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Relative Importance of Monetary Transmission Mechanism in Sri Lanka: An Empirical Investigation

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Abstract

This paper studies various monetary transmission channels in Sri Lanka to identify the more effective transmission mechanism and the policy rate that signals changes in monetary policy more effectively. The standard recursive Structural Vector Autoregression (SVAR) models are used to analyze monetary transmission mechanism. Impulse response of output to a one standard deviation positive shock in reserve money indicates that credit channel is more effective transmission channel than interest rate and exchange rate channel in Sri Lanka and repo rate is the policy rate that signals the changes in monetary policy more effectively.

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1. Introduction

The monetary transmission mechanism has been extensively studied by economist in recent years. There is a general agreement among economist regarding the long run effect of money supply on output and inflation but still there is no consensus in terms of short run effect of money supply on output and price level. Policy actions to the real economy and the role of distributional effects of various channels (the interest rate, the credit, the exchange rate, and the asset price channels) has been a central question in both academia and policy making (Mishkin, 1996). The literature suggests that monetary policy decision can influence the real sector through six channels: Traditional interest rate channel, Bank lending channel, Exchange rate channel, Housing and land price channel, Equity price channel and Balance sheet channel (Mishkin, 1996). The interest rate channel through which policy innovations affect output and prices has been viewed as the main channel. This channel was studied through IS/LM and VAR models (Sims,1972; Christiano et al,1999). Many studies have focused on interest rate channel. Bank lending and asset price channels also play important role and become widely studied (Bernanke,1993; Gertler and Gilchrist,1993; Hubbard ,1995). Bank lending channel focuses on the distributional consequences of monetary policy on individual agents' credit worthiness from the feasibility of investment projects. The exchange rate channel is examined in the context of emerging markets and low income economies (Cushman and Zha, 1995).

Mishkin (1995) singles out two mechanisms of equity price channels: (1) Expansionary monetary policy increases the demand for equities and then increases the price of equities. When price of equities is high relative to the replacement cost of capital, companies can then issue new equities to purchase investment goods. (2) A rise in equity prices increases the value of financial wealth, thereby increasing the consumption. Balance sheet channel arises due to the asymmetric information problems in credit markets. Expansionary monetary policy, which increases equity prices, raises the net worth of firms and so increases investment because of the decrease in adverse selection and moral hazard problems. Monetary policy can also affect real sector through housing and land price channel. When expansionary monetary policy increases stock prices, value of financial assets of consumers rises. It leads to an increase in spending on consumer durables and housing. Perera and Wickramanayake (2013) and Fernandez et al (2004) have shown that interest rate and credit channels are the dominant monetary policy channels in Sri Lanka.

Even if banks are dominant financial intermediaries in developing countries, the formal financial system is very small relative to the size of the economy and these banks are not well connected with the private international capital markets. Central bank in these countries intervene heavily in foreign exchange markets (Mishra et al, 2010; Mishra and Montiel, 2012). There are only few studies on the effectiveness of monetary policy transmission for developing countries in Asia. Agha et al (2005) examined the monetary policy in Pakistan by using Ramey's (1993) approach together with their own system of four variable recursive VARs. Alam and Waheed (2006) also employed recursive VARs approach at the aggregate and sectoral levels for Pakistan. Mallick (2009) investigated monetary policy transmission in India by adopting five variables recursive and structural VARs. Ahmad (2008) used a VAR approach with a recursive Sims ordering of monetary policy for Fiji and Papua New Guinea. Yang et al (2011) examined the monetary policy transmission mechanisms in Pacific islands using Autoregressive Distributed Lags (ADL) model.

In an economy with relatively unsophisticated financial market like Sri Lanka monetary policy decision can influence real sector of the economy via credit channels. Monetary policy plays a significant role in the fluctuations in real output and prices (Rafiq and Mallick, 2008). In a recent study, Mishra and Montiel (2012) argued that credit channel might be more effective in low income countries than other channels. The objectives of central bank of Sri Lanka like many other central banks in developing countries have been set out as maintaining economic and price stability as well as financial system stability. Monetary policy and its transmission mechanism in Sri Lanka have not been investigated extensively (Perera, Anil et al 2013). A clear understanding of monetary mechanism is required to conduct monetary policy effectively. The Objective of this study is to identify the effective monetary transmission mechanism channel and policy instruments in Sri Lanka. In this study, due to the unavailability of data, we investigate only three major monetary mechanism channels: interest rate channel, credit channel and exchange rate channel.

2. Methodology

The standard recursive Structural Vector Autoregression (SVAR) models are used to analyze monetary transmission mechanism. Recursive SVAR assumes a recursive relationship between errors of a reduced form VAR. The structure of a reduced form model of an economy:

$$Y_t = A_1 Y_{t-1} + \ldots + A_q Y_{t-q} + BZ_t + B_1 Z_{t-1} + \ldots\ldots + B_p Z_{t-q} + u_t \qquad (1)$$

Where t = 1,….,T, Y_t is an M x 1 vector of endogenous time series variables, Z is a vector of exogenous variables, u_t is a vector of reduced form residuals, A_i and B_i are matrices of coefficients, p and q are non negative integers denoting the number of lags included in the model. The variance and covariance matrix $\sum$ can be written as $\sum = E u_t u_t$. Ordinary least squares method is used to obtain the consistent estimators of A_i , B_i, and $\sum$. Once the estimates of reduced form parameter obtained, parameters of structural form model have to recover. Structural form model can be written as

$$C_0 Y_t = C_1 Y_{t-1} + \ldots + C_q Y_{t-q} + DZ_t + \varepsilon_t \qquad (2)$$

Where C_i and D are matrices of parameters underlying the structure of the economy. ε_t is a vector of the structural economic shocks, and the corresponding variance covariance matrix can be written as $W = E\varepsilon_t \varepsilon_t$. The relationship between the reduced form and structural form parameters can be written as

$$A_i = C_0^{-1} C_i , \qquad \varepsilon_t = C_0 u_t \qquad (3)$$

There is a relationship between variance-covariance matrixes of the reduced form and the structural form model: $\sum = C_0^{-1} W (C_0^{-1})$. Since there is a lack of information about the contemporaneous parameter matrix, C_0, identification problems are often encountered in the structural VAR. The number of estimated parameters in the reduced form model is smaller than the number of parameters in the structural form model. To resolve this problem, certain restrictions are imposed on the structural parameters. Choleski decomposition is applied to the contemporaneous parameter matrix, C_0. The ordering of the triangular matrix is written as follows:

$$\begin{bmatrix} \varepsilon_t^y \\ \varepsilon_t^p \\ \varepsilon_t^m \\ \varepsilon_t^r \\ \varepsilon_t^c \\ \varepsilon_t^e \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ A_{21} & 1 & 0 & 0 & 0 & 0 \\ A_{31} & A_{32} & 1 & 0 & 0 & 0 \\ A_{41} & A_{42} & A_{43} & 1 & 0 & 0 \\ A_{51} & A_{52} & A_{53} & A_{54} & 1 & 0 \\ A_{61} & A_{62} & A_{63} & A_{64} & A_{65} & 1 \end{bmatrix} \begin{bmatrix} u_t^y \\ u_t^p \\ u_t^m \\ u_t^r \\ u_t^c \\ u_t^e \end{bmatrix} \quad (4)$$

Variables used in this model were denoted as output (y), price level (p), reserve money (m), short term interest rate (r), credit to private sector (c), and the exchange rate (e). The ordering of variables used in this model is crucial for the econometric identification of monetary policy shocks. The ordering of variables is as follows: y, p, m, r, c and e. It means that output and price level respond to an innovation in reserve money with lag. Reserve money is considered as the most important instrument of monetary policy. The policy rate or the short term interest rate is ordered after reserve money. The policy rate or other short term interest rate is used by central banks as a supplementary instrument to signal the changes in monetary policy. Monetary authority cannot choose reserve money and interest rate simultaneously. This weakens the effectiveness of monetary policy. Credit to private sector is ordered after the policy rate because commercial banks respond contemporaneously to a monetary policy shocks by granting loans and changing loan terms. Monetary loosening policy expands credit available to private sector and it has a subsequent impact on inflation and output. Because exchange rate responds to shocks in macro fundamentals contemporaneously, the exchange rate is ordered after all other variables.

Monthly data from January 2005 to august 2013 were collected from central bank of Sri Lanka and IMF data base. As monthly GDP (Gross Domestic Production) is not available we use Industrial Production Index (IPI) as a proxy to output (y). SVAR model that we used consists of six endogenous variables and four exogenous variables. The six endogenous variables are Sri Lanka industrial production index, Consumer Price Index (CPI), reserve money, policy rate (repo rate, average weighted money call rate, and t-bill rate), credit to private sector, and the nominal effective exchange rate (NEER). Reserve money (Monetary base) is defined as the sum of currency in circulation and deposits held by banks and other depository institutions in their accounts at the Central Bank. Repo rate is the rate at which the central bank of a country lends money to commercial banks in the event of any shortfall of funds. Money call rate is the interest rate on a type of short-term loan that banks give to brokers who in turn lend the money to investors to fund margin accounts. For brokers and investors, this type of loan does not have a set repayment schedule and must be repaid on demand. T-bill rate is the rate of return on a 3 Month Treasury Bills. The four exogenous variables that affect endogenous variables are global oil price index, global food price index, U.S federal funds rate and U.S. industrial production index. These four exogenous variables affect the aggregate demand and aggregate supply of the Sri Lankan economy and then GDP. Since United States is the major importer of Sri Lankan products and U.S federal funds rate and U.S. industrial production are proxies to global economic condition, these two exogenous variables are expected to affect price and output by shifting aggregate demand. Global oil price and global food price influence the cost of production by affecting the wage, price of energy and materials in Sri Lanka. These two exogenous variables are expected to affect price and output by shifting aggregate supply.

3. Empirical Results

The benchmark SVAR model was estimated using the data from January 2005 to August 2013 and recursive identification methods described by equation (4). Using the standard lag length selection criteria (Akaike and schwarz), the VAR maximum lag length of three was chosen. The policy rates used in the models are repo rate, average weighted money call rate, t-bill rate. Therefore, three benchmark SVAR models were estimated, using these three policy rates. It enables us to identify the policy rate that signals the changes in monetary policy more effectively.

Figure 1:

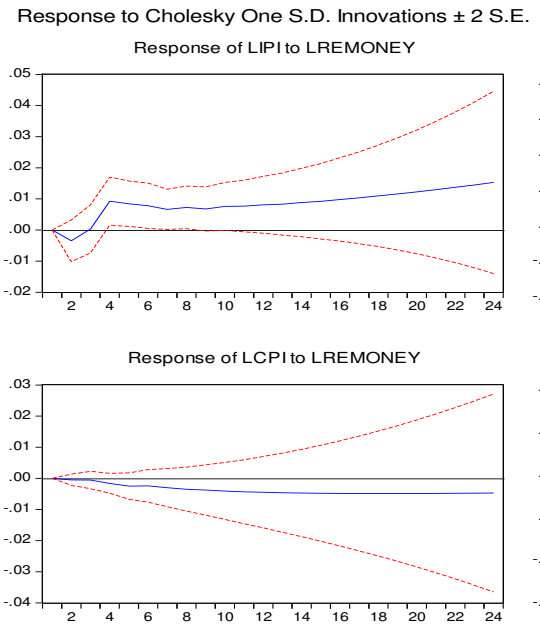


Figure 2:

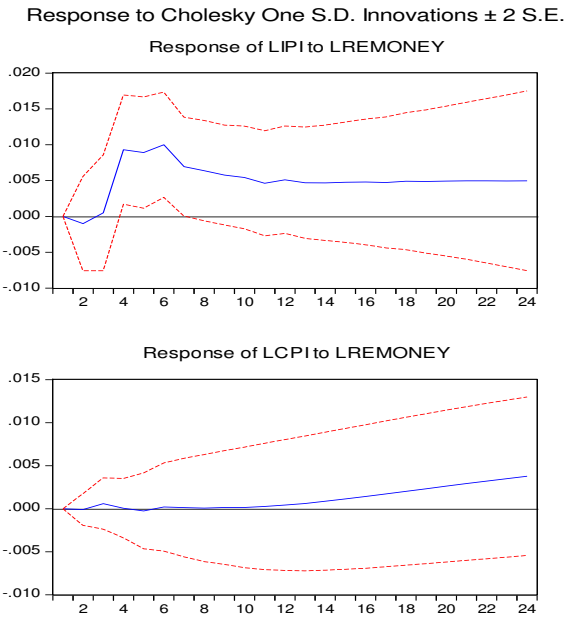


Figure 3:

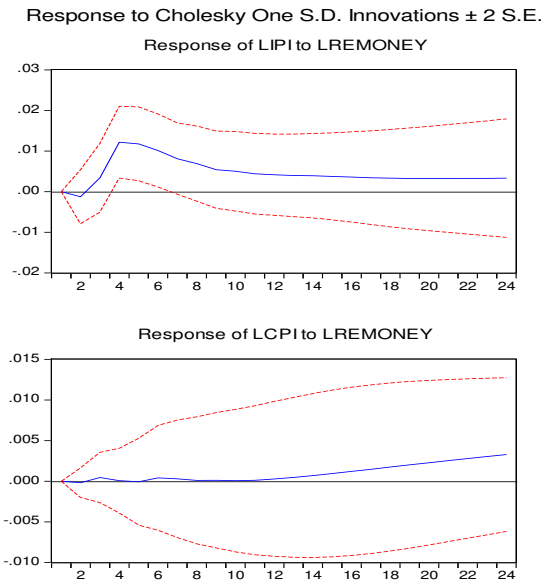


Figure 1, Figure 2 and Figure 3 show the impulse responses of output and prices to a one standard deviation positive shock in reserve money in the benchmark SVAR model using repo rate, average weighted money call rate, and t-bill rate as policy rate respectively. These figures indicate that output responds positively and significantly to a shock in reserve money, but price does not respond significantly to a shock in reserve money. To identify the effective transmission channel in Sri Lanka, we estimated the nine SVAR model with credit to private sector, policy rate, and nominal effective exchange rate (NEER) as an exogenous variable in the model separately, using three policy rates, Figure 4, 5, and 6 show the impulse responses of output to a one standard deviation positive shock in reserve money in the SVAR model with credit to private sector as an exogenous variable as well as an endogenous variable , using repo rate, average weighted money call rate, and t-bill rate as policy rate respectively

Figure 4: Response of LIPI to one standard deviation of repo

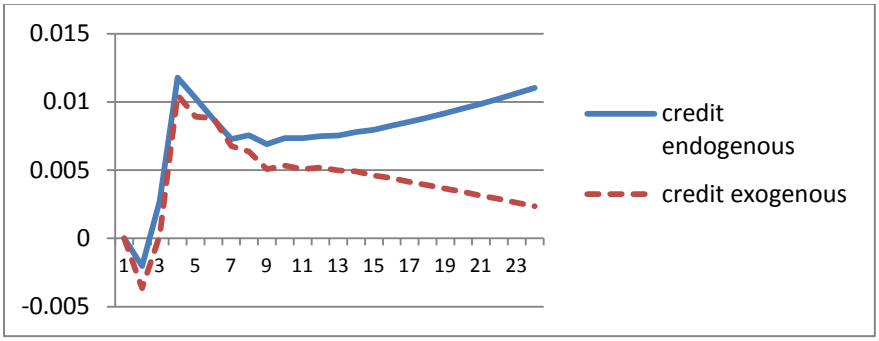


Figure 5: Response of LIPI to one standard deviation of average weighted money call rate

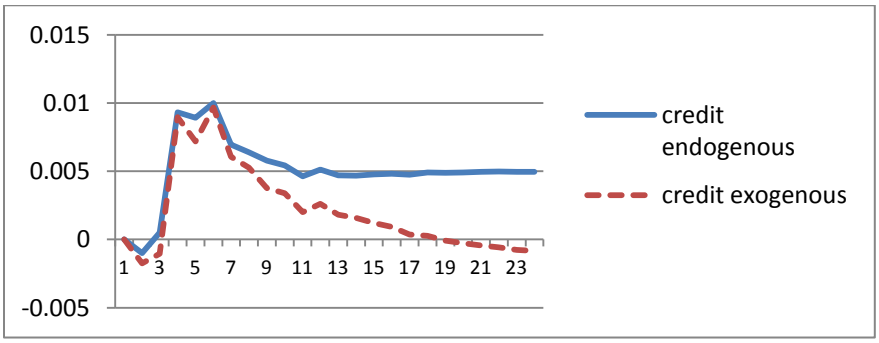


Figure 6: Response of LIPI to one standard deviation of t-bill rate

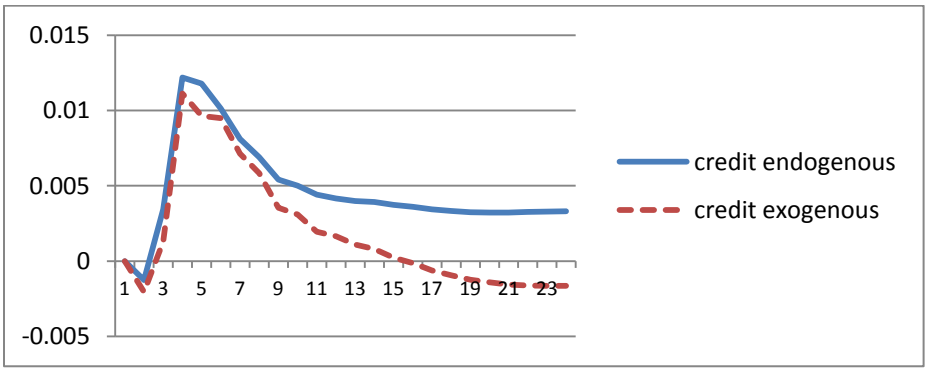


Figure 7, 8, and 9 show the impulse responses of output to a one standard deviation positive shock in reserve money in the SVAR model with repo rate, average weighted money call rate, and t-bill rate as an exogenous variable as well as an endogenous variable separately.

Figure 7: Response of LIPI to one standard deviation of repo

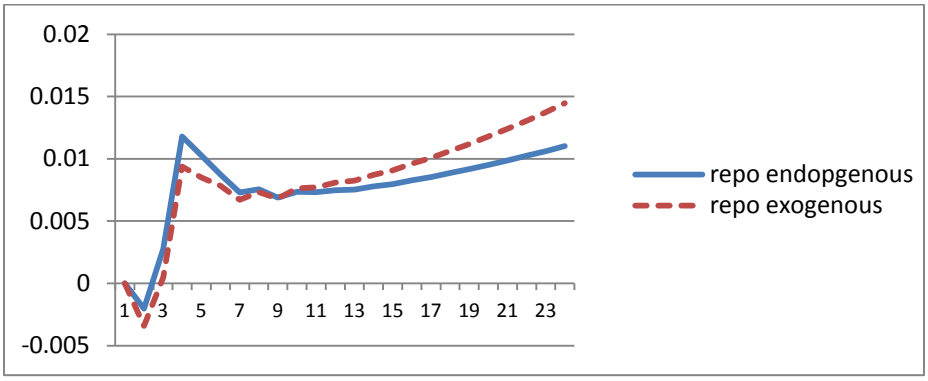


Figure 8: Response of LIPI to one standard deviation of average weighted money call rate

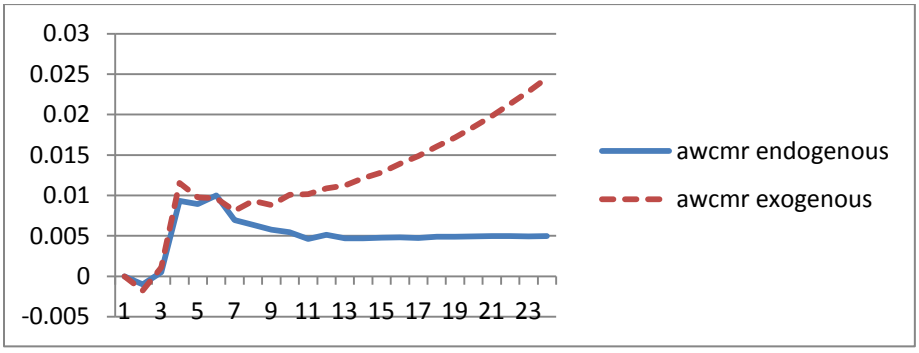


Figure 9: Response of LIPI to one standard deviation of t-bill rate

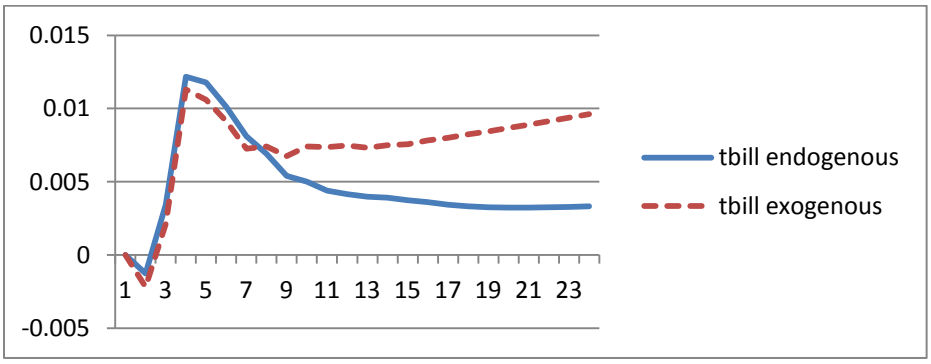


Figure 10, 11, and 12 show the impulse responses of output to a one standard deviation positive shock in reserve money in the SVAR model with NEER as an exogenous variable as well as an

endogenous variable, using repo rate, average weighted money call rate, and t-bill rate as policy rate respectively.

Figure 10: Response of LIPI to one standard deviation of repo

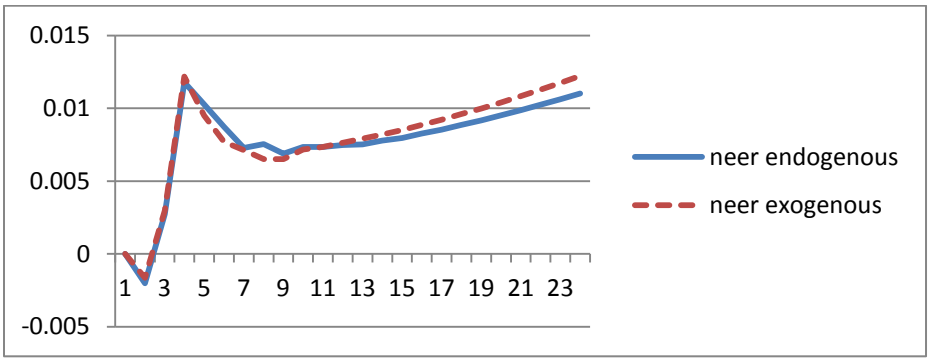


Figure 11: Response of LIPI to one standard deviation of average weighted money call rate

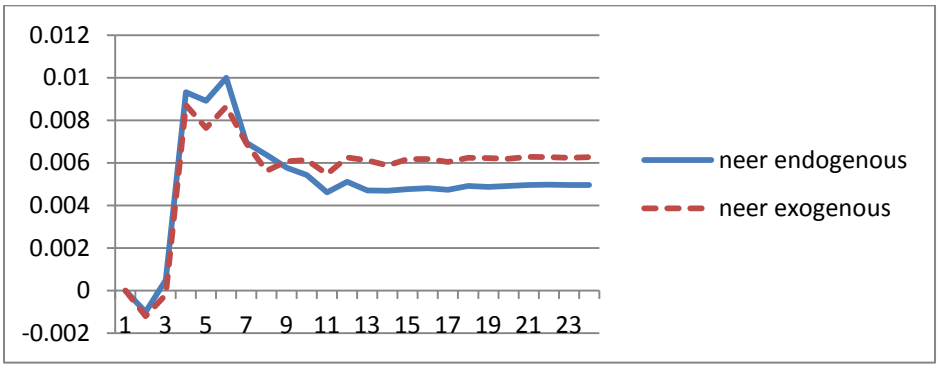
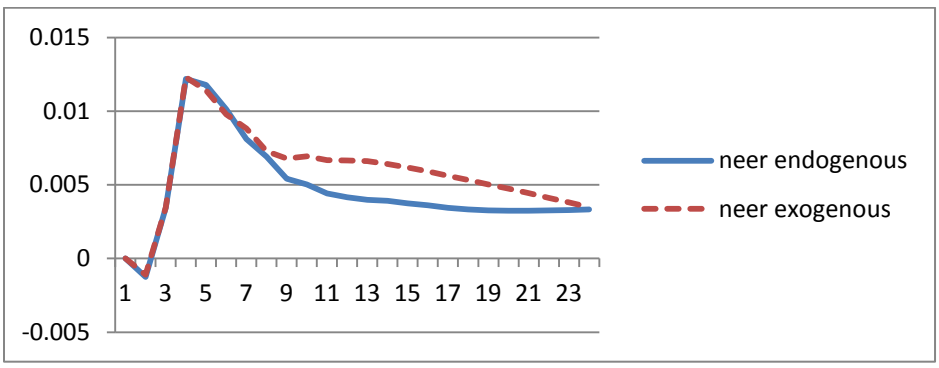


Figure 12: Response of LIPI to one standard deviation of t-bill rate



Among all these figures, in the figures (4, 5 & 6) with credit to private sector as an endogenous as well as an exogenous variable, impulse response of output to a one standard deviation positive shock in reserve money when credit is an endogenous variable is greater than impulse response when credit is an exogenous variable. This indicates that credit channel is more effective transmission channel in Sri Lanka. Figures (4, 5 & 6) show that impulse response is

high when repo rate is used as policy rate. Therefore, it indicates that repo rate is the policy rate that signals the changes in monetary policy more effectively.

4. Conclusion

Credit channel is more effective transmission channel than interest rate and exchange rate channel in Sri Lanka and repo rate is the policy rate that signals the changes in monetary policy more effectively. This finding would be very useful when policy makers formulate the economic policies. Developing the capital market and reducing the role of state banks in the financial system would make credit channel more effective. To make the exchange rate channel more effective, the authorities should not intervene in the foreign exchange market. The authorities should take necessary steps to increase the capital mobility, transparent, foreign investment in domestic secondary securities market and the development of a competitive export base.

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