demarcated as the rate at which the central bank offers short term loans to commercial banks (Ngalawa and Viegi, 2011). Hawwa (2018) studied the relationship between bank interest rates and the state monetary policy goals of monitoring inflation and stimulating output growth and it was found that Bank interest rates do not significantly affect the inflation and GDP. The term bank lending expresses commercial bank loans and advances. Takáts and Temesvary (2021) used regression models to predict the impacts of bank lending in UK economy and it was found that monetary policies significantly affect bank lending process as well as country's economy.

Dilmaghani and Tehranchian (2015) investigated the impacts of monetary policies on the exchange rate in developing countries using empirical and regression models and it was found that lag of exchange rate variable has a positive and significant effect on the exchange rate. Borrallo et al. (2016) studied the link between monetary policy, and

exchange rate changes at a quarterly frequency in Latin America, and it was revealed that country's currency tends to appreciate when there are higher and simultaneous policy rates in that country relative to others.

Fan et al. (2011) studied sensitivity of the Chinese government's monetary policies in terms of the money supply using VAR models and it was concluded that money supply responded actively to both the inflation rate and the real output. Ngalawa and Viegi (2011) found that Reserve Money and Aggergate Money Supply plays vital role in Malawi's economic activities. Victoria et al. (2016) used money supply as a variable to study the effectiveness of Nigerian monetary polies in economic growth using regression models, and it was revealed that money supply is significantly governed by monetary policies. Omankhanlen et al. (2021) used money supply as a variable to determine the impacts of monetary policies in bank profit in Nigeria and it was concluded that monetary authorities should have account money supply during monetary policy related decision making.

## 3. Methodology

### 3.1 Study Data

The main data source for this research is CBSL annual report in 2020. This research study uses monthly time series data for the period from January 2003 to December 2020. The starting date has been chosen based on the availability of data. The cut-off date corresponds to the date when the latest data on all variables of interest were available. Table 1 shows the description of selected monetary variables.

**Table 1.** Description of Monetary Variables

| Monetary Variable | Units | Remarks |
|---|---|---|
| Gross Domestic Product (GDP) | Sri Lankan Rupees (Mn) | Interpolated from quarterly series |
| Bank Rate (BR) | Percentage | Seasonally Adjusted using TRAMO and SEATS |
| Reserve Money (RM) | Sri Lankan Rupees (Mn) | Transformed to Logarithms<br>Seasonally Adjusted using TRAMO and SEATS |
| Loans and Advances/ Bank Lending (BL) | Sri Lankan Rupees (Mn) | Transformed to Logarithms<br>Seasonally Adjusted using TRAMO and SEATS |
| Exchange Rate (ER) | Sri Lankan Rupees per USD | Transformed to Logarithms<br>Seasonally Adjusted using TRAMO and SEATS |
| Aggregate Money Supply (M2) | Sri Lankan Rupees (Mn) | Transformed to Logarithms<br>Seasonally Adjusted using TRAMO and SEATS |
| Consumer Price Index (CPI) | Index No<br>Base Year 2002=100 | Transformed to Logarithms<br>Seasonally Adjusted using TRAMO and SEATS |

| Monetary Variable | Units | Remarks |
|---|---|---|
| | Base Year 2006/07=100 | |
| | Base Year 2013=100 | |

**Source**: Research finding.
**Note:** TRAMO (Time Series Regression with ARIMA Noise, Missing Observations and Outliers)
SEATS (Signal Extraction in ARIMA Time Series)

### 3.2 Model Specification

From the extensive literature review, it was observed that various methods have been explained and adopted by scholars to find the transmission mechanisms, effects of monetary policy and monetary variables.

Using the SVAR model for the Sri Lankan economy is very reasonable. Because, Sri Lanka has an open economy, the SVAR model can take into account the interdependence between domestic monetary policy variables and nominal exchange rates, and while CBSL's investment target is monetary total (reserve currency), short-term interest rates remain a major policy variable, but determine the most appropriate monetary policy instrument used to identify monetary policy shocks may not be clear or difficult in Sri Lanka. The SVAR model allows a combination of monetary totals and short-term interest rates to help identify monetary policy shocks properly (Perera and Wickramanayake, 2013). Third, the SVAR model is preferred as it takes no account of the time series properties of the data and due to relatively small sample size (MacDonald et al., 2011).

### 3.3 Estimation Method

Given that a simultaneous equation system models the dynamic relationship among the endogenous and exogenous variables, a vector representation of the SVAR system can therefore be given by the Equation (1).

$$Ay_t = \Omega + \phi_1 y_{t-1} + \phi_2 y_{t-2} + \cdots + \phi_p y_{t-p} + B\mu_t \quad (1)$$

where A is an invertible (nxn) matrix describing contemporaneous relations among the variables; $y_t$ is an (nx1) vector of endogenous variables such that $y_t = (y_{1t}, y_{2t}, \ldots, y_{nt})$; $\Omega$ is a vector of

constants; $\phi_i$ is an (nxn) matrix of coefficients of lagged endogenous variables ($\forall$ i = 1,2,3, … , p); B is an (nxn) matrix whose non-zero off–diagonal elements allow for direct effects of some shocks on more than one endogenous variable in the system; and $\mu_t$ are uncorrelated or orthogonal white-noise structural disturbances i.e. the covariance matrix of $\mu_t$ is an identity matrix E($\mu_t, \acute{\mu}_t$)=1. Equation (1) can be rewritten in compact form as:

$$Ay_t = \Omega + \phi(L)\, y_{t-i} + B\mu_t \quad (2)$$

where $\phi(L)$ is an $(nxn)$ finite order matrix polynomial in the lag operator L.

The SVAR presented in the primitive system of Equations (1) and (2) cannot be estimated directly due to the feedback inherent in a VAR process. Nonetheless, the information in the system can be recovered by estimating a reduced form VAR implicit in (1) and (2). Pre-multiplying Equation (1) by $A^{-1}$ yields a reduced form VAR of order p, which in standard matrix form is written as:

$$yt = \psi_0 + \sum_{i=1}^{p} \psi_i y_{t-i} + \varepsilon_t \quad (3)$$

where $\psi_0 = A^{-1}\Omega$ ; $\psi_I = A^{-1}\phi_i$ ; and $\varepsilon_t = A^{-1}B\mu_t$ is an (nx1) vector of error terms assumed to have zero means, constant variances and to be serially uncorrelated with all the right-hand side variables as well as their own lagged values though they may be contemporaneously correlated across equations. The variance-covariance matrix of the regression residuals in Equation (3) is defined as $\Sigma$ = E($\varepsilon_t, \acute{\varepsilon}_t$).Given the estimates of the reduced form VAR in Equation (3), the structural economic shocks are separated from the estimated reduced form residuals by imposing restrictions on the parameters of matrices A and B in Equation (4):

$$A\varepsilon_t = B\mu_t \quad (4)$$

which derives from Equation (3). The orthogonally assumption of the structural innovations i.e. E ($\mu_t, \acute{\mu}_t$) = 1, and the constant variance-covariance matrix of the reduced-form equation residuals i.e. $\Sigma$ = E($\varepsilon_t, \acute{\varepsilon}_t$).impose identifying restrictions on A and B as presented in equation(5):

$$A\Sigma A' = BB' \quad (5)$$

since matrices A and B are both $(nxn)$, a total of $2n^2$unknown elements can be identified upon which $n(n+1)/2$ restrictions are imposed by equation (5). To identify A and B, therefore, at least $2n^2 - n(n+1)/2$ or $n(3n-1)/2$ additional restrictions are required. Structural factorisation, an approach which uses relevant economic theory to impose restrictions on the elements of matrices. The underlying structural model is identified by assuming orthogonality of the structural disturbance; imposing that macroeconomic variable do not simultaneously react to monetary variables, while the simultaneous feedback in the reverse direction is allowed for; and imposing restrictions on the monetary block of the model reflecting the operational procedures implemented by the monetary policy-maker.

Seven variables are included in the SVAR namely, GDP, CPI, BL, EXR, M2, BR and RM. GDP and CPI enters the SVAR as policy goals; BR and RM as operating targets; and BL, EXR and M2 as intermediate targets. The structural shocks in Equation (4) are identified according to the following scheme:

$$\text{A}=\begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ a21 & 1 & 0 & 0 & 0 & 0 & 0 \\ a31 & a32 & 1 & a34 & a35 & a36 & a37 \\ a41 & a42 & 0 & 1 & 0 & 0 & 0 \\ a51 & a52 & 0 & 0 & 1 & a56 & 0 \\ 0 & 0 & 0 & a64 & 0 & 1 & 0 \\ 0 & 0 & a73 & a74 & a75 & a76 & 1 \end{pmatrix}, \ \epsilon_t = \begin{pmatrix} \epsilon_t{}^{GDP} \\ \epsilon_t{}^{CPI} \\ \epsilon_t{}^{BL} \\ \epsilon_t{}^{EXR} \\ \epsilon_t{}^{M2} \\ \epsilon_t{}^{BR} \\ \epsilon_t{}^{RM} \end{pmatrix} \quad (6)$$

$$\text{B}=\begin{pmatrix} b11 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & b22 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & b33 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & b44 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & b55 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & b66 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & b77 \end{pmatrix}, \ \mu_t = \begin{pmatrix} \mu_t{}^{GDP} \\ \mu_t{}^{CPI} \\ \mu_t{}^{BL} \\ \mu_t{}^{EXR} \\ \mu_t{}^{M2} \\ \mu_t{}^{BR} \\ \mu_t{}^{RM} \end{pmatrix}$$

The non-zero coefficients $a_{ij}$ and $b_{ij}$ in matrices A and B, respectively, show that any residual $j$ in matrices $\epsilon_t$ and $\mu_t$, in that order, has an

instantaneous impact on variable *i*. The first two equations suggest that output and consumer prices are sluggish in responding to shocks to monetary variables in the economy.

## 4. Data Analysis

All the variables are seasonally adjusted using the TRAMO and SEATS as processed in Ngalawa and Viegi (2011) and specified in logs except for interest rates.

Economic time series are usually non-stationary, having unit root(s). Estimated parameters based on such non-stationary time series lead to spurious relationship. An Augmented Dickey-Fuller (ADF) unit-root tests have been used for confirming stationary and the order of integrality of variables.

The procedure for operating SVAR involves a number of discrete steps. First step involves estimating the reduced form VAR, ensuring that enough lags are incorporated to ensure no serial correlation in the residuals and also to diagnose stability, the absence of autocorrelation and heteroskedasticity. An important aspect in specification of the VAR is the determination of the lag order of the autoregressive lag polynomial and lie inside the unit circle since all inference in the VAR model depends on the correct model specification. VAR lag exclusion Wald test also reveals that all endogenous variables in the model are jointly significant at each lag length for all equations collectively.

There are various other test procedures for the determination of the lag length but the commonly used procedures are the Schwarz's Bayesian information criterion (SC), the Akaike information criterion (AIC) and the Hannan–Quin information criterion (HQ).

Analysis of the SVAR is carried out in three modular experiments. At the first level of analysis, Generic model is estimated.

## 5. Generic Model

Investigation of the monetary transmission process commences with a simple four variable generic model. The vector of endogenous variables included in the model is presented in Equation (7).

$$y't = (GDP_{t,}\, CPI_t,\, BR_{t,}\, RM_t) \quad (7)$$

Following is the identification scheme in system of Equations (6), the equation separating structural economic shocks from the estimated reduced form residuals for the generic model is presented in Equation (8).

$$\begin{pmatrix} 1 & 0 & 0 & 0 \\ a21 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & a43 & 1 \end{pmatrix} \begin{pmatrix} {\epsilon_t}^{GDP} \\ {\epsilon_t}^{CPI} \\ {\epsilon_t}^{BR} \\ {\epsilon_t}^{RM} \end{pmatrix} = \begin{pmatrix} b11 & 0 & 0 & 0 \\ 0 & b22 & 0 & 0 \\ 0 & 0 & b33 & 0 \\ 0 & 0 & 0 & b44 \end{pmatrix} \begin{pmatrix} {\mu_t}^{GDP} \\ {\mu_t}^{CPI} \\ {\mu_t}^{BR} \\ {\mu_t}^{RM} \end{pmatrix} \quad (8)$$

## 6. Bank Lending Model

The bank lending model is a component of the credit channel of monetary transmission. The underlying argument in the credit channel is that asymmetric information and costly enforcement of contracts create agency problems in financial markets. In this study, BL and M2 representing three different transmission processes, are separately appended to the generic model and estimated. Appending commercial bank loans to equation (7) transforms the generic model to a bank lending model and the corresponding vector of endogenous variables becomes as shown in the following Equation (9).

$$y't = (GDP_{t,}\, CPI_t, BL_t, BR_{t,}\, RM_t) \quad (9)$$

The SVAR under investigation in Equation (9) comprises five variables, which include GDP, CPI, BL, BR and RM. In line with the identification scheme in system of Equations (6), the bank lending model is identified according to the following scheme:

$$\begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ a21 & 1 & 0 & 0 & 0 \\ a31 & a32 & 1 & a34 & a35 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & a53 & a54 & 1 \end{pmatrix} \begin{pmatrix} {\epsilon_t}^{GDP} \\ {\epsilon_t}^{CPI} \\ {\epsilon_t}^{BL} \\ {\epsilon_t}^{BR} \\ {\epsilon_t}^{RM} \end{pmatrix} =$$

$$\begin{pmatrix} b11 & 0 & 0 & 0 & 0 \\ 0 & b22 & 0 & 0 & 0 \\ 0 & 0 & b33 & 0 & 0 \\ 0 & 0 & 0 & b44 & 0 \\ 0 & 0 & 0 & 0 & b55 \end{pmatrix} \begin{pmatrix} {\mu_t}^{GDP} \\ {\mu_t}^{CPI} \\ {\mu_t}^{BL} \\ {\mu_t}^{BR} \\ {\mu_t}^{RM} \end{pmatrix} \quad (10)$$

## 7. Exchange Rate Model

The changes in the exchange rate, in turn, affect aggregate demand through the cost of imported goods, the cost of production and investment, international competitiveness and firms balance sheets in the case of high-liability dollarization. The vector of endogenous variables in the exchange rate model is presented as follows:

$$y't = (GDP_{t,}\, CPI_t, EXR_t, BR_{t,} RM_t) \tag{11}$$

The five variables in the model are GDP, CPI, EXR, BR and RM. In line with system of Equations (6), the model is identified according to the following scheme:

$$\begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ a21 & 1 & 0 & 0 & 0 \\ a31 & a32 & 1 & 0 & 0 \\ 0 & 0 & a43 & 1 & 0 \\ 0 & 0 & a53 & a54 & 1 \end{pmatrix} \begin{pmatrix} \epsilon_t{}^{GDP} \\ \epsilon_t{}^{CPI} \\ \epsilon_t{}^{EXR} \\ \epsilon_t{}^{BR} \\ \epsilon_t{}^{RM} \end{pmatrix} =$$
$$\begin{pmatrix} b11 & 0 & 0 & 0 & 0 \\ 0 & b22 & 0 & 0 & 0 \\ 0 & 0 & b33 & 0 & 0 \\ 0 & 0 & 0 & b44 & 0 \\ 0 & 0 & 0 & 0 & b55 \end{pmatrix} \begin{pmatrix} \mu_t{}^{GDP} \\ \mu_t{}^{CPI} \\ \mu_t{}^{EXR} \\ \mu_t{}^{BR} \\ \mu_t{}^{RM} \end{pmatrix} \tag{12}$$

## 8. The Money Effect Model

An alternative channel of monetary transmission is the monetarist view. The channel downplays the role of interest rates and liquid asset adjustment in the transmission mechanism, reducing the process to a direct link between changes in aggregate money supply and absorption. Appending M2 to the generic model, the vector of endogenous variables in the money effect model is presented as:

$$y't = (GDP_{t,}\, CPI_t, M2_t, BR_{t,}\, RM_t) \tag{13}$$

where the five variables in the model are GDP, CPI, M2, BR and RM. Following the identification scheme in system of Equations (6), the model is identified as:

$$\begin{pmatrix} 1 & 0 & 0 & 0 & 0 \\ a21 & 1 & 0 & 0 & 0 \\ a31 & a32 & 1 & a34 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & a53 & a54 & 1 \end{pmatrix} \begin{pmatrix} \epsilon_t{}^{GDP} \\ \epsilon_t{}^{CPI} \\ \epsilon_t{}^{M2} \\ \epsilon_t{}^{BR} \\ \epsilon_t{}^{RM} \end{pmatrix} =$$

$$\begin{pmatrix} b11 & 0 & 0 & 0 & 0 \\ 0 & b22 & 0 & 0 & 0 \\ 0 & 0 & b33 & 0 & 0 \\ 0 & 0 & 0 & b44 & 0 \\ 0 & 0 & 0 & 0 & b55 \end{pmatrix} \begin{pmatrix} \mu_t{}^{GDP} \\ \mu_t{}^{CPI} \\ \mu_t{}^{M2} \\ \mu_t{}^{BR} \\ \mu_t{}^{RM} \end{pmatrix} \quad (14)$$

## 9. Composite Model

Gathering every monetary variable together, a composite model of monetary transmission in Sri Lankan economy can be drawn with the following vector of endogenous variables which is identified according to system of Equations (6).

$$y't = (GDP_{t,}\, CPI_t, BL_t, EXR_t, M2_{t,}\, BR_{t,}\, RM_t) \quad (15)$$

$$\begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ a21 & 1 & 0 & 0 & 0 & 0 & 0 \\ a31 & a32 & 1 & a34 & a35 & a36 & a37 \\ a41 & a42 & 0 & 1 & 0 & 0 & 0 \\ a51 & a52 & 0 & 0 & 1 & a56 & 0 \\ 0 & 0 & 0 & a64 & 0 & 1 & 0 \\ 0 & 0 & a73 & a74 & a75 & a76 & 1 \end{pmatrix} \begin{pmatrix} \epsilon_t{}^{GDP} \\ \epsilon_t{}^{CPI} \\ \epsilon_t{}^{BL} \\ \epsilon_t{}^{EXR} \\ \epsilon_t{}^{M2} \\ \epsilon_t{}^{BR} \\ \epsilon_t{}^{RM} \end{pmatrix} =$$

$$\begin{pmatrix} b11 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & b22 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & b33 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & b44 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & b55 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & b66 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & b77 \end{pmatrix} \begin{pmatrix} \mu_t{}^{GDP} \\ \mu_t{}^{CPI} \\ \mu_t{}^{BL} \\ \mu_t{}^{EXR} \\ \mu_t{}^{M2} \\ \mu_t{}^{BR} \\ \mu_t{}^{RM} \end{pmatrix}$$

## 10. Results and Discussions

### 10.1 Descriptive Statistics Analysis

The descriptive statistics of the final monthly time series data used in the analysis after required transformations for the full sample are given in

Table 2. The skewness and standard deviation statistics show that variances of the variables are not unnecessarily large while the Jarque-Bera statistics of each variable accepts the null hypothesis of normality at 1% level of significance.

**Table 2.** Descriptive Statistics Summary Of The Variables

| Statistics | BL | CPI | EXR | BR | GDP | M2 | RM |
|---|---|---|---|---|---|---|---|
| Mean | 14.39519 | 4.931336 | 4.833692 | 15.90782 | 14.31458 | 14.57321 | 12.91307 |
| Median | 14.46144 | 4.899944 | 4.762829 | 16.06000 | 14.54652 | 14.60305 | 12.98521 |
| Maximum | 15.72926 | 5.221520 | 5.263133 | 18.08000 | 15.21660 | 15.95117 | 13.82924 |
| Minimum | 12.86793 | 4.650248 | 4.548728 | 10.61000 | 13.01260 | 13.14557 | 11.72099 |
| Std. Dev. | 0.849929 | 0.162176 | 0.196766 | 1.195708 | 0.695612 | 0.827604 | 0.636709 |
| Skewness | -0.116340 | 0.220296 | 0.560584 | -2.618893 | -0.468879 | -0.061438 | -0.123051 |
| Kurtosis | 1.842004 | 2.009684 | 2.195407 | 12.55664 | 1.839953 | 1.762123 | 1.787937 |
| Jarque-Bera | 12.55585 | 10.57363 | 17.13946 | 1068.874 | 20.02588 | 13.92693 | 13.76696 |
| Probability | 0.001877 | 0.005058 | 0.000190 | 0.000000 | 0.000045 | 0.000946 | 0.001025 |
| Sum Sq.Dev. | 155.3116 | 5.654748 | 8.324104 | 307.3893 | 104.0333 | 147.2597 | 87.16071 |
| Observations | 216 | 216 | 216 | 216 | 216 | 216 | 216 |

**Source**: Research finding, using CBSL Report, 2020.

## 10.2 Stationary Checking

Stationary tests rather than the exception, it is the rule in time series analysis to investigate the stationary of macroeconomic variables whether they are stationary series or non-stationary series before they are used in analysis. ADF unit root test is performed to ensure that the data series possessed the time series property of stationary. The assumption of the ADF test is there to be no autocorrelation among the error terms when deciding the number of lags included in a series to test for the unit root. The variables are stationary after differencing once. This implies that the variables are integrated of order one I(1), as shown in Table 3.

**Table 3.** Unit Root Test Results

| **Variable** | **ADF p-value (t- statistic)** | **Test Critical Values** | **Order of Integration** |
|---|---|---|---|
| BL | 0.0011 (-4.136402) | 1% level :-3.461178<br>5% level : -2.874997<br>10% level :-2.574019 | I(1) |
| CPI | 0.0000 (-14.67407) | 1% level : -3.460884<br>5% level : -2.874868<br>10% level : -2.573951 | I(1) |
| EXR | 0.0000 (-10.10526) | 1% level : -3.460884<br>5% level : -2.874868<br>10% level : -2.573951 | I(1) |

| Variable | ADF p-value (t- statistic) | Test Critical Values | Order of Integration |
|---|---|---|---|
| BR | 0.0000 (-15.54847) | 1% level : -3.460884<br>5% level : -2.874868<br>10% level : -2.573951 | I(1) |
| GDP | 0.0007 (-4.266400) | 1% level : -3.461783<br>5% level : -2.875262<br>10% level : -2.574161 | I(1) |
| M2 | 0.0000 (-12.35643) | 1% level : -3.460884<br>5% level : -2.874868<br>10% level : -2.573951 | I(1) |
| RM | 0.0000 (-15.21600) | 1% level : -3.460739<br>5% level : -2.874804<br>10% level : -2.573917 | I(1) |

**Source:** Research finding, using CBSL Report, 2020.

### 10.3 Lag Length Selection Criteria

Selection of the optimal lag length is guided by established criteria. Lag length determines the number of lags of a particular series to be included in the model. The appropriate number of lags for the model has been decided based on Schwarz's Bayesian information criterion (SC), the Akaike information criterion (AIC), and the Hannan–Quin information criterion (HQ). AIC and HIC, respectively suggest a lag length of order five and one while Schwartz Information Criterion (SIC) suggests a lag length of order two.

## 11. Analysis of Generic Model

### 11.1 Results of Impulse Responses

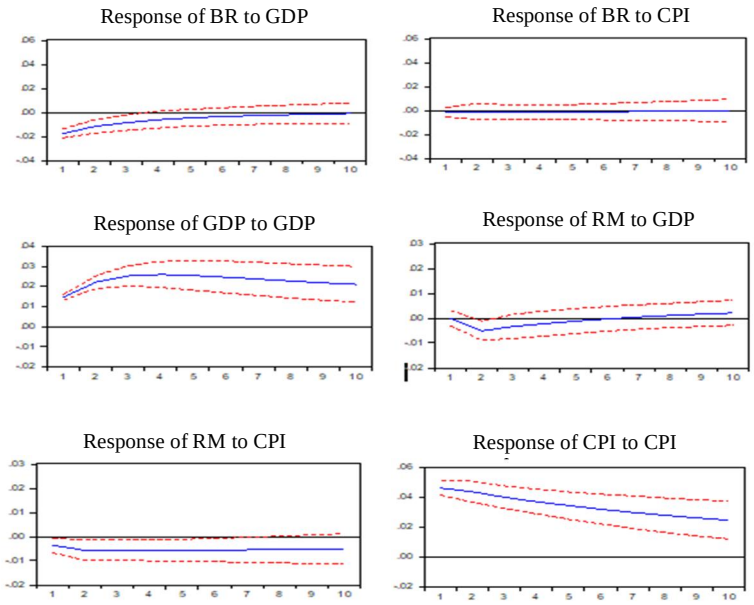


**Figure 1.** The Impulse Responses of Bank Rate and Reserve Money
**Source:** Research finding.

Figure 1 shows impulse responses of the BR and RM to structural one standard deviation inventions in GDP and CPI over a 10 months horizon. Impulse responses of GDP and CPI to own shocks are also shown in the same figure. The time scale indicated on the primary horizontal axis is in months and the dashed lines are analytic confidence intervals obtained from variance-covariance matrices after the final iteration. A GDP shock conforming to 1.2 percent increase in GDP and a supply shock equivalent to an unexpected 4.8 percent rise in CPI. Resulting the unexpected increase in GDP, RM drops while the unexpected rise in CPI causes an increase in RM.

To examine how monetary policy goals are influenced by shocks to the operating goals, impulse responses of GDP and CPI to structural one standard deviation shocks in the BR and RM have been plotted. Figure 2

shows that a monetary policy shock conforming to an unexpected increase in the BR of about 2.9 percent causes to a drop in GDP, which has lowest after 2 months at 0.1 percent below the baseline. Likewise, CPI responds to the monetary narrowing with a decreasing value.

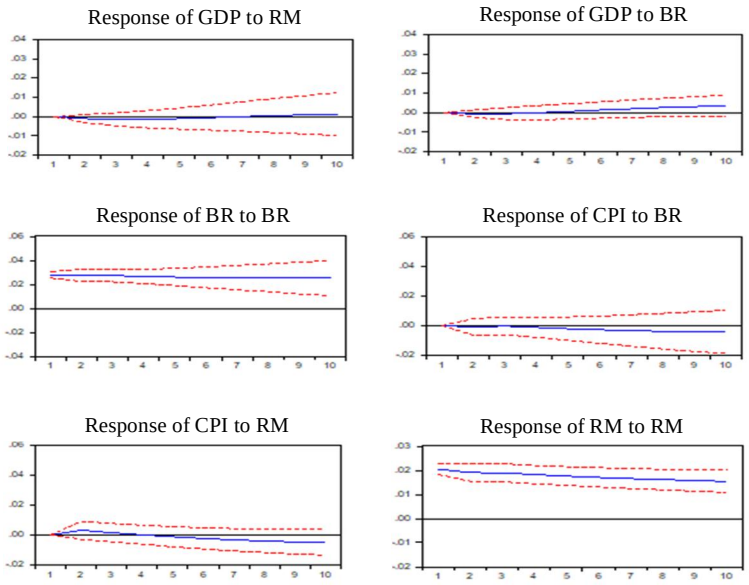


**Figure 2.** The impulse Responses of GDP and Consumer Prices
**Source:** Research finding.

Figure 2 further shows that, a monetary shock equivalent to 2 percent sudden increase in RM causes a rise in GDP, cresting at 0.1 percent above baseline after 6 months. CPI responds with 2 percent increase with RM in 2 months and started to decrease after that. Overall findings indicated that shocks to whichever of the monetary policy operating targets attract substantial responses and negligible responses from CPI. The results pattern was observed similar to the finding by Ngalawa and Viegi (2011).

### 11.2 Analysis of Variance Decomposition

Tables 4, 5, 6, and 7 show variance decompositions for each variable in the model over ten months forecast horizon to find the relative

importance of structural innovation in explaining fluctuations of each variable in the generic model. Table 4 preliminary indication is that the bank rate is a more effective tool of monetary policy than RM. While BR shocks account for more than 0.1 percent of the fluctuations in GDP throughout the 10 months. RM shocks initially account for less than 0.1 percent of the GDP fluctuations in the first 6 months but later rise gradually for four months this shows that bank rate shocks account for a greater proportion of the fluctuations in GDP while RM shocks only have impact on GDP variation after the 6 months.

**Table 4.** Variance decomposition of GDP

| Period | GDP | CPI | BR | RM |
|---|---|---|---|---|
| 1 | 100.0000 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 99.80523 | 0.012766 | 0.138614 | 0.043393 |
| 3 | 99.72340 | 0.008126 | 0.227315 | 0.041155 |
| 4 | 99.69029 | 0.041673 | 0.240587 | 0.027454 |
| 5 | 99.61571 | 0.131054 | 0.215346 | 0.037889 |
| 6 | 99.45278 | 0.277260 | 0.181274 | 0.088690 |
| 7 | 99.18824 | 0.474087 | 0.154512 | 0.183165 |
| 8 | 98.82749 | 0.712569 | 0.142067 | 0.317870 |
| 9 | 98.38453 | 0.983208 | 0.145816 | 0.486448 |
| 10 | 97.87614 | 1.277085 | 0.165041 | 0.681738 |

**Source:** Research finding.

**Table 5. Variance Decomposition of CPI**

| Period | GDP | CPI | BR | RM |
|---|---|---|---|---|
| 1 | 0.035848 | 99.96415 | 0.000000 | 0.000000 |
| 2 | 0.113093 | 99.62182 | 0.021329 | 0.243762 |
| 3 | 0.183628 | 99.58642 | 0.016662 | 0.213289 |
| 4 | 0.414462 | 99.37969 | 0.034688 | 0.171159 |
| 5 | 0.789369 | 98.96658 | 0.079687 | 0.164362 |
| 6 | 1.285663 | 98.35974 | 0.150645 | 0.203955 |
| 7 | 1.871732 | 97.59935 | 0.241722 | 0.287198 |
| 8 | 2.518418 | 96.72818 | 0.346674 | 0.406731 |
| 9 | 3.200802 | 95.78511 | 0.459820 | 0.554263 |
| 10 | 3.898726 | 94.80284 | 0.576446 | 0.721992 |

**Source:** Research finding.

Table 5 shows BR could not account for up to 0.1 percent of the shock in CPI throughout the period of 5 months. However, after failing to account for shocks for first month reserve money shocks account for as much as 0.24 percent of the fluctuations in CPI after varies from 0.2 to

0.8 percent within seven months. This indicates that, given the two operating targets, RM accounts for more of the CPI variations.

Table 6 shows, shocks of GDP account for greater than 10 percent of the BRe up to six months but after decreased slowly. While CPI account greater than 0.1 percent throughout the ten months.

**Table 6.** Variance Decomposition of BR

| Period | GDP | CPI | BR | RM |
|---|---|---|---|---|
| 1 | 27.20753 | 0.151051 | 72.64142 | 0.000000 |
| 2 | 21.46230 | 0.107802 | 78.30166 | 0.128232 |
| 3 | 17.54755 | 0.132436 | 82.22314 | 0.096877 |
| 4 | 14.76960 | 0.149479 | 84.99848 | 0.082441 |
| 5 | 12.72135 | 0.155311 | 87.02074 | 0.102600 |
| 6 | 11.15441 | 0.151270 | 88.54083 | 0.153491 |
| 7 | 9.917586 | 0.141190 | 89.71199 | 0.229237 |
| 8 | 8.916911 | 0.128675 | 90.62928 | 0.325138 |
| 9 | 8.091905 | 0.116637 | 91.35372 | 0.437735 |
| 10 | 7.402123 | 0.107297 | 91.92618 | 0.564396 |

**Source:** Research finding.

Table 7 shows that shocks to CPI account for 2.99 percent of the RM fluctuations after the first month, 5.13 percent after the second month, 5.77 and 6.32 percent after the third and fourth months respectively. Shocks to GDP, on the other hand, account for less than 0.1 percent of reserve money fluctuations of the first month but accounts for 2.87 percent of the second month. This indicates that price level and GDP are responsive to RM.

**Table 7. Variance Decomposition of RM**

| Period | GDP | CPI | BR | RM |
|---|---|---|---|---|
| 1 | 0.001403 | 2.995080 | 0.372928 | 96.63059 |
| 2 | 2.876971 | 5.129515 | 3.493886 | 88.49963 |
| 3 | 2.794173 | 5.773005 | 3.965389 | 87.46743 |
| 4 | 2.442320 | 6.324677 | 4.033183 | 87.19982 |
| 5 | 2.082706 | 6.774290 | 3.899439 | 87.24356 |
| 6 | 1.796503 | 7.146247 | 3.692366 | 87.36488 |
| 7 | 1.596280 | 7.450538 | 3.461569 | 87.49161 |
| 8 | 1.477947 | 7.695881 | 3.230354 | 87.59582 |
| 9 | 1.433265 | 7.889491 | 3.010181 | 87.66706 |
| 10 | 1.453413 | 8.037578 | 2.806952 | 87.70206 |

**Source:** Research finding.

Overall, the preliminary indication is that the bank rate is a more effective tool of monetary policy than reserve money. Shocks in both the

bank rate and reserve money witnessed a mixed response from the target variables. Consumer prices seem to be more responsive to reserve money variation than bank rate.

### 11.3 Analysis of Bank Lending Model

Figure 3 shows the impulse responses of GDP, CPI and BL to improvements in the BR, RM and BL. The figure shows that a BR shock equivalent to an unexpected increase in the BR about 2.9 percent causes BL to drop continuously within the horizon of 10 months. A RM shock, on the other hand, conforming to a 2 percent sudden increase in RM causes to an increase in BL. However, this response is not significant. An unpredicted rise in BL, on the other hand, leads to an increase in CPI while decreasing GDP having lowest at 0.2 percent between 3 to 5 months.

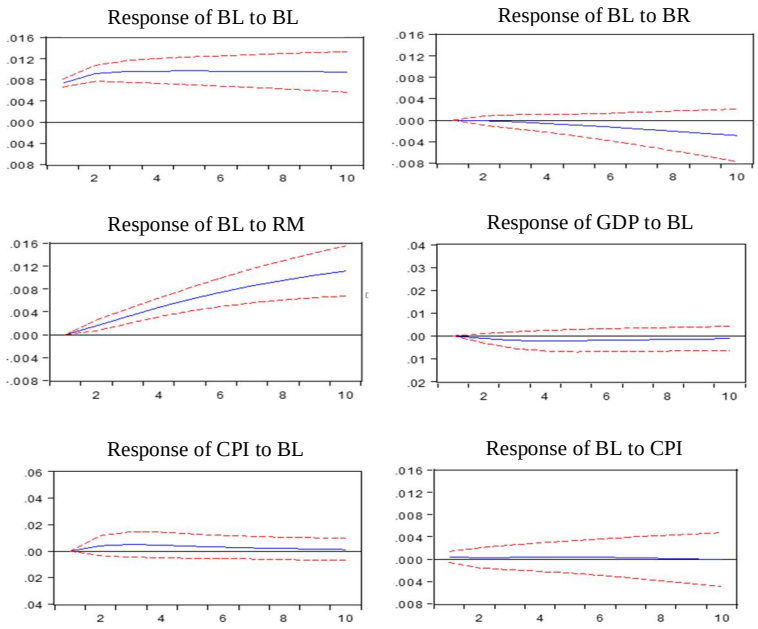


**Figure 3.** The Impulse Responses of Bank Lending Model
Source: Research finding.

### 11.4 Analysis of Exchange Rate Model

Figure 4 shows impulse responses of EXR to own, BR and RM shocks and responses of GDP and CPI to improvements in EXR. A monetary compression conforming to an unexpected 2.9 percent rise in the BR causes the domestic money value to escalate and it deprecates after couple of months. However this response is insignificant. Opposing to theoretic expectations, EXR responds to a RM shock equivalent to 2 percent sudden increase in RM with an appreciation as same as previously discussed this response is also insignificant. An EXR shock equivalent to a depreciation of the domestic money value attracts significant responses in both CPI and GDP. CPI rises, peaking at 0.5 percent above baseline after 2 months and maintained as constant while GDP started to decline after 4 months.

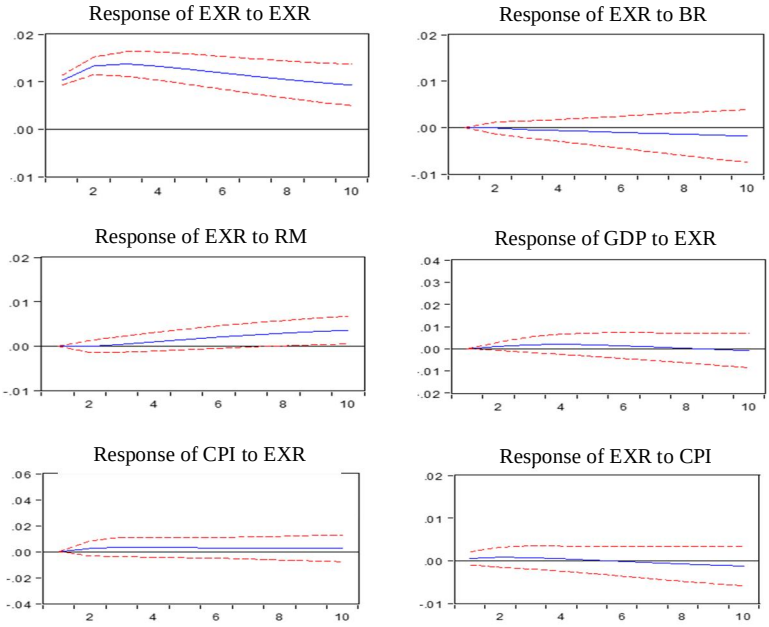


**Figure 4.** The Impulse Responses of Exchange Rate Model
Source: Research finding.

### 11.5 Analysis of Money Effect Model

Figure 5 shows impulse responses of M2 to own, BR and RM shocks and responses of GDP and CPI to M2 shocks. A monetary compression

equivalent to a 2.9 percent unpredicted rise in BR causes to decline in M2. A RM shock conforming to a sudden 2 percent increase in RM has not impacted in M2. This might have been occurred due to the dominance of commercial banks in the trading of government securities. A sudden change in RM arising open market transactions and changes bank investments proportionally without expressively affecting currency. Therefore, aggregate money supply is unimportantly affected by the RM shock. Both GDP and CPI also respond insignificantly to unpredicted changes in M2.

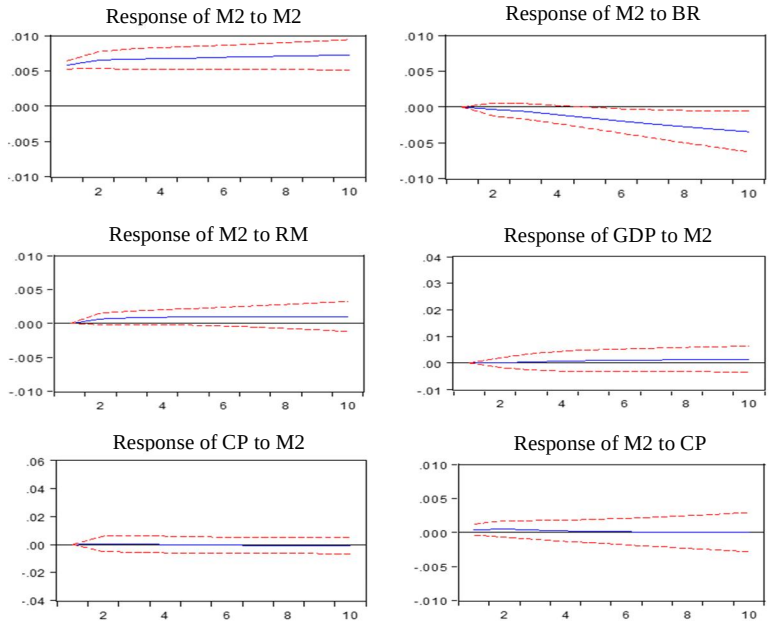


**Figure 5.** The Impulse Responses of Money Effect Model
**Source:** Research finding.

## 11.6 Analysis of Composite Model

### 11.6.1 Impulse Responses Results

Figure 6 shows the impulse responses of composite models which includes all 7 variables. BL responds marginally significant with all variables however the transmission rate is very low.

BR plays a significant role in monetary transmission in Sri Lanka. It was observed that 2.9 percent unexpected increase in BR is observed. With the increment of GDP. There is a sudden decline in BR below the base line with the reduction of 1.9 percent. CPI also impact monetary transmission marginally. However with the increment of GDP, CPI responds progressively and close to 1 percent increment after 10 months.

EXR also responds significantly with other variables with low transmission rate as like as BL. However, EXR notably declined with the increasing GDP. It was observed that GDP is not much affected by other variables. However, GDP responds against other variables are notable with less percentage variations.

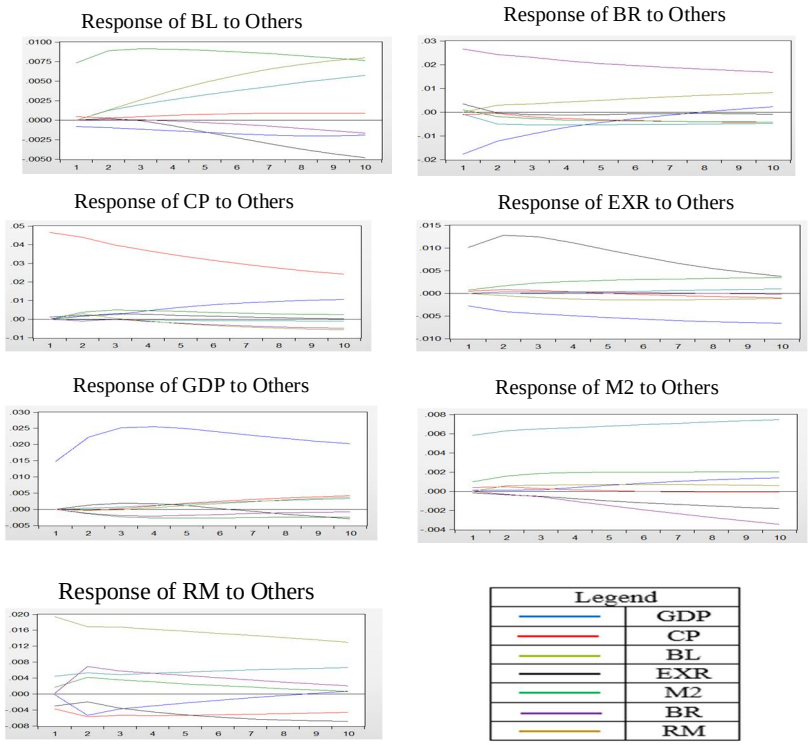


**Figure 6.** Impulse Responses of Composite Model
**Source:** Research finding.

M2 is significantly governed by GDP, BL, EXR and RM. GDP and BL impacts positively on M2 while other two have negative impacts. RM also have significant impacts from other variables. On the second month RM reaches its peak positively with BR and RM and Negatively with GDP and CPI.

## 12. Variance Decomposition Results

In composite model, the proportion of fluctuations in a given variable caused by the different shocks to all the variables is presented. Tables 8, 9, 10, 11, 12, 13, and 14 show the results of forecast error the variance decomposition of the first ten period horizons into the future.

**Table 8.** Variance Decomposition of GDP

| Period | GDP | CPI | BL | EXR | M2 | BR | RM |
|---|---|---|---|---|---|---|---|
| 1 | 100.0000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 99.20173 | 0.014796 | 0.291143 | 0.215936 | 0.009454 | 0.240354 | 0.026592 |
| 3 | 98.55814 | 0.012327 | 0.570087 | 0.356968 | 0.041293 | 0.444819 | 0.016364 |
| 4 | 98.16920 | 0.059474 | 0.744195 | 0.380196 | 0.095488 | 0.532202 | 0.019247 |
| 5 | 97.87897 | 0.162256 | 0.848150 | 0.333336 | 0.169592 | 0.548745 | 0.058955 |
| 6 | 97.56284 | 0.312865 | 0.913483 | 0.274545 | 0.262117 | 0.532334 | 0.141820 |
| 7 | 97.15401 | 0.500567 | 0.958580 | 0.246189 | 0.371653 | 0.503440 | 0.265558 |
| 8 | 96.63023 | 0.714689 | 0.993488 | 0.269896 | 0.496427 | 0.471877 | 0.423390 |
| 9 | 95.99727 | 0.945635 | 1.023801 | 0.350711 | 0.634342 | 0.441923 | 0.606319 |
| 10 | 95.27562 | 1.185291 | 1.052779 | 0.483290 | 0.783146 | 0.415203 | 0.804670 |

**Source:** Research finding.

Table 8 shows the GDP variance decomposition. In the first period, variations of GDP are entirely explained by own shocks. This denotes that variations in GDP is almost not affected by other variables in the first month. The Table 8 also shows that the contributions of other variables are insignificant throughout the other periods rather than the own contributions, GDP fluctuations can only be attributed marginally to variations in both the CPI and the BL beginning from the second month through to the tenth month maintaining a upward trend. Collectively, BR and EXR were found not to account for fluctuation in GDP until second month when their aggregate contribution was observed to be less than 1 percent.

**Table 9.** Variance Decomposition of CPI

| Period | GDP | CPI | BL | EXR | M2 | BR | RM |
|---|---|---|---|---|---|---|---|
| 1 | 0.050817 | 99.94918 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 0.122386 | 99.27276 | 0.320226 | 0.058858 | 0.003328 | 0.027878 | 0.194563 |
| 3 | 0.184966 | 98.82243 | 0.647568 | 0.179163 | 0.003547 | 0.020589 | 0.141741 |
| 4 | 0.441768 | 98.33908 | 0.804829 | 0.229264 | 0.007659 | 0.043359 | 0.134037 |
| 5 | 0.852840 | 97.71866 | 0.879892 | 0.242978 | 0.012409 | 0.102123 | 0.191098 |
| 6 | 1.379391 | 96.95582 | 0.911233 | 0.238037 | 0.017790 | 0.194425 | 0.303309 |
| 7 | 1.981381 | 96.08074 | 0.919614 | 0.225817 | 0.023628 | 0.311877 | 0.456943 |
| 8 | 2.628543 | 95.12881 | 0.915537 | 0.211972 | 0.029842 | 0.446604 | 0.638690 |
| 9 | 3.298143 | 94.13259 | 0.904692 | 0.198960 | 0.036347 | 0.591882 | 0.837382 |
| 10 | 3.973232 | 93.11932 | 0.890311 | 0.187600 | 0.043062 | 0.742312 | 1.044160 |

**Source:** Research finding.

Table 9 shows clearly that the variance explained by own shock of CPI in the first month amount to 99.95 percent while the remaining 0.05 percent is explained by variations in the level of GDP in first month. However, the variation in CPI accounted for own shock weakened over the time. On the other hand, the contribution of shock to GDP variation increased to 1.38 percent in the sixth month. Beside own variations in CPI, the contributions of GDP and BL to explaining the variations in price level increased over time. Variations to other variables in the model does not account for any significant percent in the variations to CPI.

Table 10 shows that more than half of the variations to BL is attributed to own shock in the first month while CPI and GDP variations accounted for the remaining 0.31 and 1.19 percent respectively. The contribution of BL to own shock reduced to 96.35 and 92.64 in the second and third months respectively. In the following months, variations in BL as accounted by own shock diminished continuously at 56.81 percent in tenth month while variations in EXR, M2 and RM increased gradually while the BR which accounted marginally over time.

**Table 10.** Variance Decomposition of BL

| Period | GDP | CPI | BL | EXR | M2 | BR | RM |
|---|---|---|---|---|---|---|---|
| 1 | 1.189849 | 0.307511 | 98.50264 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 1.180750 | 0.180099 | 96.35370 | 0.033064 | 1.078107 | 0.003909 | 1.170368 |
| 3 | 1.268690 | 0.192612 | 92.63609 | 0.023578 | 2.316843 | 0.002313 | 3.559877 |
| 4 | 1.419876 | 0.240734 | 87.88437 | 0.175392 | 3.600574 | 0.007702 | 6.671351 |
| 5 | 1.604610 | 0.292766 | 82.49063 | 0.624468 | 4.905541 | 0.028791 | 10.05320 |
| 6 | 1.785293 | 0.336709 | 76.85307 | 1.376749 | 6.200080 | 0.071131 | 13.37697 |
| 7 | 1.932616 | 0.368738 | 71.29877 | 2.360550 | 7.462398 | 0.139232 | 16.43769 |
| 8 | 2.030269 | 0.389124 | 66.04338 | 3.483411 | 8.683255 | 0.237219 | 19.13335 |
| 9 | 2.074007 | 0.399808 | 61.20026 | 4.663414 | 9.862588 | 0.368761 | 21.43117 |
| 10 | 2.067845 | 0.403125 | 56.80923 | 5.839526 | 11.00513 | 0.536980 | 23.33816 |

**Source:** Research finding.

**Table 11.** Variance Decomposition of BR

| Period | GDP | CPI | BL | EXR | M2 | BR | RM |
|---|---|---|---|---|---|---|---|
| 1 | 30.54199 | 0.108598 | 0.074706 | 1.089424 | 0.092605 | 68.09268 | 0.000000 |
| 2 | 25.78441 | 0.082905 | 0.242131 | 0.634404 | 1.520974 | 71.24989 | 0.485293 |
| 3 | 22.19976 | 0.234348 | 0.491806 | 0.517662 | 2.302146 | 73.43714 | 0.817140 |
| 4 | 19.37552 | 0.440329 | 0.770172 | 0.471439 | 2.856668 | 74.85078 | 1.235084 |
| 5 | 17.11137 | 0.678207 | 1.027222 | 0.432724 | 3.263302 | 75.74658 | 1.740591 |
| 6 | 15.27267 | 0.926425 | 1.259909 | 0.397765 | 3.574501 | 76.23557 | 2.333168 |
| 7 | 13.77725 | 1.172810 | 1.472473 | 0.368122 | 3.814164 | 76.39160 | 3.003574 |
| 8 | 12.56990 | 1.408719 | 1.669986 | 0.344570 | 3.996316 | 76.26997 | 3.740537 |
| 9 | 11.60920 | 1.628144 | 1.856562 | 0.327490 | 4.130497 | 75.91641 | 4.531696 |
| 10 | 10.86178 | 1.827098 | 2.035403 | 0.317550 | 4.224098 | 75.36984 | 5.364230 |

**Source:** Research finding.

Table 11 shows that a significant percentage of the forecast error variance is accounted for by own variation except for GDP. The variation of GDP is 30.54 percent in first month period while the EXR account for 1.09 percent of the remaining variation. On the whole the other variables in the model were found, less than 6 percent to account for an insignificant percentage of the variation in BR.

Table 12 shows that all the variables in the model exhibit less than 10 percent variation to RM. The variance explained by own shock of RM in the first month amount to 89.14 percent. Though, the variation in CPI accounted for own shock diminished over the time to 68.01 percent in tenth month period

Table 13 shows that all the variables in the model exhibit less than 10 percent variation to M2. The variance explained by own shock of M2 in

the first month amount to 96.61 percent while the BL is 2.82 percent. However, the variation in the M2 accounted for own shock decreased to 91.28 percent in fourth month, 88.34 percent in sixth month, 85.14 percent in eighth month and 81.98 percent in tenth month period.

**Table 12.** Variance Decomposition of RM

| Period | GDP | CPI | BL | EXR | M2 | BR | RM |
|---|---|---|---|---|---|---|---|
| 1 | 0.009024 | 3.355439 | 0.676452 | 2.167040 | 4.643607 | 0.007385 | 89.14105 |
| 2 | 3.314151 | 5.470740 | 2.380812 | 1.501903 | 5.475901 | 5.481521 | 76.37497 |
| 3 | 3.361534 | 5.935379 | 2.578587 | 2.046965 | 5.543397 | 6.346763 | 74.18738 |
| 4 | 3.109353 | 6.325062 | 2.528509 | 2.810102 | 5.862865 | 6.534522 | 72.82959 |
| 5 | 2.788534 | 6.586588 | 2.387959 | 3.679094 | 6.275231 | 6.406602 | 71.87599 |
| 6 | 2.482166 | 6.769702 | 2.223047 | 4.572147 | 6.742798 | 6.156511 | 71.05363 |
| 7 | 2.210971 | 6.897678 | 2.056618 | 5.450712 | 7.243922 | 5.855744 | 70.28436 |
| 8 | 1.983514 | 6.986283 | 1.898752 | 6.291360 | 7.768566 | 5.538939 | 69.53259 |
| 9 | 1.804843 | 7.045430 | 1.754383 | 7.080104 | 8.310910 | 5.224524 | 68.77981 |
| 10 | 1.678524 | 7.081568 | 1.626058 | 7.809033 | 8.867043 | 4.923200 | 68.01457 |

**Source:** Research finding.

**Table 13.** Variance Decomposition of M2

| Period | GDP | CPI | BL | EXR | M2 | BR | RM |
|---|---|---|---|---|---|---|---|
| 1 | 0.028973 | 0.442523 | 2.821701 | 0.095164 | 96.61164 | 0.000000 | 0.000000 |
| 2 | 0.021460 | 0.491265 | 4.530585 | 0.244958 | 94.15819 | 0.150664 | 0.402875 |
| 3 | 0.025428 | 0.367850 | 5.642725 | 0.389735 | 92.64517 | 0.379162 | 0.549930 |
| 4 | 0.099295 | 0.275507 | 6.181059 | 0.623784 | 91.28134 | 0.900412 | 0.638604 |
| 5 | 0.243380 | 0.211585 | 6.413820 | 0.915133 | 89.85658 | 1.669380 | 0.690124 |
| 6 | 0.434785 | 0.168898 | 6.477933 | 1.237457 | 88.33507 | 2.628809 | 0.717046 |
| 7 | 0.648815 | 0.140137 | 6.446637 | 1.568056 | 86.74936 | 3.722586 | 0.724405 |
| 8 | 0.867228 | 0.119968 | 6.360189 | 1.890251 | 85.14037 | 4.906689 | 0.715305 |
| 9 | 1.077845 | 0.104907 | 6.242178 | 2.192549 | 83.54222 | 6.147954 | 0.692349 |
| 10 | 1.273068 | 0.092851 | 6.107119 | 2.467632 | 81.97920 | 7.421952 | 0.658173 |

**Source:** Research finding.

Table 14 shows that more than half of the variations to exchange rate is attributed to own shock in the first month while consumer prices, GDP and BL variations accounted for the remaining 0.18, 6.87 and 0.4 percent respectively. In overall significant percentage of the observed variance is accounted for by own variation except for variation in GDP. The contribution of GDP shock to exchange rate increased gradually over time. The CPI and M2 account for less than 0.5 percent while the BR is less than 0.1 percent.

**Table 14.** Variance Decomposition of EXR

| Period | GDP | CPI | BL | EXR | M2 | BR | RM |
|---|---|---|---|---|---|---|---|
| 1 | 6.878416 | 0.182467 | 0.403297 | 92.53582 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 8.077215 | 0.267259 | 1.088456 | 90.45560 | 9.55E-05 | 0.022575 | 0.088795 |
| 3 | 9.369618 | 0.238829 | 1.751173 | 88.37035 | 0.000907 | 0.031284 | 0.237842 |
| 4 | 10.97082 | 0.192386 | 2.405491 | 85.96338 | 0.006692 | 0.034517 | 0.426708 |
| 5 | 12.87277 | 0.159668 | 3.064195 | 83.22696 | 0.019988 | 0.034256 | 0.622161 |
| 6 | 15.02421 | 0.149786 | 3.733129 | 80.21769 | 0.042470 | 0.032348 | 0.800363 |
| 7 | 17.34421 | 0.164674 | 4.407908 | 77.03207 | 0.075059 | 0.029782 | 0.946301 |
| 8 | 19.74472 | 0.203132 | 5.079381 | 73.77377 | 0.118196 | 0.027417 | 1.053388 |
| 9 | 22.14583 | 0.262413 | 5.737596 | 70.53432 | 0.171997 | 0.026263 | 1.121578 |
| 10 | 24.48392 | 0.339076 | 6.373963 | 67.38402 | 0.236381 | 0.027515 | 1.155125 |

**Source:** Research finding.

## 12.1 Robustness Checking

While all models are subjected to robustness checks, here the robustness check for composite model has been presented. Inverse roots of the characteristic AR polynomial to determine stability (stationary) of the model are shown in Figure 7. The figure explains that all inverse roots of the characteristic AR polynomial have modulus less than one and they lie inside the unit circle, representing that at the chosen lag length, the estimated model is stationary or stable. Further, it was observed that almost all coefficient have standard errors less than one implying that they are effective and henceforward form a solid basis to measure monetary policy shocks. Further, there were no observations made on serious serial correlation by the serial correlation test. Therefore, the composite model is robust and the outputs from the model is reliable.

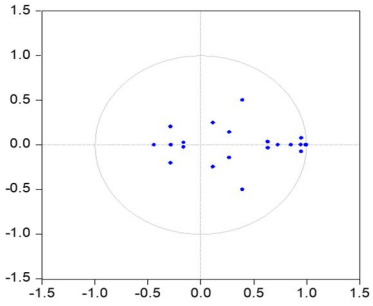


**Figure 7.** Inverse Roots of AR Characteristic Polynomial
Source: Research finding.

## 13. Conclusion

This research has been conducted to determine the monetary variable shocks affecting Sri Lankan economy using five structural vector autoregressive models namely: generic model, bank lending model, money effect model, exchange rate model and composite model respectively. All these models were generated to evaluate the impacts of Sri Lankan Economy by the monetary variables. According to the results obtained by this research study, Sri Lankan government should take necessary action to implement appropriate monetary policies to keep gross domestic product in a progressive path.

### 13.1 Findings of the Research

It is found that gross domestic product of the country is marginally affected by consumer price index and bank lending while exchange rate and bank rate doesn't have any significant impacts on it. On the other hand, consumer price index is affected by bank lending and gross domestic product significantly. Variations in bank lending affect aggregate money supply, exchange rate and reserve money considerably while slightly affect bank rate. The bank rate is clearly affected by gross domestic product variation while exchange rate also plays slight role in bank rate variations. It is observed that reserve money has impacts on all other monetary variables with less percentage. Furthermore, aggregate money supply also has some impacts on other monetary variables as similar to reserve money. The exchange rate is affected by gross domestic product and bank lending significantly while consumer price index and aggregate money supply have less impacts on exchange rate.

### 13.2 Policy Implication

According to the findings, it can be expressed that, necessary action to be taken to implement appropriate monetary policies to keep gross domestic product in a progressive path. Keeping gross domestic product in a progressive path will lead Sri Lankan currency to appreciate against United States dollar. Keeping reserve money in a balanced way will maintain gross domestic product and consumer price index in a favorable

way. Central bank of Sri Lanka should implement strong monetary policies to closely monitor bank rates and commercial bank loans to keep progressive economic growth.

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