Monetary Transmission Mechanism in the Philippines: A VAR Approach

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Abstract:

It is necessary for policy makers to understand how the monetary policy is transmitted to the economy through different channels. This study focused on the reduced-form relationships between money, real output and price level and "channel" variables such as domestic credit, exchange rate and real lending interest rate and examined the monetary transmission mechanism in the Philippines, using the vector autoregression approach (VAR). The results derived from the forecast error variance decompositions analyses show that the main sources of variances in output and price level are their "own" shocks. The results of the impulse response functions indicate that monetary policy can affect output and price level and that the effect of monetary policy on output was strongest after two quarters. An expansionary monetary policy increases output in two quarters however; it has a weak effect on price level after two quarters. Furthermore, domestic credit has the most significant effect on output in the Philippines. Theories in monetary economics suggest that an expansionary monetary policy increases output and price level however, in the case of the Philippines, an expansionary monetary policy increases output but have a weak effect on inflation.

CHAPTER I

INTRODUCTION

The monetary transmission mechanism describes how changes in the nominal money stock or the short-term nominal interest rate affect real variables such as aggregate output and employment and inflation. The liabilities of the central bank include two components of the monetary base, such as bank and currency reserves. Central banks can control the monetary base in such a way that they conduct monetary policy through open market operation and buying (selling) government bonds in order to increase (decrease) the monetary base. Monetary policy is a tool used by central banks in order to stabilize the economy hence, it is important to determine how the channels of monetary transmission mechanism affect the economy and the time it takes for monetary policy operate in the economy. According to Ireland (2005), “if policy induced movements in the monetary base have an impact beyond the immediate effects on the central bank’s balance sheet; other agents must lack the ability to offset them by changing the quantity or composition of their own liabilities.” Nonetheless, any model of the monetary transmission mechanism must have an assumption those privately-issued securities that are perfect substitutes for the monetary base does not exist. Ireland (2005) cites that “this assumption holds even if legal restrictions does not allow private agents from issuing liabilities that have one or more of the characteristics as bank and currency reserves.”

It must be noted that both bank and currency reserves are denominated in nominal terms, with quantities measured in terms of the country's unit of account. Whenever policy-induced movements in the monetary base are to have real effects, nominal prices are not able to respond immediately, in such a way that there are no changes in the real value of the monetary base. Ireland (2005) cites that "any model of the monetary transmission mechanism must also assume that some of the friction in the economy works in order to avert the immediate and proportionate adjustment of nominal prices to some changes in the monetary base."

The study used the VAR models of Hung (2008) that focuses on the relationship between monetary policy and output that used variables such as money supply, real output, price level, domestic credit, real effective exchange rate and real lending interest rate. This study aims to address the following questions: What is the impact of an increase in the money supply on output and price level in the Philippines? and; How many quarters does it take the channels of monetary transmission mechanism to operate in the economy of the Philippines?

CHAPTER II

REVIEW OF RELATED LITERATURE

Mishkin (2004) "cites that in the exchange rate channel of monetary policy, an increase in the domestic interest rate causes inflow of capital." Under the floating exchange rate regime, this further causes a decrease in the exchange rate (appreciation of domestic currency) and a decrease in net exports and ultimately, output. In the case of a fixed exchange rate, the resultant inflow of capital will be sterilized by an rise in the money supply in an attempt to minimize the fluctuation in the parity. Furthermore, he noted that such event might make the initial expansion in money supply redundant and impact of policy not be transmitted into exchange rate. In the case where there is a presence of black market or parallel market, pulses of the policy will be transmitted into the economy via black market trade.

Bernanke and Gertler (1995) have proposed a mechanism of monetary transmission known as the credit channel. Bernanke and Gertler (1995) "noted that the traditional channel has been unable to explain the following two observed phenomena: (1) monetary policy has large effects on long-lived assets which respond to real long-term rates, given the fact that policy must have strongest effects on short-term rates and weakest effect on long-term rates (2) spending has been found insensitive to the interest rate."

Credit channel, which is not considered to be a separate channel, amplifies the traditional channel and has two separate channels: (1) the balance sheet channel or broad lending channel and (2) bank lending channel. In the balance sheet channel, asymmetric information and moral hazards problems create external financial premium i.e., a wedge between the cost of funds raised externally (by issuing equities) and the opportunity cost of funds raised internally (by retaining earnings). He further noted that a rigid monetary policy increases the internal rate that will move the external finance premium in the same direction, hence putting boundaries to the firms' ability to obtain funds from external sources by deteriorating its credit worthiness and net worth (or deterioration in balance sheets of the firms). Accordingly, this channel enhances the traditional monetary channel by explaining the firms' inability in increasing its funds and consequently decreasing investment spending in the event of an interest rate hike.

CHAPTER III

THEORETICAL FRAMEWORK

3.1 Channels of Monetary Transmission Mechanism

According to Mishkin (2004), a rise in the money supply results to an increase in aggregate demand. Moreover, through different channels, increases total output. The channels of monetary transmission mechanism include the credit channel, the exchange rate channel, the interest rate channel and other asset price channel.

3.1.1 Basic Monetary Channel

Theories in monetary economics suggest that an increase in money supply leads to an increase in output and price level.

3.1.2 The Credit Channel

The credit channel primarily involves agency problems arising from asymmetric information and high cost of the enforcement of contracts in the financial market (Miskin, 2004). Furthermore, this channel operates via two sub-channels that consist of the balance-sheet channel and bank lending channel.

Balance-Sheet Channel

The balance-sheet channel operates through firms' net worth. This takes into account the effects of adverse selection and moral hazard. A fall in the net worth of firms implies that lenders (i.e. banks) can expect lower collateral for their loans, which increase the problem of adverse selection and decrease lending for investments. According to Hung (2008), lower net worth also leads to a problem of moral hazard since owners of businesses have a lower equity stake in the firm hence, have an incentive to take part in risky ventures. Consequently, lending and investment falls. Monetary policy affects the balance-sheets of firms through adverse selection & moral hazard lending:

$$M \downarrow \rightarrow P_e \downarrow \rightarrow \textit{adverse selection and moral hazard} \uparrow \rightarrow \textit{lending} \downarrow \rightarrow I \downarrow \rightarrow Y \downarrow$$

A tightened monetary policy results to a fall in the prices of equities (P_e). This situation increases the problems of adverse selection and moral hazard, and ultimately leads to a fall in the lending for investments (Hung, 2008).

M ↓→i↑→ cashflow ↓→ adverse selection & moral hazard ↑→ lending ↓→I↓→ Y ↓

Contractionary monetary policy (i.e. policies that decreases the money supply) raises the interest rate. In turn, this raises the problems of adverse selection and moral hazard. Analogous to a tightened monetary policy, when a contractionary policy is implemented, lending and investment spending falls (Hung, 2008).

Bank Lending Channel

A decrease in the money supply results to a decrease in bank deposits, which further leads to a decrease in the volume of money that banks can lend to the public. In turn, this leads to a decrease in investment and finally, aggregate demand. According to the textbook model of Miskin (2004), this channel allows monetary policy to operate without interest rate. This means that decreasing the interest rates may be inadequate to increase investment. However, Mishkin (2004) also noted that with innovations in the finance, the significance of this channel has been doubted. The following presents a schematic for the bank lending channel is as follows:

M ↓→ bank deposits↓ → bank loans →I↓→Y↓

3.1.3 The Exchange Rate Channel

The textbook model of Mishkin (2004) indicates that a rise in money supply (*Ms*) causes the domestic real interest rate (i_r) to fall. As a result, assets denominated in domestic currency are less attractive compared to assets denominated in foreign currency. This results to a domestic currency depreciation ($E\uparrow$). The domestic currency depreciation makes goods in the produced domestically relatively cheaper compared to foreign goods, in this manner, causing net export (*NX*) and output to rise. These events are established in the following schematic:

$$M\uparrow\rightarrow i_r\downarrow\rightarrow E\uparrow\rightarrow NX\uparrow\rightarrow Y\uparrow$$

3.1.4 The Interest Rate Channel

An expansionary monetary policy (i.e. increasing the money supply) causes the real interest rate (i_r) to decline, which means that the cost of capital is lowered (Miskin, 2004). The decline in real interest rate makes it more attractive for business owners to raise spending on investments spending on one hand, and for consumers to increase their housing and durable expenditures, which are also considered investment on the other hand (Hung, 2008). Such rise in investment spending (*I*) leads a rise in aggregate demand and an increase in output (*Y*). This process is presented in the following schematic:

$$M\uparrow\rightarrow i_r\downarrow\rightarrow I\uparrow\rightarrow Y\uparrow$$

3.1.5 Other Asset Price Channels

According to Miskin (2004), other asset price channels primarily operate through two effects: Tobin's *q* theory of investment and wealth effects on consumption. Tobin (1969) defines *q* as ratio of the market value of a firm and the replacement cost of capital. The replacement cost of capital is low compared with the market value of the firm if the value of *q* is high. This enables the firm to increase its plant and equipment with the higher-value equity hence, investment spending increases. On the other hand, the market value of the firm is also low in comparison with the replacement cost of capital and the firm will not purchase investment goods if the value of *q* is low thus, leading to a decline in investment.

The monetarist view in economics states that if money supply falls, the public has less money and desires to decrease their spending. One means to decrease their spending is to allocate less amount of money invested in the stock market, hence depressing the demand for and the price of equities (P_e) (Mishkin, 2004). This view combined with the Tobin's q effect expresses the channel in the following schematic:

$$M\downarrow \rightarrow P_e\downarrow \rightarrow q\downarrow \rightarrow I\downarrow \rightarrow Y\downarrow$$

The life-cycle model of Modigliani (1971) identifies the wealth effect on consumption. According to his model, consumers establish their consumption spending by taking into account their lifetime resources which includes real capital, financial wealth and human capital. In addition, common stocks are also considered as a major component of the financial wealth of consumers. When the prices of stocks fall, the wealth of consumers also decreases and they tend to spend less on consumption (Hung, 2008). Since a contractionary monetary policy can lower the prices of stocks, this process could be presented in the following schematic.

$$M \downarrow \rightarrow P_e \downarrow \rightarrow wealth \downarrow \rightarrow consumption \downarrow \rightarrow Y \downarrow$$

CHAPTER 4

METHODOLOGY

4.1 Data Specification

Quarterly data from first quarter of 1985 to fourth quarter of 2007 was used in identifying the monetary transmission mechanism in the Philippines. The set of data included the following variables:

CPI - Consumer Price Index (2000=100)
RGDP - the real GDP deflated by the CPI
M1 – money, measured in billions of Philippine Pesos
RRL – real lending rate, which is equal to the lending interest rate of banks minus the inflation rate
DC – domestic credit, measured in billions of Philippine Pesos
REER – the index of the real effective exchange rate (2000=100) wherein the decrease (increase) of the index indicates a(n) depreciation (appreciation)
WOP – world oil price of Dubai crude oil in U.S. Dollars per barrel

The ordering of the variables is based on the assumption that a shock to the money supply would be transmitted to the price level and output. The variables wop was included in the model as exogenous in order to control for external shocks. This would take into account the openness of the economy of the Philippines and monetary official's use of the USD/PHP exchange rate as a benchmark in monetary policy-making. Furthermore, external shocks such as world oil prices has a significant effect on domestic prices and real output.

Sources of Data:

All of these data were taken from the April, 2008 International Financial Statistics CD-ROM

These four reduced form VAR models were used in analyzing the Granger causality tests, variance decompositions, and impulse response functions for the effect of monetary shocks on inflation and real output. The effects of specific channels, namely the basic monetary channel, credit channel, exchange rate channel and domestic lending interest rate channel were analyzed in the multi-variable VAR analysis.

The VAR Model

This study applied the theoretical framework Hung (2008). The following mathematical representation of a VAR model was used in the study:

$$y_t = c + \sum_{i=1}^{k} A_i y_{t-1} + \sum_{i=1}^{k} B_i x_t + \varepsilon_t , \qquad (4.1)$$

where:

y_t – is a (n x 1) vector of endogenous variables

x_t – is a (n x 1) vector of exogenous variables

c – is a (n x 1) intercept vector of the VAR model

A_i and B_i – is a (n x 1) i^{th} matrix of autoregressive coefficients to be estimated

ε_t – is a (n x 1) vector of innovations that may be contemporaneously correlated but are uncorrelated with their own lagged values and uncorrelated with all of the right-hand side variables.

CHAPTER 5
RESULTS AND DISCUSSION

5.1 Summary Statistics

The summary statistics of the variables in levels and first difference form are presented in Table 5.1 and Table 5.2.

Table 5.1 Summary Statistics of Levels Form

	MONEY	RGDP	CPI	RLR	REER	DC	WOP
Mean	266.422	7.311261	81.03573	13.33223	107.118	1261.411	24.50141
Median	200.8475	6.714948	80.89085	12.44820	105.3165	1307.97	17.705
Maximum	831.836	13.12824	144.1	32.53192	142.95	2718.12	83.21
Minimum	28.8468	4.196405	32.1107	7.231033	83.97	136.856	10.58
Std. Dev.	219.3478	2.120077	34.95347	4.989779	13.71812	953.4018	15.25424
Skewness	0.903039	0.740849	0.123401	1.267744	0.695318	0.049778	1.949239
Kurtosis	2.899643	2.561884	1.781117	4.973070	3.025367	1.324525	6.168524
Jarque-Bera	12.54261	9.151602	5.928582	39.56655	7.415621	10.79898	96.74441
Probability	0.00189	0.010298	0.051597	0.000000	0.024531	0.004519	0
Sum	24510.82	672.636	7455.287	1226.565	9854.858	116049.8	2254.13
Sum Sq. Dev.	4378324	409.0202	111178.8	2265.708	17125	82716725	21174.95
Observations	92	92	92	92	92	92	92

Table 5.2 Summary Statistics of First Difference Form

	DMONEY	DRGDP	DCPI	DRLR	DREER	DWOP
Mean	8.824057	0.092052	1.230652	-0.240286	-0.277363	0.615385
Median	4.9022	0.097178	1.1668	-0.268821	0.934	0.48
Maximum	67.232	1.811344	3.7959	4.715493	7.64	13.24
Minimum	-29.456	-1.510713	-3.491	-6.854629	-13.21	-11.55
Std. Dev.	13.10342	0.786302	0.96137	2.166682	4.627465	3.751976
Skewness	1.605734	-0.032788	-0.882991	-0.339538	-0.794616	0.009657
Kurtosis	8.584966	2.509225	8.416578	3.671450	3.283075	5.397131
Jarque-Bera	157.3746	0.929568	123.0699	3.457959	9.88028	21.78923

Probability	0	0.628271	0	0.177465	0.007154	0.000019
Sum	802.9892	8.376744	111.9893	-21.86598	-25.24	56
Sum Sq. Dev.	15452.97	55.64431	83.18093	422.5061	1927.209	1266.959
Observations	91	91	91	91	91	91

5.2 Unit Root Tests

Econometric analysis that uses time series data requires stationarity. To have representation of the VAR models that are stationary, each variable was tested for unit root specification using the Augmented Dickey Fuller (ADF) test. The ADF was employed in all series in their levels and first differences. The lag length was determined by using the Schwarz Information Criterion (SC).

Variable	Intercept	Trend
RGDP	with intercept	with trend
CPI	with intercept	with trend
TB	with intercept	no trend
MONEY	with intercept	with trend
REER	with intercept	no trend
DC	with intercept	no trend
RLR	with intercept	no trend
CRUDE	with intercept	no trend

	Levels			First Difference		
Variable	t-stat	5% Significance Level Test Critical Value	prob.	t-stat	5% Significance Level Test Critical Value	prob.
RGDP	-5.682092	-3.45995	0	-19.07571	-3.460516	0
CPI	-3.255732	-3.45995	0.0804	-6.68559	-3.460516	0
TB	-3.564134	-2.893589	0.0084	-9.532879	-2.893956	0
MONEY	1.418025	-3.45995	1	-7.357527	-3.460516	0
REER	-2.663237	-2.893589	0.0845	-6.170174	-2.893956	0
DC	0.483964	-2.893956	0.9853	-9.684077	-2.893956	0
RLR	-3.347031	-2.893956	0.0156	-10.60706	-2.893956	0
CRUDE	2.264711	-2.893589	1	-6.920583	-2.893956	0

Table 5.1 summarizes the results of the ADF unit root test, both in levels and first difference. As seen from the results of the test, only the variables RGDP, TB and RLR

were stationary in levels form and are integrated of order zero or I(0). Also, at the 5% level of significance, we cannot reject the null hypothesis of a unit root in the variables: CPI, MONEY, REER, DC and CRUDE. However, in the case of first difference, the null hypothesis of unit roots is rejected. Therefore, it is possible to conclude that the CPI, MONEY, REER and CRUDE series follow a unit root process (non-stationarity) and are integrated of order one or I(1).

The non-stationary variables were transformed into their first differences in order to exhibit stationarity. This indicates that the mean, variance and covariance of the time series are independent of time. Furthermore, the variables transformed in their first difference form are read now as "changes in" or "movements in."

5.3 Lag Length Selection

Basic Monetary Channel VAR Model

Lag	Schwarz Criterion
0	14.93330
1	13.16525
2	13.07600
3	13.25125
4	11.80231*
5	12.10454
6	12.32510
7	12.53283
8	12.87422
* the optimal lag length selected by the SC	

Domestic Credit Channel VAR Model

Lag	Schwarz Criterion
0	26.37831
1	24.40123
2	24.73729

3	25.02696
4	**23.85812***
5	24.36979
6	24.81447
7	25.29300
8	25.89196
* the optimal lag length selected by the SC	

Exchange Rate Channel VAR Model

Lag	Schwarz Criterion
0	37.10140
1	**34.91070***
2	35.26121
3	35.71246
4	35.12923
5	35.53108
6	36.41688
7	37.18963
8	38.03725
* the optimal lag length selected by the SC	

Real Lending Rate Channel VAR Model

Lag	Schwarz Criterion
0	19.78539
1	17.31832
2	17.27110
3	17.73955
4	**16.44533***
5	16.85768
6	17.20588
7	17.67438
8	18.34136
* the optimal lag length selected by the SC	

Table 5.5 suggests different criteria for the optimal lag lengths of the VAR models. The optimal lag length of the VAR model was selected using the Schwarz information criterion.

5.4 Multi-variable VAR Analysis

The ordering of the VAR model is based on the theoretical framework of the study. The study estimated the following VAR models with a vector of exogenous variable, DCRUDE.

Basic Monetary Channel VAR Model – RGDP, DCPI, DMONEY

Domestic Credit Channel VAR Model - RGDP, DCPI, DDC, DMONEY

Exchange Rate Channel VAR Model - GDP, DCPI, TB, DREER, DMONEY

Real Lending Interest Rate Channel VAR Model - RGDP, DCPI, RLR, DMONEY

5.4.1 Multi-variable VAR Model Granger Causality Test

Basic Monetary Channel VAR Model

Null Hypothesis	Chi-sq	df	Prob.
RGDP Equation			
DCPI does not GC to RGDP	20.57441	4	0.0004*
DMONEY does not GC to RGDP	1.542042	4	0.8192
DCPI equation			
RGDP does not GC to DCPI	16.06197	4	0.0029*
DMONEY does not GC to DCPI	14.82861	4	0.0051
DMONEY equation			
RGDP does not GC to DMONEY	16.76074	4	0.0022*

DCPI does not GC to DMONEY	7.825188	4	0.0982

* denotes rejection of the null hypothesis at the 0.05 level

Table 5.6.1 Multi-variable VAR Granger Causality Test Results

Conclusion:

Variables:	Causality
RGDP and DMONEY	RGDP →DMONEY
RGDP and DCPI	DCPI ↔RGDP

A rise in the money supply results to an increase in the level of prices and a potential increase in real GDP. The simple monetary channel VAR model captures the effect of money supply without taking into account the channels of monetary transmission. Granger causality tests of the simple monetary channel VAR model shows that dual causality exists between real output and inflation. In addition, the results also show that the real output help explain movements in the money supply.

In the basic monetary channel VAR model, the movements in the money supply does not help explain real output and inflation. In addition, only the real output help explain inflation.

<u>Domestic Credit Channel VAR Model</u>

Null Hypothesis	Chi-sq	df	Prob.
RGDP Equation			
DCPI does not GC to RGDP	20.24516	4	0.0004*
DDC does not GC to RGDP	6.088457	4	0.1926
DMONEY does not GC to RGDP	1.050452	4	0.9021
DCPI *equation*			
RGDP does not GC to DCPI	17.65819	4	0.0014*
DDC does not GC to DCPI	6.328319	4	0.1759
DMONEY does not GC to DCPI	14.19568	4	0.0067*
DDC *equation*			
RGDP does not GC to DDC	12.40555	4	0.0146*
DCPI does not GC to DDC	4.696278	4	0.3199
DMONEY does not GC to DDC	4.382937	4	0.3567
DMONEY *equation*			
RGDP does not GC to DMONEY	14.64543	4	0.0055*
DCPI does not GC to DMONEY	7.386734	4	0.1168
DDC does not GC to DMONEY	1.470277	4	0.8319

* denotes rejection of the null hypothesis at the 0.05 level

Table 5.6.2 Multi-variable VAR Granger Causality Test Results

Conclusion:

Variables:	Causality
DMONEY and DCPI	DMONEY → DCPI
RGDP and DCPI	DCPI ↔ RGDP
RGDP and DDC	RGDP → DDC
RGDP and DMONEY	RGDP → DMONEY

The Granger causality test indicates that at the 5% level of significance, dual causality exists between the real output and inflation. The movements in the money supply Granger-causes inflation. Furthermore, the results also show that the real GDP is important in explaining movements in the domestic credit and changes in the money supply.

To sum up, in the domestic credit VAR model, the movements in the money supply help explain movements in the inflation but not real output. Moreover, the real output is important in explaining the movements in the money supply and inflation

Exchange Rate Channel VAR Model

Null Hypothesis	Chi-sq	df	Prob.
RGDP Equation			
DCPI does not GC to RGDP	4.111193	1	0.0426*
TB does not GC to RGDP	3.517260	1	0.0607
DREER does not GC to RGDP	0.910716	1	0.3399
DMONEY does not GC to RGDP	0.500148	1	0.4794
DCPI Equation			
DRGDP does not GC to DCPI	9.883868	1	0.0017*
TB does not GC to DCPI	1.753171	1	0.1855
DREER does not GC to DCPI	0.945480	1	0.3309
DMONEY does not GC to DCPI	14.32464	1	0.0002*
TB Equation			
RGDP does not GC to TB	0.060658	1	0.8055
DCPI does not GC to TB	0.645630	1	0.4217
DREER does not GC to TB	1.619213	1	0.2032
DMONEY does not GC to TB	6.036254	1	0.0140*
DREER Equation			
RGDP does not GC to DREER	6.440772	1	0.0112*

DCPI does not GC to DREER	2.648636	1	0.1036
TB does not GC to DREER	1.078884	1	0.2989
DMONEY does not GC to DREER	2.776918	1	0.0956
DMONEY Equation			
RGDP does not GC to DMONEY	12.88811	1	0.0003*
DCPI does not GC to DMONEY	1.110214	1	0.2920
TB does not GC to DMONEY	0.241907	1	0.6228
DREER does not GC to DMONEY	2.733396	1	0.0983

* denotes rejection of the null hypothesis at the 0.05 level

Table 5.6.3 Multi-variable VAR Granger Causality Test Results Conclusion:

Variables:	Causality
RGDP and DCPI	DCPI ↔ RGDP
DMONEY and DCPI	DMONEY → DCPI
DMONEY and TB	DMONEY → TB
RGDP and DREER	RGDP → DREER
RGDP and DMONEY	RGDP → DMONEY

Similar to the Granger causality test results in the domestic credit VAR model, dual causality exists between the real output and inflation. In addition, movements in the money supply Granger-causes inflation and real output help explain movements in the money supply.

The results also show that the real GDP is important in explaining movements in the real exchange rate. Contrary to economic theory, no causality exists between movements in the real exchange rate and trade balance.

To sum up, in the exchange rate channel VAR model, the movements in the money supply help explain movements in the inflation but not real output. Furthermore, the real output is important in explaining the movements in the money supply and inflation.

Real Lending Interest Rate Channel VAR Model

Null Hypothesis	Chi-sq	df	Prob.
RGDP Equation			
DCPI does not GC to RGDP	20.01579	4	0.0005
RLR does not GC to RGDP	13.16836	4	0.0105
DMONEY does not GC to RGDP	1.652845	4	0.7993
DCPI *equation*			
RGDP does not GC to DCPI	13.17124	4	0.0105
RLR does not GC to DCPI	8.240752	4	0.0831
DMONEY does not GC to DCPI	13.56741	4	0.0088
RLR *equation*			
DRGDP does not GC to RLR	4.442893	4	0.3494
DCPI does not GC to RLR	24.66586	4	0.0001
DM2does not GC to RLR	5.513467	4	0.2385
DMONEY *equation*			
RGDP does not GC to DMONEY	12.01506	4	0.0172
DCPI does not GC to DMONEY	5.881544	4	0.2082
RLR does not GC to DMONEY	0.621291	4	0.9607

* denotes rejection of the null hypothesis at the 0.05 level

Table 5.6.4 Multi-variable VAR Granger Causality Test Results
Conclusion:

Variables:	Causality
RGDP and DCPI	DCPI ↔ RGDP
RLR and RGDP	RLR→RGDP
DMONEY and DCPI	DMONEY → DCPI
DCPI and RLR	DCPI → RLR
RGDP and DMONEY	RGDP → DMONEY

Some of the results in the real lending rate channel VAR model Granger causality tests are similar to the results in the previous two channels. Dual causality exists between the real output and inflation. The real output also help explain movements in the money supply. Furthermore, movements in the money supply Granger-causes inflation.

The causality between the real lending rate and real output runs from the real lending rate to real output. As expected, inflation is important in explaining the real lending rate. The real output is important in

To sum up, in the exchange rate channel VAR model, the movements in the money supply help explain movements in the inflation but not real output.

5.4.2 Forecast Error Variance Decomposition Analysis

Table 5.7.1 Multi-variable VAR Variance Decomposition Results

Variance Decomposition of Basic Monetary Channel VAR Model

Variance Decomposition of RGDP:				
Quarter	S.E.	RGDP	DCPI	DMONEY
4	0.286766	77.43078	17.46841	5.100811
8	0.414920	74.87973	18.57043	6.549839
12	0.507374	74.98248	18.85594	6.161588
Variance Decomposition of DCPI:				
Quarter	S.E.	RGDP	DCPI	DMONEY
4	0.969095	3.431251	79.07601	17.49274
8	0.996034	4.197179	75.84247	19.96035
12	1.002712	4.846154	75.01037	20.14347
Variance Decomposition of DMONEY:				
Quarter	S.E.	RGDP	DCPI	DMONEY
4	11.85050	0.559866	9.779573	89.66056
8	12.52129	0.560645	10.24833	89.19102
12	12.71249	0.935067	10.76530	88.29964
Cholesky Ordering: RGDP DCPI DMONEY				

Table 5.7 shows that the most important source of variation of the real output forecast error is its own innovations, which account for 74.87% to 77.43% of the variance of its forecast. Innovations of inflation account for 17.47% to 15.04% and innovations of movements in the money supply accounts for 5.1% to 6.54% of the forecast error variance of the movements in the real output.

Similar to the real output, the movements in the price level’s own innovations account for the highest fraction of its forecast error variance, which accounts for 75.01% to 79.08% of the forecast error variance. The next highest source in the variation of inflation is the innovations in the movements in the money supply, which accounts for 17.49% to 20.14%. Innovations in the real output help explain 3.43% to 4.85% of the forecast error variance of the movements in the price level.

"Own" innovations of the movements in the money supply are the most important source in explaining the forecast error variance of the movements in the money supply, which accounts for 89.19% to 89.66% of the forecast error variance. Innovations of inflation account for 9.78% to 10.77% and innovations in the real output explain 0.56% to 0.94% of the forecast error variance of the movements in the money supply.

From the findings of forecast error variance decompositions model 1 we arrive at the following conclusions: (1) innovations in the movements in the money supply have a weak influence of the determination of the variation of output. Furthermore, this influence is too small compared to "own" innovations of output (2) the main sources of variance of the movements in the real exchange rate, real GDP and price level forecast errors are their "own shocks" (3) money supply movements account for a higher proportions in the variability of the forecast error of price level movements than those of real output. This suggests that monetary policy has a greater impact on inflation than in real output.

Table 5.7.2 Multi-variable VAR Variance Decomposition Results

Variance Decomposition of Credit Channel VAR Model

		Variance Decomposition of RGDP:			
Quarter	S.E.	RGDP	DCPI	DDC	DMONEY
4	0.283272	76.80321	15.59971	4.046411	3.550667
8	0.394935	71.90872	16.23418	6.076793	5.780312

12	0.475305	69.10817	15.60180	9.231833	6.058192

Variance Decomposition of DCPI:

Quarter	S.E.	RGDP	DCPI	DDC	DMONEY
4	0.946947	3.627231	79.11075	1.185929	16.07609
8	1.013846	5.163528	70.72979	7.582564	16.52411
12	1.023415	5.804310	69.94511	7.741298	16.50928

Variance Decomposition of DDC:

Quarter	S.E.	RGDP	DCPI	DDC	DMONEY
4	69.06863	21.08181	3.650561	70.97187	4.295756
8	73.84888	24.94079	3.874265	64.15369	7.031256
12	75.77577	27.66410	4.003882	61.56060	6.771418

Variance Decomposition of DMONEY:

Quarter	S.E.	RGDP	DCPI	DDC	DMONEY
4	12.09552	0.576288	10.52397	2.756320	86.14342
8	12.79784	0.547539	10.70582	4.515192	84.23144
12	12.98243	0.912194	10.99626	4.597134	83.49441

Cholesky Ordering: RGDP DCPI DDC DMONEY

Its "own" innovations are the most important source of variation of the real output. It accounts for 69.11% to 76.8% of the variance of its forecast. The next most important source of variation of the real output is the innovations in inflation which account for account for 15.6% to 16.23%. Movements in the money supply account for 3.55% to 6.06% while movements in the domestic credit accounts for 4.05% to 9.23% of the forecast error variance of the real GDP.

The movements in the price level's own innovations account for the highest fraction of its forecast error variance. It accounts for 69.95% to 79.11% of the forecast error variance of inflation. The next highest source in the variation of inflation is the innovations in the movements in the money supply, which accounts for 16.08% to

16.52%. Innovations in the real output help explain 3.62% to 5.84% of the forecast error variance of the movements in the price level. The weakest source of the forecast error variance of inflation is the innovations in the movements in the domestic credit, which accounts for only 1.18% to 7.74%.

"Own" innovations of the movements in the domestic credit are the most important source in explaining the forecast error variance of the movements in the domestic credit, which accounts for 61.56% to 70.97% of the forecast error variance. The next most important source of the forecast error of the innovations in the movements in the domestic credit is the innovations in the real output, which accounts for 21.08% to 27.66%. Innovations of inflation account for 3.65% to 4.0% and innovations in the money supply accounts for 4.3% to 7.03% of the forecast error variance of the movements in the domestic credit.

The most important source of variation in the movements in the money supply forecast error is its "own" innovations, which account for 86.14% to 83.49% of the variance of its forecast. Innovations in inflation are the second most important source of the forecast error of the movements in money supply. It accounts for 10.52% to 11.0% of the forecast error of money supply. Innovations in the movements in the domestic credit account for 2.75% to 4.6% of the forecast error of money supply. The innovations in real output is the weakest source of the forecast error of the movements in the money supply since it only explain 0.55% to 0.91% of the forecast error variance of the money supply.

From the findings of forecast error variance decompositions model 2 we arrive at the following conclusions: (1) innovations in the movements in the money supply have a weak influence of the determination of the variation of output. Furthermore, this influence is too small compared to “own” innovations of output (2) the main sources of variance of the movements in the real exchange rate, real GDP and price level forecast errors are their “own shocks” (3) money supply movements account for a higher proportions in the variability of the forecast error of price level movements than those of real output. This suggests that monetary policy has a greater impact on inflation than in real output.

Variance Decomposition of Real Lending Interest Rate Channel VAR Model

Variance Decomposition of RGDP:					
Quarter	S.E.	RGDP	DCPI	RLR	DMONEY
4	0.278660	71.74506	13.35427	9.105497	5.795171
8	0.414440	62.74844	14.41233	17.47620	5.363036
12	0.522734	57.93207	16.13557	21.63520	4.297158
Variance Decomposition of DCPI:					
Quarter	S.E.	RGDP	DCPI	RLR	DMONEY
4	0.968843	1.784982	72.87146	10.06234	15.28121
8	1.010411	2.324525	67.20567	10.35098	20.11883
12	1.020785	2.881570	65.89181	10.42215	20.80448
Variance Decomposition of RLR:					
Quarter	S.E.	RGDP	DCPI	RLR	DMONEY
4	2.534064	0.447277	8.904111	89.44401	1.204604
8	3.007247	0.743097	16.43671	81.10122	1.718968
12	3.167627	1.095585	18.20863	79.02460	1.671182
Variance Decomposition of DMONEY:					
Quarter	S.E.	RGDP	DCPI	RLR	DMONEY

4	12.11030	0.602860	8.901451	2.468419	88.02727
8	12.83341	0.637107	8.772925	3.169465	87.42050
12	13.06460	0.859670	8.748655	3.571102	86.82057
Cholesky Ordering: RGDP DCPI RLR DMONEY					

"Own" innovations of real output are the most important source of variation of the real output. It accounts for 57.93% to 71.75% of the variance of its forecast. The next most important source of variation of the real output is the innovations in inflation which account for account for 13.35% to 16.14%. Movements in the money supply account for 4.3% to 5.8% while real lending rate accounts for 9.11% to 21.64% of the forecast error variance of the real GDP.

Analogous to the real output, the movements in the price level's own innovations account for the highest fraction of its forecast error variance. It accounts for 65.89% to 72.87% of the forecast error variance of inflation. The next highest source in the variation of inflation is the innovations in the movements in the money supply, which accounts for 15.28% to 20.11%. Innovations in the real lending rate help explain 10.06% to 10.42% of the forecast error variance of the movements in the price level. The weakest source of the forecast error variance of inflation is the innovations in the real output, which accounts for only 1.78% to 2.88%.

Innovations in the real lending rate are the most important source in explaining the forecast error variance of the real lending rate, which accounts for 79.02% to 89.44% of the forecast error variance. The next most important source of the forecast error of the innovations in the real lending rate is the innovations in inflation, which accounts for 8.9% to 18.21%. Innovations of the movements in the money supply account for 1.2% to

1.72% while innovations in the real output account for 0.44% to 1.00% of the forecast error variance of the real lending rate.

The most important source of variation in the movements in the money supply forecast error is its "own" innovations, accounting for 86.82% to 88.03% of the variance of its forecast. Innovations in inflation are the second most important source of the forecast error of the movements in money supply. It accounts for 8.74% to 8.9% of the forecast error of money supply. Innovations in the movements in the real lending rate account for 2.47% to 3.57% of the forecast error of money supply. The innovations in real output is the weakest source of the forecast error of the movements in the money supply as it only explain 0.6% to 0.86% of the forecast error variance of the money supply.

From the findings of forecast error variance decompositions model 2 we arrive at the following conclusions: (1) innovations in the movements in the money supply have a weak influence of the determination of the variation of output. Furthermore, this influence is too small compared to "own" innovations of output (2) the main sources of variance of the movements in the real exchange rate, real GDP and price level forecast errors are their "own shocks" (3) money supply movements account for a higher proportions in the variability of the forecast error of price level movements than those of real output. This suggests that monetary policy has a greater impact on inflation than in real output.

Variance Decomposition of Exchange Rate Channel VAR Model

		Variance Decomposition of RGDP:				
Quarter	S.E.	RGDP	DCPI	TB	DREER	DMONEY

4	1.301331	90.92376	3.222337	4.201363	1.215799	0.436742
8	1.622846	81.86729	4.422711	11.69849	1.169244	0.842263
12	1.810159	77.22330	4.970155	15.78155	0.988741	1.036255

Variance Decomposition of DCPI:

Quarter	S.E.	RGDP	DCPI	TB	DREER	DMONEY
4	0.946572	6.025827	73.20535	3.691071	3.832657	13.24510
8	0.962044	6.123125	70.97833	5.998966	3.889542	13.01003
12	0.968186	6.598798	70.18234	6.494281	3.849442	12.87513

Variance Decomposition of TB:

Quarter	S.E.	RGDP	DCPI	TB	DREER	DMONEY
4	797.4876	4.521922	1.539922	84.40668	4.352804	5.178668
8	838.2726	6.070293	2.273955	82.11843	4.695525	4.841799
12	859.4457	8.266966	2.569952	80.02072	4.470430	4.671932

Variance Decomposition of DREER:

Quarter	S.E.	RGDP	DCPI	TB	DREER	DMONEY
4	4.758066	2.355557	5.017251	2.227226	84.84413	5.555832
8	4.850061	4.132881	5.204290	2.888350	82.19000	5.584476
12	4.896169	5.058154	5.229107	3.525758	80.65298	5.533999

Variance Decomposition of DMONEY:

Quarter	S.E.	RGDP	DCPI	TB	DREER	DMONEY
4	12.56757	12.88099	3.343467	1.300471	3.713356	78.76171
8	13.11303	18.29778	3.664205	2.065489	3.599301	72.37322
12	13.44538	20.37847	3.814688	3.417473	3.458255	68.93111

Cholesky Ordering: RGDP DCPI TB DREER DMONEY

Innovations in the real output are the most important source of variation of the real output. It accounts for 77.22% to 90.92% of the variance of its forecast. The next most important source of variation of the real output is the innovations in the trade balance which account for account for 4.2% to 15.78%. Movements in the price level account for 3.22% to 4.97% of the forecast error variance of real output. Movements in the real exchange rate and money supply are the lowest sources of variation of the real output since they only account for 0.99% to 1.22% and 0.44% to 1.04%, respectively.

The movements in the price level's own innovations account for the highest fraction of its forecast error variance, which accounts for 70.18% to 73.21% of the forecast error variance of inflation. The next highest source in the variation of inflation is the innovations in the movements in the money supply, which accounts for 12.88% to 13.25%. Innovations in the real output help explain 6.03% to 6.6% of the forecast error variance of the movements in the price level. The innovations of the trade balance accounts for 3.69% to 6.49% of the forecast error variance of inflation. The weakest source of the forecast error variance of inflation is the innovations in the movements in the real exchange rate, which accounts for only 3.83% to 3.88%.

"Own" innovations of the trade balance are the most important source in explaining the forecast error variance of the movements in the trade balance. It accounts for 80.02% to 84.41% of the forecast error variance. The next most important source of the forecast error of the innovations in the trade balance is the innovations in the movements in the money supply, which accounts for 4.67% to 5.18%. Innovations of the real output account for 4.52% to 8.27% of the forecast error variance of the movements in the trade balance. On the other hand, real exchange rate movements' innovations account for 4,35% to 4.7% of the forecast error variance of the trade balance. The weakest source of variation in the trade balance is the innovations in inflation, which accounts for 1.54% to 2.57% of the forecast error.

The most important source of variation in the real exchange rate movements' forecast error is its "own" innovations, which account for 80.65% to 84.84% of the variance of its forecast. Innovations in the movements in the money supply are the second most important source of the forecast error of the movements in money supply. It accounts for 5.53% to 5.58% of the forecast error of the real exchange rate movements. Innovations in inflation account for 5.01% to 5.23% of the forecast error of real exchange rate movements. The innovations in real output accounts for 2.36% to 5.06% of the movements in the real exchange rate's forecast error. The weakest source of the forecast error variance of real exchange rate movements is the innovations in the trade balance since it only accounts for 2.22% to 3.53%.

From the findings of forecast error variance decompositions model 2 we arrive at the following conclusions: (1) innovations in the movements in the money supply have a weak influence of the determination of the variation of output. Furthermore, this influence is too small compared to "own" innovations of output (2) the main sources of variance of the movements in the real exchange rate, real GDP and price level forecast errors are their "own shocks" (3) money supply movements account for a higher proportions in the variability of the forecast error of price level movements than those of real output. This suggests that monetary policy has a greater impact on inflation than in real output.

"Own" innovations of movements in the money supply accounts for 68.93% to 78.76% of the forecast error of the movements in the money supply. The next most important source of variation of the money supply forecast error is the innovations in the real output, which account for 12.88% to 12.38%. Inflation and real exchange rate movements has little importance in explaining the money supply movements' forecast error since they only account for 3.34% to 3.81% and 3.46% to 3.71%, respectively. The weakest source of the forecast error of the money supply movements is the innovations in the trade balance, which accounts for 1.3% to 3.42%.

From the findings of forecast error variance decompositions model 1 we arrive at the following conclusions: (1) innovations in the movements in the real exchange rate and money supply have a weak influence of the determination of the variation of output. Furthermore, this influence is too small compared to "own" innovations of output (2) the main sources of variance of the movements in the real exchange rate, real GDP and price level forecast errors are their "own shocks" (3) innovations in the movements in the real exchange rate has a weak influence in explaining the variation of the trade balance, inflation and output (4) real exchange rate movements account for a higher proportions in the variability of the forecast error of price level movements than those of real output and; (5) money supply movements account for a higher proportions in the variability of the forecast error of price level movements than those of real output. This suggests that monetary policy has a greater impact on inflation than in real output.

5.4.3 Impulse Response Functions Analysis

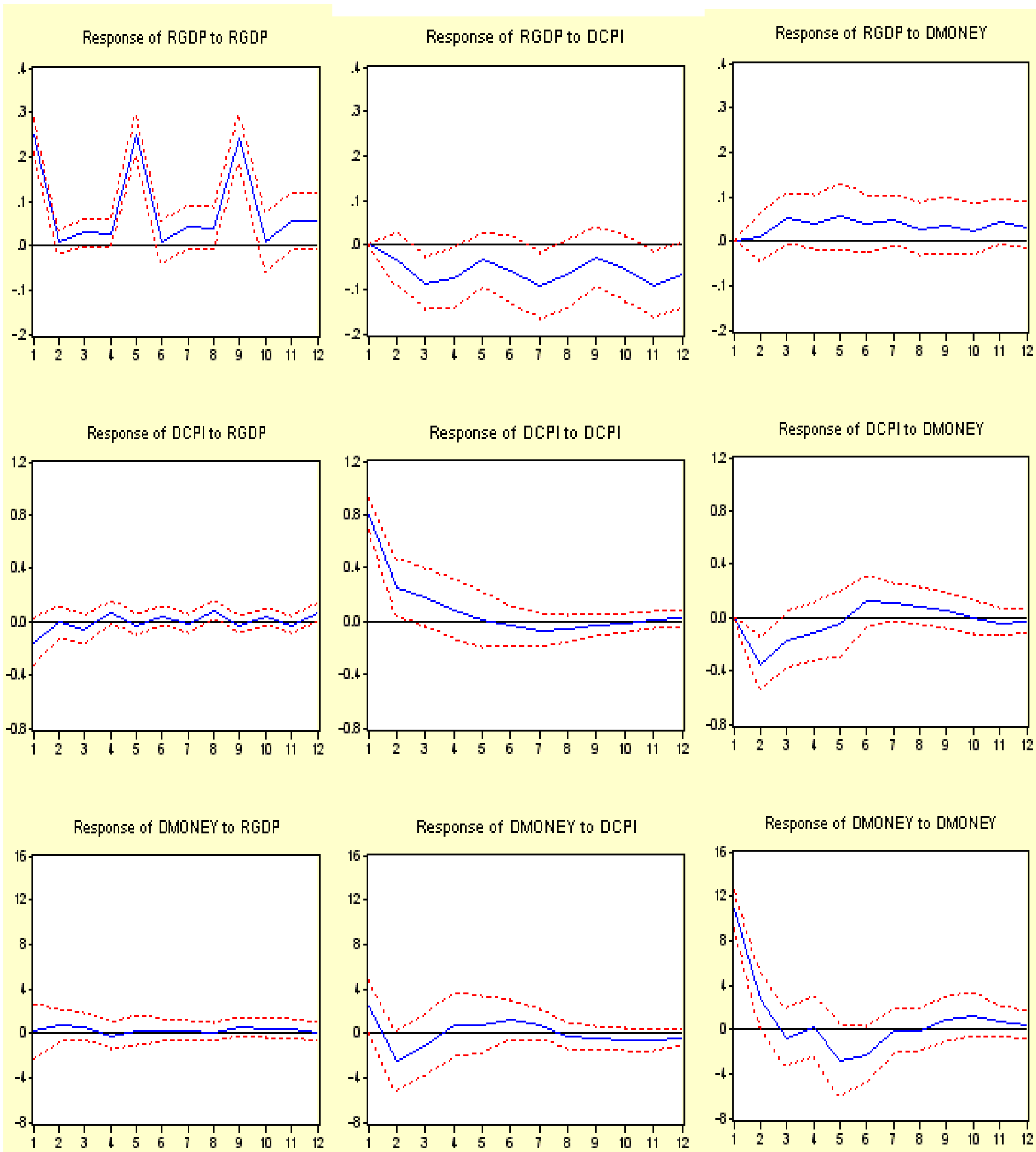
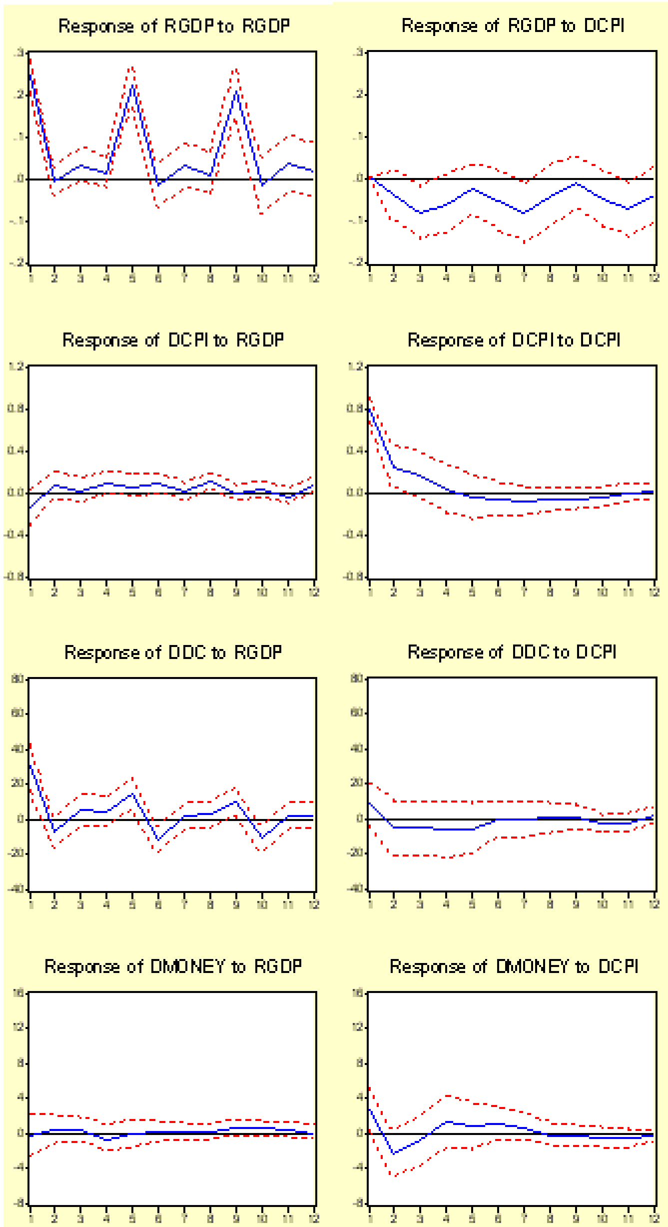


Figure 5.1 Impulse Response Functions of Simple Monetary VAR Model

Theories in monetary economics suggest that an increase in money supply leads to an increase in output and price level. In the study's analysis, the impulse response functions of Figure 5.1 shows that a positive shock to M2 leads to an increase in real output in 2 quarters and thereafter, a decrease in output from the second quarter to the fifth quarter. Furthermore, a positive shock of money decreases the growth rate in the price level in 2 quarters and increases the growth rate of price level thereafter up to the third quarter. After the third quarter, the positive shock of money has an insignificant and stable effect on the price level. This is consistent the theory in macroeconomics and is referred to as "prices stickiness" of monetary policy.


Response of RGDP to RGDP
Response of RGDP to DCPI
Response of DCPI to RGDP
Response of DCPI to DCPI
Response of DDC to RGDP
Response of DDC to DCPI
Response of DMONEY to RGDP
Response of DMONEY to DCPI

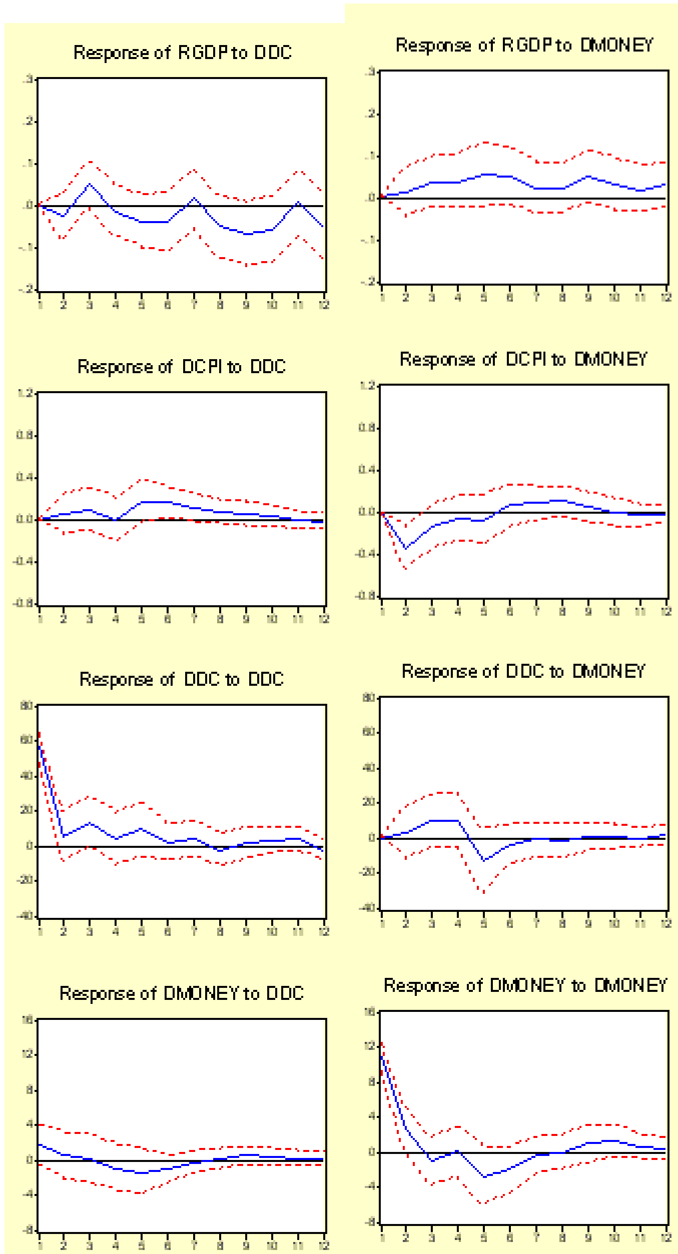
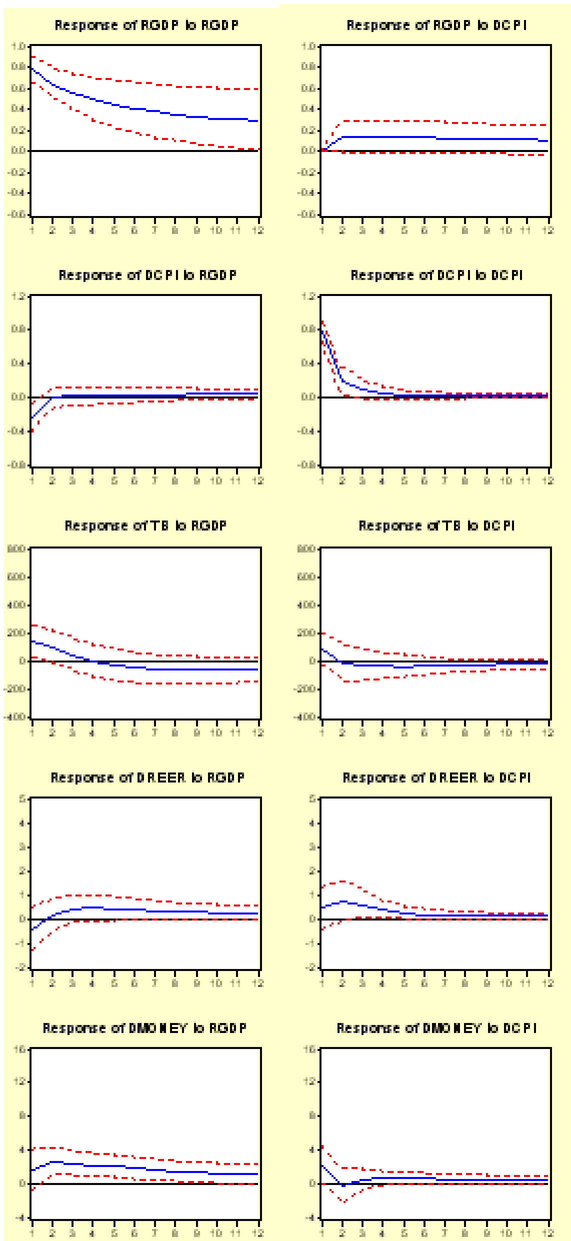


Figure 5.2 Impulse Response Functions of Domestic Credit Channel VAR Model

Theories in monetary economics suggest that raising money supply increases the total credit available to the public. This in turn will boost aggregate demand and output through the bank lending channel. The impulse response functions of figure 5.2 shows that a positive shock to domestic credit increased output from the first to the third quarter.

Output also increased from the in 2 quarters due to a positive shock in money supply. Positive shocks in M2 increased credit in three quarters. A positive shock in the money supply has a weak effect on domestic credit. Furthermore, a positive shock in the domestic credit decreases the money supply in two quarters.



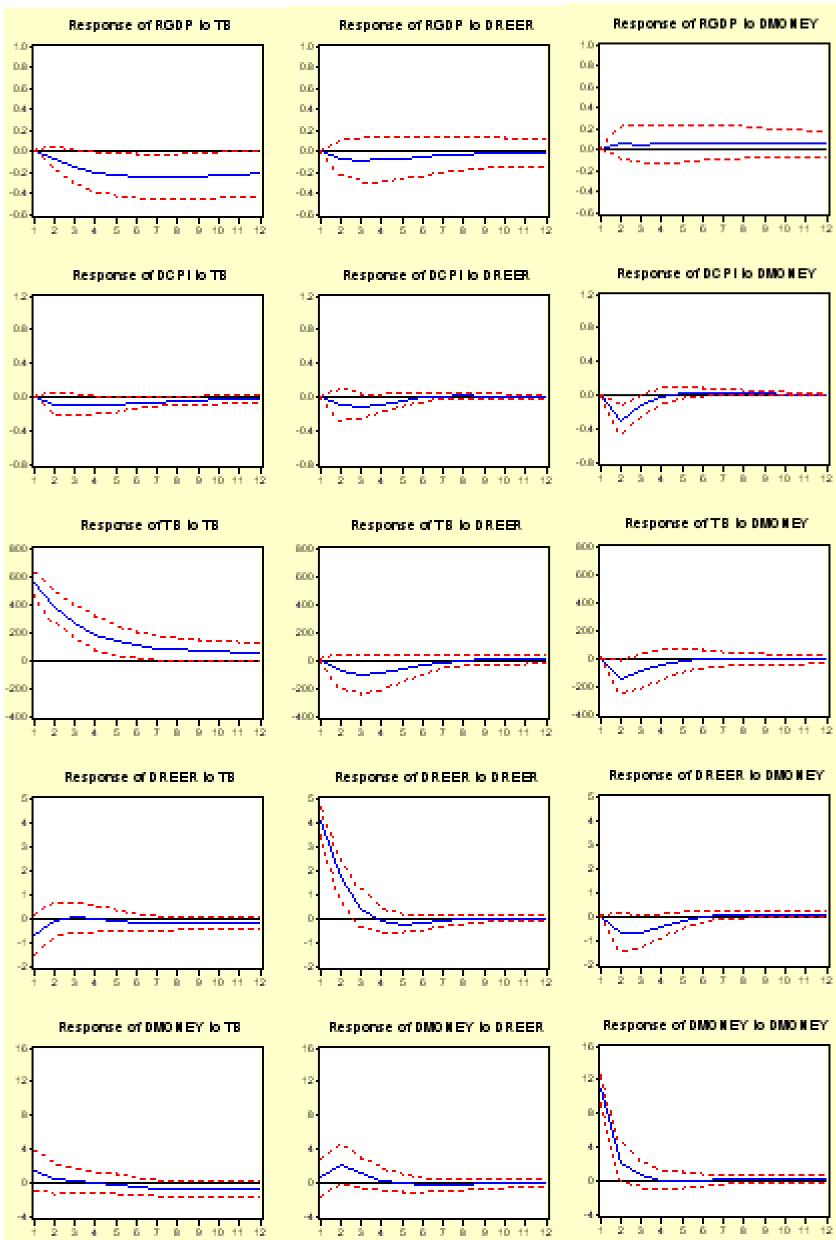
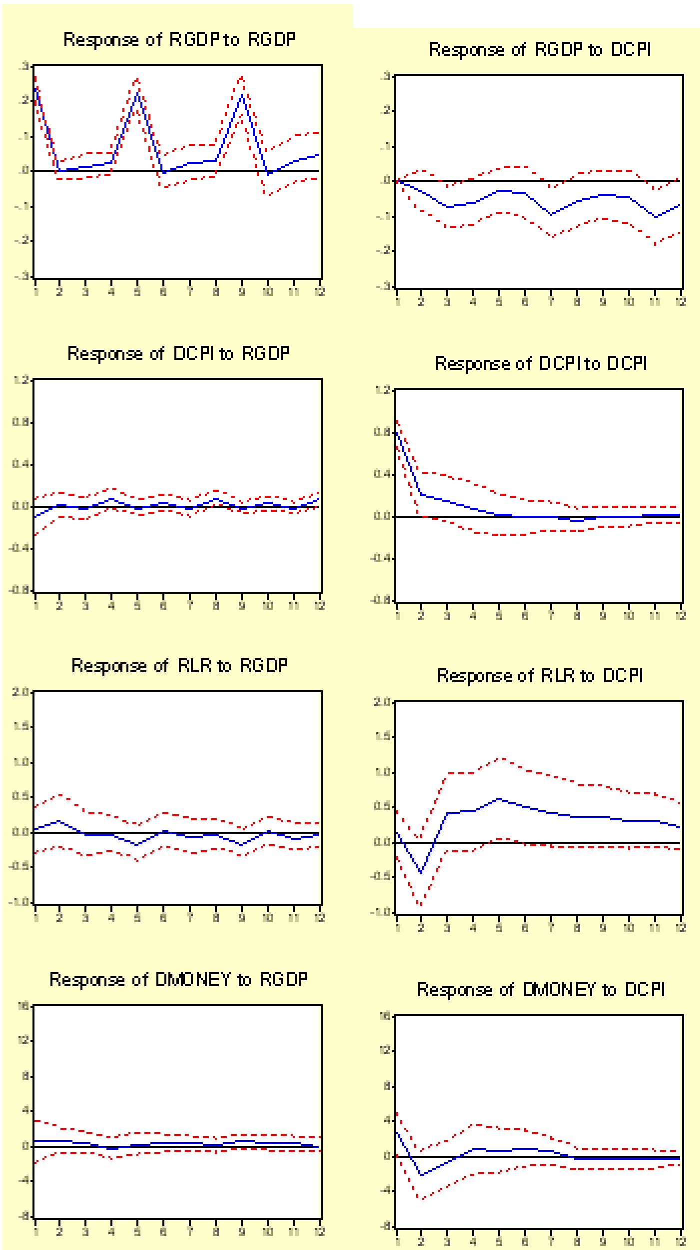


Figure 5.3 Impulse Response Functions of Exchange Rate Channel VAR Model

The impulse response functions in Figure 5.3 shows that a positive shock to the real effective exchange rate or real appreciation leads to an increase in output in four quarters. A positive shock in money supply increases the growth rate of the real GDP in two quarters and thereafter decreases it in the fourth quarter. The result is consistent with what the theories in monetary economics suggest. Positive shocks to the money supply leads to a depreciation of the real effective exchange rate from the first to the second quarter. This is consistent to what theories in monetary economics suggest.



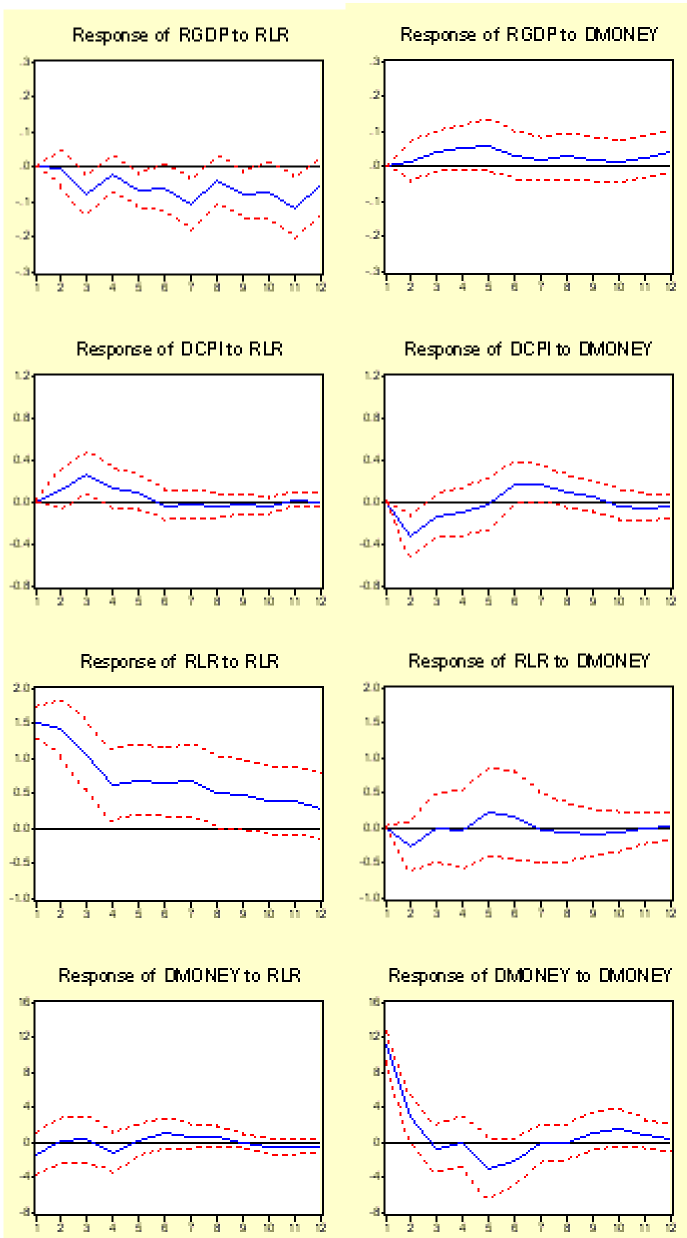


Figure 5.4 Impulse Response Functions of Real Lending Rate Channel VAR Model

The impulse response functions in Figure 5.4 suggest that a positive shock to the real lending rate leads to a decrease in output in four quarters. An expansionary monetary policy leads an increase in the real lending rate, from the first to the second quarter, and decreases output in four quarters. This evidence is not consistent with the theories in monetary economics which suggests that expansionary monetary policy leads to a decrease in the interest rate thus, encouraging investment, which in turn raise aggregate demand and output. Furthermore, the increase in the real lending rate has a negative impact on money supply.

CHAPTER 6
SUMMARY AND CONCLUSIONS

The results derived from the forecast error variance decompositions analyses show that each channel were weak sources of the variance of changes in the output and the price level. Furthermore, the main sources of variances in output and price level are their “own” shocks.

The analysis of the study presented that monetary policy did affect output and price level in the Philippines. In addition, the results also show that the effect of monetary policy was strongest after two quarters. Basic monetary VAR model suggested that an increase in money supply increased output and decreased the price level in two quarters. A positive shock in the money supply decreases price level in 2 quarters but has a weak effect thereafter. This is consistent the theory in macroeconomics referred to as “price stickiness.”

In the domestic credit channel VAR model, an expansionary monetary policy increases domestic credit in three quarters, increased output in two quarters and decreased the price level in two quarters. The results also show that monetary policy has a weak effect on domestic credit. On the other hand, positive shocks in the domestic credit decreases money supply in two quarters.

In the exchange rate channel VAR model, an expansionary monetary policy depreciates the peso in two quarters; increases real output in two quarters and decrease the price level in two quarters. An appreciation shock affects output (increases output in four quarters) however, the exchange rate was not affected by money supply (an expansionary monetary policy has a weak effect on the exchange rate after 3 quarters).

In the real lending rate channel VAR model, the real lending rate affected real output however; the effect was not very significant. An expansionary monetary policy increases the real lending rate in two quarters, increases real output in two quarters while decrease the price level in two quarters.

To sum up, the results of the impulse response functions indicate that monetary policy can affect output and price level and that the effect of monetary policy was strongest after two quarters. An expansionary monetary policy increases inflation in two quarters however, it a weak effect on price level after two quarters. Furthermore, domestic credit has the most significant effect on output in the Philippines.

When adding real interest rate to the basic model to examine the effect of the interest rate channel, money supply still affected output and real interest rate. The real interest rate affected real output, but the effect was not very significant. In the exchange rate channel, the real effective exchange rate did affect output but was not affected by money supply. The credit channel was also insignificant, with money supply causing credit and vice versa, but credit did not affect output.

The results of the impulse response functions indicate that monetary policy can affect output and price level and that the effect of monetary policy on output and inflation was strongest after two quarters. An expansionary monetary policy increases output in two quarters however; it has a weak effect on price level after two quarters. Furthermore, domestic credit has the most significant effect on output in the Philippines. Theories in monetary economics suggest that an expansionary monetary policy increases output and price level however, in the case of the Philippines, an expansionary monetary policy increases real output in the short run but have a weak effect on inflation in the long run.

Appendix 1: Basic Monetary Channel VAR Model Results

Vector Autoregression Estimates
Date: 10/31/08 Time: 19:57
Sample (adjusted): 1986Q1 2007Q4
Included observations: 88 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	DRGDP	DCPI	DM2
DRGDP(-1)	-1.016236	0.330705	-19.51687
	(0.06804)	(0.21215)	(12.7103)
	[-14.9348]	[1.55886]	[-1.53552]
DRGDP(-2)	-1.038483	-0.033183	-33.50049
	(0.07646)	(0.23837)	(14.2813)
	[-13.5829]	[-0.13921]	[-2.34576]
DRGDP(-3)	-1.018068	0.286644	-61.16473
	(0.06201)	(0.19332)	(11.5823)
	[-16.4188]	[1.48275]	[-5.28087]
DCPI(-1)	-0.015745	0.416444	5.188382
	(0.03658)	(0.11403)	(6.83203)
	[-0.43048]	[3.65197]	[0.75942]
DCPI(-2)	-0.083825	0.123166	2.023984
	(0.03876)	(0.12085)	(7.24036)
	[-2.16259]	[1.01918]	[0.27954]
DCPI(-3)	-0.052638	-0.032270	2.750905
	(0.03733)	(0.11639)	(6.97351)
	[-1.40998]	[-0.27724]	[0.39448]
DM2(-1)	0.001169	-0.002602	0.120689
	(0.00065)	(0.00201)	(0.12065)
	[1.81032]	[-1.29235]	[1.00034]
DM2(-2)	0.001647	0.002201	0.133537
	(0.00067)	(0.00208)	(0.12490)
	[2.46265]	[1.05559]	[1.06912]
DM2(-3)	0.000666	-1.28E-05	0.029454
	(0.00066)	(0.00205)	(0.12280)
	[1.01347]	[-0.00622]	[0.23985]
C	0.359119	0.599535	22.25179

	(0.06551)	(0.20426)	(12.2377)
	[5.48147]	[2.93518]	[1.81829]
DWOP	0.024959	0.002627	2.908492
	(0.00837)	(0.02611)	(1.56403)
	[2.98088]	[0.10063]	[1.85962]
R-squared	0.889363	0.265511	0.387457
Adj. R-squared	0.874994	0.170123	0.307906
Sum sq. resids	6.026941	58.58369	210289.9
S.E. equation	0.279771	0.872254	52.25933
F-statistic	61.89684	2.783481	4.870549
Log likelihood	-6.898310	-106.9638	-467.1384
Akaike AIC	0.406780	2.680996	10.86678
Schwarz SC	0.716447	2.990664	11.17645
Mean dependent	0.092034	1.265243	39.10531
S.D. dependent	0.791295	0.957494	62.81760

Determinant resid covariance (dof adj.)	140.6789
Determinant resid covariance	94.24384
Log likelihood	-574.6187
Akaike information criterion	13.80952
Schwarz criterion	14.73852

Appendix 2: Credit Channel VAR Model Results

Vector Autoregression Estimates
Date: 11/01/08 Time: 16:17
Sample (adjusted): 1986Q1 2007Q4
Included observations: 88 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	DRGDP	DCPI	DDC	DM2
DRGDP(-1)	-0.997610	0.256205	-45.29559	-19.68123
	(0.06871)	(0.21522)	(15.9333)	(13.1442)
	[-14.5189]	[1.19044]	[-2.84282]	[-1.49734]
DRGDP(-2)	-1.059367	-0.043982	-61.71625	-34.25310
	(0.07817)	(0.24484)	(18.1261)	(14.9531)
	[-13.5525]	[-0.17964]	[-3.40483]	[-2.29070]
DRGDP(-3)	-1.023427	0.369528	-43.63875	-58.27140
	(0.06707)	(0.21007)	(15.5520)	(12.8296)
	[-15.2598]	[1.75909]	[-2.80599]	[-4.54195]
DCPI(-1)	-0.010932	0.384668	-7.947680	5.432190
	(0.03705)	(0.11604)	(8.59051)	(7.08673)
	[-0.29509]	[3.31509]	[-0.92517]	[0.76653]
DCPI(-2)	-0.094952	0.154309	-7.892243	2.134965
	(0.03926)	(0.12297)	(9.10405)	(7.51038)
	[-2.41852]	[1.25483]	[-0.86689]	[0.28427]
DCPI(-3)	-0.051427	0.013767	1.145686	3.427547
	(0.03830)	(0.11997)	(8.88200)	(7.32720)
	[-1.34264]	[0.11475]	[0.12899]	[0.46778]
DDC(-1)	-0.001019	0.003083	0.166146	-0.010569
	(0.00060)	(0.00189)	(0.13972)	(0.11526)
	[-1.69045]	[1.63377]	[1.18913]	[-0.09170]
DDC(-2)	0.000597	0.001287	0.118011	0.046663
	(0.00060)	(0.00189)	(0.13962)	(0.11518)
	[0.99084]	[0.68267]	[0.84522]	[0.40513]
DDC(-3)	-0.000533	-0.000683	0.109135	-0.091203
	(0.00058)	(0.00183)	(0.13552)	(0.11180)
	[-0.91194]	[-0.37299]	[0.80528]	[-0.81576]
DM2(-1)	0.001683	-0.004301	-0.090212	0.121335

	(0.00072)	(0.00225)	(0.16670)	(0.13752)
	[2.34120]	[-1.91007]	[-0.54116]	[0.88230]
DM2(-2)	0.001221	0.001804	0.212566	0.107550
	(0.00075)	(0.00234)	(0.17350)	(0.14313)
	[1.63215]	[0.76990]	[1.22515]	[0.75141]
DM2(-3)	0.001187	-2.76E-05	-0.079159	0.083097
	(0.00073)	(0.00228)	(0.16861)	(0.13909)
	[1.63312]	[-0.01212]	[-0.46949]	[0.59743]
C	0.369621	0.522971	44.81228	21.31444
	(0.06634)	(0.20780)	(15.3839)	(12.6909)
	[5.57146]	[2.51674]	[2.91293]	[1.67950]
DWOP	0.023250	0.004260	1.209362	2.692879
	(0.00845)	(0.02645)	(1.95851)	(1.61567)
	[2.75285]	[0.16103]	[0.61749]	[1.66672]
R-squared	0.895598	0.300455	0.281748	0.393773
Adj. R-squared	0.877257	0.177562	0.155569	0.287274
Sum sq. resids	5.687295	55.79649	305817.7	208121.4
S.E. equation	0.277228	0.868336	64.28586	53.03255
F-statistic	48.83051	2.444854	2.232916	3.697430
Log likelihood	-4.346100	-104.8191	-483.6165	-466.6824
Akaike AIC	0.416957	2.700433	11.30947	10.92460
Schwarz SC	0.811079	3.094555	11.70359	11.31872
Mean dependent	0.092034	1.265243	28.61359	39.10531
S.D. dependent	0.791295	0.957494	69.95733	62.81760

Determinant resid covariance (dof adj.)	355455.9
Determinant resid covariance	177738.7
Log likelihood	-1031.341
Akaike information criterion	24.71231
Schwarz criterion	26.28879

Appendix 3: Exchange Rate Channel VAR Model Results

Vector Autoregression Estimates
Date: 10/31/08 Time: 19:58
Sample (adjusted): 1986Q1 2007Q4
Included observations: 88 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	DRGDP	DCPI	DREER	DM2
DRGDP(-1)	-1.029494	0.411868	2.372556	-18.30072
	(0.07301)	(0.22233)	(1.03374)	(13.7043)
	[-14.1009]	[1.85250]	[2.29512]	[-1.33540]
DRGDP(-2)	-1.031638	0.096285	2.267227	-32.99480
	(0.08352)	(0.25434)	(1.18254)	(15.6771)
	[-12.3522]	[0.37858]	[1.91724]	[-2.10465]
DRGDP(-3)	-1.009008	0.382752	1.100800	-61.30804
	(0.06675)	(0.20327)	(0.94512)	(12.5295)
	[-15.1162]	[1.88297]	[1.16473]	[-4.89311]
DCPI(-1)	-0.016608	0.472351	0.601302	5.064763
	(0.03837)	(0.11685)	(0.54329)	(7.20244)
	[-0.43283]	[4.04244]	[1.10678]	[0.70320]
DCPI(-2)	-0.077054	0.110969	0.983932	0.938551
	(0.04111)	(0.12520)	(0.58214)	(7.71753)
	[-1.87413]	[0.88630]	[1.69018]	[0.12161]
DCPI(-3)	-0.064449	0.036425	0.213076	1.563906
	(0.04006)	(0.12200)	(0.56722)	(7.51971)
	[-1.60878]	[0.29858]	[0.37565]	[0.20797]
DREER(-1)	0.000530	-0.052345	0.396492	0.885234
	(0.00839)	(0.02554)	(0.11875)	(1.57423)
	[0.06316]	[-2.04957]	[3.33898]	[0.56233]
DREER(-2)	0.000212	0.032431	-0.146690	0.381224
	(0.00909)	(0.02768)	(0.12870)	(1.70618)
	[0.02330]	[1.17165]	[-1.13978]	[0.22344]
DREER(-3)	0.008013	-0.027509	0.061521	-0.085030
	(0.00802)	(0.02441)	(0.11349)	(1.50449)
	[0.99974]	[-1.12706]	[0.54210]	[-0.05652]
DM2(-1)	0.001110	-0.003177	-0.018594	0.120934

	(0.00067)	(0.00204)	(0.00947)	(0.12553)
	[1.65981]	[-1.55999]	[-1.96378]	[0.96341]
DM2(-2)	0.001513	0.001966	0.012908	0.144196
	(0.00069)	(0.00211)	(0.00982)	(0.13024)
	[2.18104]	[0.93052]	[1.31390]	[1.10718]
DM2(-3)	0.000695	0.000653	-0.001388	0.024260
	(0.00068)	(0.00206)	(0.00957)	(0.12693)
	[1.02727]	[0.31725]	[-0.14495]	[0.19113]
C	0.376611	0.424782	-2.385009	25.49674
	(0.07245)	(0.22063)	(1.02582)	(13.5994)
	[5.19824]	[1.92533]	[-2.32498]	[1.87485]
DWOP	0.024186	0.008150	-0.105175	2.445679
	(0.00931)	(0.02834)	(0.13178)	(1.74701)
	[2.59871]	[0.28755]	[-0.79812]	[1.39992]
R-squared	0.891201	0.310915	0.347951	0.391726
Adj. R-squared	0.872088	0.189859	0.233401	0.284867
Sum sq. resids	5.926783	54.96225	1188.190	208824.3
S.E. equation	0.283005	0.861820	4.007071	53.12203
F-statistic	46.62737	2.568364	3.037563	3.665824
Log likelihood	-6.160955	-104.1562	-239.3920	-466.8307
Akaike AIC	0.458204	2.685369	5.758908	10.92797
Schwarz SC	0.852325	3.079490	6.153030	11.32209
Mean dependent	0.092034	1.265243	-0.125534	39.10531
S.D. dependent	0.791295	0.957494	4.576600	62.81760

Determinant resid covariance (dof adj.)	2188.947
Determinant resid covariance	1094.539
Log likelihood	-807.3823
Akaike information criterion	19.62232
Schwarz criterion	21.19881

Appendix 4: Real Lending Interest Rate Channel VAR Model Results

Vector Autoregression Estimates
Date: 10/31/08 Time: 22:59
Sample (adjusted): 1986Q1 2007Q4
Included observations: 88 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	DRGDP	DCPI	RLR	DM2
DRGDP(-1)	-1.044452	0.336362	-0.974074	-21.16707
	(0.06088)	(0.22110)	(0.38634)	(12.7914)
	[-17.1570]	[1.52131]	[-2.52130]	[-1.65480]
DRGDP(-2)	-1.064308	-0.149196	-0.793292	-35.33339
	(0.06769)	(0.24585)	(0.42958)	(14.2232)
	[-15.7231]	[-0.60686]	[-1.84666]	[-2.48421]
DRGDP(-3)	-0.983733	0.232482	-0.876992	-56.76821
	(0.05415)	(0.19669)	(0.34368)	(11.3789)
	[-18.1655]	[1.18200]	[-2.55180]	[-4.98892]
DCPI(-1)	-0.036703	0.397291	0.634759	2.065811
	(0.03262)	(0.11846)	(0.20699)	(6.85336)
	[-1.12529]	[3.35376]	[3.06659]	[0.30143]
DCPI(-2)	-0.073431	0.180278	-0.590476	4.514516
	(0.03773)	(0.13703)	(0.23945)	(7.92786)
	[-1.94622]	[1.31557]	[-2.46602]	[0.56945]
DCPI(-3)	-0.053117	-0.124758	0.127421	2.546497
	(0.03495)	(0.12695)	(0.22182)	(7.34437)
	[-1.51968]	[-0.98275]	[0.57443]	[0.34673]
RLR(-1)	-0.013429	-0.000401	1.120729	-3.103495
	(0.01700)	(0.06174)	(0.10787)	(3.57157)
	[-0.79002]	[-0.00649]	[10.3894]	[-0.86894]
RLR(-2)	0.005981	0.112074	-0.333010	2.107720
	(0.02544)	(0.09240)	(0.16145)	(5.34561)
	[0.23508]	[1.21293]	[-2.06257]	[0.39429]
RLR(-3)	-0.029931	-0.108922	0.158089	-3.377345
	(0.01581)	(0.05744)	(0.10036)	(3.32290)
	[-1.89268]	[-1.89639]	[1.57519]	[-1.01638]
DM2(-1)	0.000578	-0.002407	0.007669	0.043934

	(0.00057)	(0.00207)	(0.00362)	(0.11987)
	[1.01297]	[-1.16160]	[2.11825]	[0.36650]
DM2(-2)	0.000723	0.002763	-0.001722	0.031780
	(0.00061)	(0.00222)	(0.00387)	(0.12822)
	[1.18475]	[1.24659]	[-0.44469]	[0.24785]
DM2(-3)	-0.000294	-0.000597	-0.000727	-0.078214
	(0.00059)	(0.00214)	(0.00373)	(0.12359)
	[-0.50011]	[-0.27954]	[-0.19487]	[-0.63284]
C	0.993563	0.663806	0.374806	95.12641
	(0.12718)	(0.46191)	(0.80712)	(26.7232)
	[7.81223]	[1.43708]	[0.46437]	[3.55969]
DWOP	0.009999	0.004851	-0.015383	1.192922
	(0.00769)	(0.02792)	(0.04879)	(1.61551)
	[1.30055]	[0.17372]	[-0.31527]	[0.73842]
R-squared	0.922513	0.301902	0.906292	0.457149
Adj. R-squared	0.908900	0.179263	0.889829	0.361783
Sum sq. resids	4.221103	55.68113	170.0058	186364.4
S.E. equation	0.238835	0.867437	1.515710	50.18404
F-statistic	67.76891	2.461713	55.05262	4.793631
Log likelihood	8.771984	-104.7280	-153.8404	-461.8240
Akaike AIC	0.118819	2.698363	3.814555	10.81418
Schwarz SC	0.512940	3.092485	4.208676	11.20830
Mean dependent	0.092034	1.265243	13.20121	39.10531
S.D. dependent	0.791295	0.957494	4.566496	62.81760

Determinant resid covariance (dof adj.)	204.3481
Determinant resid covariance	102.1802
Log likelihood	-703.0428
Akaike information criterion	17.25097
Schwarz criterion	18.82746

Appendix 5: Basic Monetary Channel VAR Model Impulse Response Functions

	Response of DRGDP:		
Period	DRGDP	DCPI	DM2
1	0.279771	0.000000	0.000000
	(0.02109)	(0.00000)	(0.00000)
2	-0.261676	-0.009311	0.057001
	(0.02551)	(0.03231)	(0.03178)
3	0.006980	-0.057009	0.031227
	(0.02324)	(0.04366)	(0.04521)
4	-0.013529	0.004777	-0.032667
	(0.02159)	(0.04236)	(0.04768)
5	0.258074	0.042819	-0.042317
	(0.02999)	(0.02063)	(0.02993)
6	-0.257527	0.009700	0.040974
	(0.03857)	(0.03313)	(0.03212)
7	0.019256	-0.047999	0.027133
	(0.04202)	(0.04307)	(0.04346)
8	-0.013612	0.003450	-0.029341
	(0.04093)	(0.04027)	(0.04553)
9	0.242861	0.036842	-0.036323
	(0.04573)	(0.02146)	(0.02990)
10	-0.252162	0.005831	0.040364
	(0.05471)	(0.03128)	(0.03055)
11	0.029709	-0.045625	0.023472
	(0.06015)	(0.04175)	(0.04194)
12	-0.014771	0.005250	-0.028656
	(0.05885)	(0.03982)	(0.04430)

	Response of DCPI:		
Period	DRGDP	DCPI	DM2
1	-0.067478	0.869640	0.000000
	(0.09284)	(0.06555)	(0.00000)
2	0.016402	0.352404	-0.126867
	(0.06142)	(0.10331)	(0.09863)
3	-0.047370	0.246115	0.057987
	(0.05424)	(0.10749)	(0.10939)
4	0.073483	0.097494	0.015103
	(0.04354)	(0.09951)	(0.10871)
5	-0.036800	0.052344	0.032890
	(0.03737)	(0.08158)	(0.06655)
6	0.024406	0.023568	0.018610
	(0.03677)	(0.06772)	(0.04374)
7	-0.049378	0.015210	0.009530
	(0.03559)	(0.04762)	(0.02368)

8	0.065655	0.014911	-0.005173
	(0.03540)	(0.03476)	(0.01514)
9	-0.040148	0.015407	0.002085
	(0.03526)	(0.02680)	(0.01453)
10	0.023838	0.001139	0.005116
	(0.03555)	(0.01980)	(0.01486)
11	-0.047559	0.000289	0.003559
	(0.03505)	(0.01436)	(0.01334)
12	0.063730	0.002859	-0.007026
	(0.03515)	(0.01241)	(0.01151)

Response of DM2:			
Period	DRGDP	DCPI	DM2
1	18.45166	3.747332	48.74968
	(5.39445)	(5.20440)	(3.67465)
2	-3.583454	4.964286	5.883529
	(2.92595)	(5.97139)	(5.89821)
3	-2.285344	4.869807	5.449256
	(2.85225)	(5.90972)	(6.18471)
4	-9.091142	7.168073	0.404255
	(2.77817)	(5.36264)	(6.07315)
5	14.85816	6.021109	-3.098558
	(2.88385)	(3.39572)	(2.54698)
6	-4.671102	5.464446	0.211511
	(2.87062)	(3.40945)	(2.69151)
7	-1.385107	0.255096	2.444341
	(2.78252)	(2.90276)	(2.64313)
8	-8.194922	-0.798757	1.095716
	(2.76518)	(2.11821)	(2.16003)
9	14.36840	1.218955	-2.333947
	(3.02816)	(1.76993)	(1.48729)
10	-5.073978	2.301154	-0.004497
	(3.27666)	(2.15396)	(2.03154)
11	-1.093975	-1.063921	1.960323
	(3.25579)	(2.12456)	(2.21659)
12	-7.682140	-1.297289	0.613195
	(3.26296)	(1.55126)	(1.89086)

Cholesky Ordering: DRGDP DCPI DM2
Standard Errors: Analytic

Appendix 6: Impulse Response Functions of Domestic Credit Channel VAR Model

Response of DRGDP:				
Period	DRGDP	DCPI	DDC	DM2

1	0.277228	0.000000	0.000000	0.000000
	(0.02090)	(0.00000)	(0.00000)	(0.00000)
2	-0.274618	-0.008955	-0.017851	0.073104
	(0.02789)	(0.03296)	(0.03171)	(0.03171)
3	0.026766	-0.055221	0.076737	-0.004983
	(0.02798)	(0.04588)	(0.04398)	(0.04647)
4	-0.029526	0.007433	-0.063953	-0.000473
	(0.02644)	(0.04535)	(0.04501)	(0.04936)
5	0.259330	0.044112	-0.010610	-0.035413
	(0.03163)	(0.02644)	(0.03186)	(0.03309)
6	-0.260362	0.014319	-0.015704	0.040642
	(0.03981)	(0.03487)	(0.03226)	(0.03372)
7	0.029233	-0.048285	0.075604	-0.005079
	(0.04424)	(0.04494)	(0.04130)	(0.04382)
8	-0.024848	0.004338	-0.054658	9.84E-05
	(0.04342)	(0.04241)	(0.04221)	(0.04512)
9	0.248102	0.037630	-0.005545	-0.034486
	(0.04774)	(0.02560)	(0.03097)	(0.03113)
10	-0.251468	0.009801	-0.013831	0.039941
	(0.05656)	(0.03323)	(0.03181)	(0.03190)
11	0.030575	-0.048076	0.072635	-0.005346
	(0.06252)	(0.04344)	(0.04106)	(0.04167)
12	-0.022451	0.003872	-0.052949	-0.000562
	(0.06168)	(0.04169)	(0.04225)	(0.04313)

Response of DCPI:

Period	DRGDP	DCPI	DDC	DM2
1	-0.046257	0.867103	0.000000	0.000000
	(0.09250)	(0.06536)	(0.00000)	(0.00000)
2	0.063550	0.334529	0.073055	-0.186811
	(0.06739)	(0.10544)	(0.09838)	(0.09881)
3	-0.005957	0.230850	0.152945	-0.009509
	(0.06073)	(0.10982)	(0.10536)	(0.10849)
4	0.097450	0.085345	0.078155	-0.026815
	(0.05040)	(0.10051)	(0.10663)	(0.10771)
5	-0.015707	0.039108	0.069199	0.007888
	(0.04328)	(0.08432)	(0.07271)	(0.07117)
6	0.041431	0.009070	0.059737	-0.015824
	(0.04303)	(0.07315)	(0.05966)	(0.04627)
7	-0.050856	-0.003983	0.019716	0.004940
	(0.03979)	(0.05595)	(0.04247)	(0.03055)
8	0.075050	-0.001912	0.025085	-0.015973
	(0.03766)	(0.04448)	(0.03202)	(0.01788)
9	-0.035229	0.003833	-0.005683	0.001451
	(0.03729)	(0.03611)	(0.02486)	(0.01678)

10	0.027637	-0.008437	0.022631	-0.005195
	(0.03784)	(0.02643)	(0.01953)	(0.01399)
11	-0.054243	-0.008058	-0.003427	0.006040
	(0.03719)	(0.01907)	(0.01697)	(0.01222)
12	0.067587	-0.003764	0.008688	-0.011025
	(0.03741)	(0.01565)	(0.01409)	(0.01028)

Response of DDC:

Period	DRGDP	DCPI	DDC	DM2
1	29.13339	4.832584	57.10134	0.000000
	(6.49151)	(6.09791)	(4.30418)	(0.00000)
2	-9.016940	-6.380472	7.326540	-3.918365
	(4.12303)	(7.48092)	(7.15445)	(7.24671)
3	1.399501	-9.354162	13.06710	6.279766
	(4.29032)	(7.53515)	(7.28902)	(7.62354)
4	3.291116	-1.849568	3.136248	-4.734608
	(3.65745)	(6.88388)	(7.33173)	(7.63668)
5	11.70633	-0.721268	1.365538	-3.189545
	(3.37705)	(4.35376)	(3.72574)	(3.59674)
6	-12.60369	-1.589473	1.102106	1.952714
	(3.70938)	(4.17796)	(3.65074)	(2.96733)
7	1.147778	-4.282777	4.465930	-0.994383
	(3.72109)	(3.44309)	(2.85442)	(2.54219)
8	1.272029	-0.851775	-2.380112	-0.651364
	(3.50671)	(3.03584)	(2.62439)	(2.37152)
9	10.43737	1.060181	-0.463795	-1.439706
	(3.61002)	(2.16737)	(1.96979)	(1.73593)
10	-12.31355	-0.562540	0.031833	1.868148
	(3.94439)	(1.92005)	(1.81415)	(1.54016)
11	0.888472	-2.893229	3.184905	-0.265521
	(4.12518)	(2.18991)	(2.07256)	(1.94427)
12	1.117183	0.161426	-2.745315	-0.348048
	(4.02766)	(2.12451)	(2.10761)	(2.03062)

Response of DM2:

Period	DRGDP	DCPI	DDC	DM2
1	18.48710	3.236051	23.95025	43.43492
	(5.47885)	(5.29305)	(4.96968)	(3.27403)
2	-3.772260	5.051834	2.302470	5.270171
	(3.33952)	(6.15755)	(5.90371)	(5.98640)
3	-0.859296	5.098643	6.190478	2.898717
	(3.26051)	(6.05141)	(5.90148)	(6.20795)
4	-9.396301	7.125061	-1.927145	1.422174
	(3.09393)	(5.44902)	(5.85624)	(6.07457)
5	15.70807	6.367710	1.203554	-3.263439

	(3.06245)	(3.60211)	(2.80026)	(2.79481)
6	-4.823781	6.017934	-1.611819	0.194471
	(3.17435)	(3.73372)	(3.18251)	(2.79027)
7	-0.809936	0.358270	4.679026	0.332810
	(3.05524)	(3.23450)	(2.82394)	(2.74461)
8	-7.989944	-0.722160	0.514089	0.974161
	(2.95821)	(2.52689)	(2.45223)	(2.25333)
9	14.83273	1.151457	0.348960	-2.374147
	(3.18598)	(2.04260)	(1.72430)	(1.53789)
10	-5.223259	2.359011	-2.360975	0.881922
	(3.49635)	(2.34415)	(2.15190)	(2.07511)
11	-0.970277	-1.295658	3.832802	0.214648
	(3.48254)	(2.29908)	(2.17398)	(2.17073)
12	-7.784677	-1.531111	-0.372203	0.918220
	(3.49517)	(1.78284)	(2.00335)	(1.91215)

Cholesky Ordering: DRGDP DCPI DDC DM2
Standard Errors: Analytic

Appendix 7: Impulse Response Functions of Exchange Rate Channel VAR Model

	Response of DRGDP:			
Period	DRGDP	DCPI	DREER	DM2
1	0.283005	0.000000	0.000000	0.000000
	(0.02133)	(0.00000)	(0.00000)	(0.00000)
2	-0.269169	-0.008983	-0.005516	0.054352
	(0.02703)	(0.03281)	(0.03318)	(0.03300)
3	0.015352	-0.049542	0.003039	0.026819
	(0.02535)	(0.04447)	(0.04386)	(0.04702)
4	-0.009224	-0.003086	0.050560	-0.024279
	(0.02358)	(0.04310)	(0.04143)	(0.04898)
5	0.256998	0.045962	-0.012982	-0.048239
	(0.03105)	(0.02223)	(0.02212)	(0.03253)
6	-0.266106	0.012866	-0.030184	0.043374
	(0.04015)	(0.03304)	(0.03398)	(0.03504)
7	0.026289	-0.039299	-0.000869	0.021924
	(0.04418)	(0.04394)	(0.04404)	(0.04628)
8	-0.011180	-0.005540	0.045181	-0.021868
	(0.04289)	(0.04112)	(0.04191)	(0.04758)
9	0.240813	0.039066	-0.016868	-0.040796
	(0.04745)	(0.02288)	(0.02295)	(0.03296)
10	-0.258137	0.007689	-0.028810	0.043266
	(0.05627)	(0.03105)	(0.03246)	(0.03324)
11	0.035673	-0.038683	0.000637	0.018570
	(0.06249)	(0.04213)	(0.04208)	(0.04432)

12	-0.013596	-0.004753	0.042727	-0.021393
	(0.06106)	(0.04029)	(0.04053)	(0.04590)

Response of DCPI:

Period	DRGDP	DCPI	DREER	DM2
1	-0.059537	0.859761	0.000000	0.000000
	(0.09176)	(0.06481)	(0.00000)	(0.00000)
2	0.008594	0.355237	-0.183809	-0.155561
	(0.06875)	(0.10508)	(0.10179)	(0.10041)
3	-0.050347	0.236171	-0.071771	0.074026
	(0.06150)	(0.10955)	(0.11530)	(0.11442)
4	0.059930	0.101367	-0.102113	0.021325
	(0.05212)	(0.10105)	(0.10901)	(0.11227)
5	-0.047492	0.039859	-0.076541	0.059531
	(0.04288)	(0.08560)	(0.08757)	(0.07754)
6	0.023833	0.010947	-0.046120	0.026338
	(0.03919)	(0.07279)	(0.05277)	(0.04901)
7	-0.051258	-0.005221	-0.015554	0.015587
	(0.03698)	(0.05817)	(0.03634)	(0.03080)
8	0.060334	-0.001246	-0.010736	-0.004277
	(0.03671)	(0.04517)	(0.02675)	(0.02188)
9	-0.042675	0.000481	-0.006132	0.003152
	(0.03644)	(0.03451)	(0.02057)	(0.01755)
10	0.026917	-0.005436	-0.007557	0.001086
	(0.03617)	(0.02482)	(0.01668)	(0.01566)
11	-0.046905	-0.006766	0.004997	0.003853
	(0.03567)	(0.01731)	(0.01266)	(0.01360)
12	0.060049	-0.001150	0.000443	-0.008293
	(0.03572)	(0.01341)	(0.01074)	(0.01234)

Response of DREER:

Period	DRGDP	DCPI	DREER	DM2
1	0.377460	0.702674	3.926880	0.000000
	(0.42621)	(0.42194)	(0.29600)	(0.00000)
2	0.433616	0.713106	1.684235	-0.910505
	(0.32469)	(0.50351)	(0.48931)	(0.46870)
3	0.363457	1.172644	-0.169445	0.196337
	(0.28827)	(0.51341)	(0.54094)	(0.53601)
4	-0.228082	0.912872	-0.286015	0.201722
	(0.27944)	(0.47877)	(0.50918)	(0.52744)
5	-0.264597	0.402837	-0.022458	0.161265
	(0.24049)	(0.40740)	(0.43374)	(0.37379)
6	0.186550	0.281689	-0.020139	0.025145
	(0.22365)	(0.30153)	(0.24982)	(0.22196)
7	0.327126	0.279345	-0.168837	0.000399

	(0.21540)	(0.25042)	(0.19483)	(0.16755)
8	-0.252641	0.144151	-0.192581	0.119917
	(0.21557)	(0.20237)	(0.14707)	(0.12402)
9	-0.268888	-0.034967	-0.061160	0.111700
	(0.21809)	(0.15987)	(0.12035)	(0.10027)
10	0.177325	-0.015886	0.045502	-0.033979
	(0.21408)	(0.13114)	(0.11135)	(0.09491)
11	0.306653	0.084728	-0.028822	-0.071395
	(0.21216)	(0.10092)	(0.09128)	(0.07577)
12	-0.241168	0.030988	-0.092847	0.061542
	(0.21180)	(0.08969)	(0.08646)	(0.07820)

		Response of DM2:		
Period	DRGDP	DCPI	DREER	DM2
1	18.91362	4.435422	-6.843840	48.96646
	(5.48043)	(5.28117)	(5.24527)	(3.69099)
2	-2.859296	5.512907	2.648557	5.921698
	(3.29757)	(6.11375)	(6.16678)	(6.16281)
3	-1.514827	4.975930	1.491416	5.188317
	(3.25182)	(6.01729)	(6.33485)	(6.47550)
4	-8.771965	6.831669	0.144790	0.440740
	(3.03965)	(5.39608)	(5.55749)	(6.21674)
5	14.98538	6.404400	-1.723534	-2.562618
	(3.02554)	(3.47353)	(3.64305)	(3.06465)
6	-5.444592	5.449557	-2.478570	0.559475
	(3.04763)	(3.54302)	(2.71625)	(2.79422)
7	-1.501081	0.762144	-3.130939	2.284410
	(2.94646)	(3.18134)	(2.73670)	(2.74591)
8	-7.988428	-1.123233	0.632898	1.612865
	(2.89767)	(2.41882)	(2.01173)	(2.35462)
9	14.51696	0.931593	0.243078	-2.306005
	(3.13160)	(1.92862)	(1.66316)	(1.70935)
10	-5.684437	1.839744	-1.262709	0.314019
	(3.39041)	(2.26163)	(2.10736)	(2.19581)
11	-1.057458	-0.829165	-1.815956	1.643622
	(3.36855)	(2.20163)	(2.17768)	(2.31306)
12	-7.411969	-1.719903	1.582939	0.861619
	(3.36621)	(1.63468)	(1.49171)	(1.99954)

Cholesky Ordering: DRGDP DCPI DREER DM2
Standard Errors: Analytic

Appendix 8: Impulse Response Functions of Real Lending Rate Channel VAR Model

Period	DRGDP	DCPI	RLR	DM2
		Response of DRGDP:		
1	0.238835	0.000000	0.000000	0.000000
	(0.01800)	(0.00000)	(0.00000)	(0.00000)
2	-0.240052	-0.023594	-0.023855	0.027899
	(0.02209)	(0.02729)	(0.02436)	(0.02762)
3	0.011686	-0.050102	0.003568	0.006282
	(0.01906)	(0.03854)	(0.03449)	(0.04041)
4	0.006508	0.017426	-0.038324	-0.045050
	(0.01847)	(0.03797)	(0.02249)	(0.04272)
5	0.222114	0.025355	-0.012956	-0.005104
	(0.02451)	(0.01993)	(0.01252)	(0.02986)
6	-0.241812	-0.007542	-0.014984	0.025648
	(0.03126)	(0.02764)	(0.02484)	(0.02969)
7	0.026437	-0.041040	0.012975	0.011338
	(0.03387)	(0.03799)	(0.03443)	(0.04049)
8	0.005539	0.020859	-0.032283	-0.038889
	(0.03303)	(0.03642)	(0.02277)	(0.04212)
9	0.205855	0.022352	-0.008448	-0.001115
	(0.03707)	(0.02058)	(0.01203)	(0.02940)
10	-0.241725	-0.008323	-0.012604	0.023699
	(0.04371)	(0.02573)	(0.02312)	(0.02772)
11	0.041662	-0.037148	0.013443	0.008125
	(0.04873)	(0.03684)	(0.03346)	(0.03882)
12	0.004229	0.022786	-0.030568	-0.037123
	(0.04760)	(0.03593)	(0.02312)	(0.04086)

Period	DRGDP	DCPI	RLR	DM2
		Response of DCPI:		
1	-0.112818	0.860070	0.000000	0.000000
	(0.09208)	(0.06483)	(0.00000)	(0.00000)
2	0.009343	0.334527	0.018155	-0.116195
	(0.05709)	(0.10185)	(0.08844)	(0.10041)
3	-0.082305	0.228590	0.150212	0.091347
	(0.05203)	(0.10625)	(0.09088)	(0.11590)
4	0.042012	0.083958	0.080008	0.032568
	(0.03878)	(0.09881)	(0.06782)	(0.11726)
5	-0.041692	0.021041	0.018351	0.031777
	(0.03364)	(0.08000)	(0.05972)	(0.06552)
6	0.017617	0.003122	0.002724	0.002037
	(0.03419)	(0.06598)	(0.05552)	(0.04016)
7	-0.040354	0.002896	-0.016626	-0.011584
	(0.03368)	(0.04603)	(0.05264)	(0.02078)
8	0.055982	0.003959	-0.010889	-0.007392
	(0.03251)	(0.03007)	(0.04954)	(0.01527)

9	-0.033671	0.004534	-0.017027	-0.003171
	(0.03180)	(0.02081)	(0.04656)	(0.01366)
10	0.021572	-0.007000	-0.006339	0.004434
	(0.03219)	(0.01391)	(0.04383)	(0.01394)
11	-0.038330	-0.001601	-0.015109	-0.004265
	(0.03210)	(0.01033)	(0.04148)	(0.01264)
12	0.055076	-0.000584	-0.009085	-0.003198
	(0.03189)	(0.00945)	(0.03946)	(0.01090)

Response of RLR:

Period	DRGDP	DCPI	RLR	DM2
1	0.075769	-0.462202	1.441528	0.000000
	(0.16147)	(0.15757)	(0.10866)	(0.00000)
2	-0.136045	0.051371	1.555875	0.370240
	(0.18652)	(0.24152)	(0.19676)	(0.17700)
3	-0.118200	-0.040638	1.274902	0.247134
	(0.16880)	(0.28132)	(0.23587)	(0.26681)
4	-0.201039	0.013062	1.239530	0.210549
	(0.15838)	(0.29930)	(0.24507)	(0.30811)
5	0.018833	0.091748	1.206135	0.138013
	(0.14014)	(0.32027)	(0.24798)	(0.29415)
6	-0.105142	0.109883	1.146493	0.161729
	(0.14579)	(0.32407)	(0.26831)	(0.25330)
7	-0.119044	0.073754	1.121601	0.187380
	(0.15127)	(0.32126)	(0.29280)	(0.23530)
8	-0.176775	0.063904	1.060337	0.161352
	(0.13988)	(0.31089)	(0.31665)	(0.22824)
9	0.032722	0.078925	1.008284	0.139865
	(0.12203)	(0.30037)	(0.33846)	(0.22537)
10	-0.096919	0.086057	0.949489	0.142432
	(0.12698)	(0.28821)	(0.35711)	(0.22113)
11	-0.100717	0.052417	0.923849	0.155841
	(0.13097)	(0.27549)	(0.37474)	(0.21187)
12	-0.152661	0.052222	0.868933	0.127775
	(0.12083)	(0.26213)	(0.39076)	(0.20076)

Response of DM2:

Period	DRGDP	DCPI	RLR	DM2
1	10.86065	3.056038	-7.782814	48.27600
	(5.28663)	(5.21777)	(5.17957)	(3.63894)
2	-5.046482	3.345448	-4.815707	2.120968
	(2.59093)	(5.69611)	(5.08325)	(5.78924)
3	-3.142309	4.183767	-1.706773	-0.352211
	(2.46547)	(5.61285)	(4.90435)	(6.28872)
4	-7.062566	7.913312	-4.005507	-5.165129

	(2.62341)	(5.16460)	(2.69402)	(6.13608)
5	13.63447	4.717378	-3.339020	-2.455352
	(2.63591)	(3.03951)	(2.56420)	(2.46788)
6	-5.163514	2.707934	-3.369507	0.724812
	(2.59665)	(2.97209)	(2.78721)	(2.70661)
7	-1.340049	-1.952044	-1.900417	1.861133
	(2.53803)	(2.64460)	(2.39765)	(2.73030)
8	-5.939700	-0.906332	-4.052422	-1.200211
	(2.50919)	(2.01665)	(1.94098)	(2.13735)
9	13.40731	0.738301	-3.788875	-1.798108
	(2.69591)	(1.53839)	(1.95537)	(1.42678)
10	-5.540443	0.951227	-4.372751	-0.304945
	(2.85209)	(2.01990)	(2.36224)	(2.01804)
11	-0.822238	-1.962007	-2.118025	1.052574
	(2.84017)	(2.05878)	(2.23153)	(2.20296)
12	-5.357507	-0.573392	-3.669712	-1.421532
	(2.82914)	(1.71716)	(1.84263)	(1.96677)

Cholesky Ordering: DRGDP DCPI RLR DM2
Standard Errors: Analytic

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