REAL SECTOR RESPONSIVENESS TO MONETARY POLICY SHOCKS IN NIGERIA
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Abstract
This study examined the responsiveness of real sector output to monetary policy shocks in Nigeria. Applying a VAR model and covering the period 1970 to 2011 the study revealed that credit to the private sector and investment had direct instantaneous impacts on real sector development (GDP). Real GDP responded more to shocks in MPR, CPS and own innovations in the log-run. Although monetary policy rate and interest rate had no instantaneous and direct impact on real sector development they indirectly do so through the credit and investment channels. To this end monetary policy rate and bank lending rates are the most important monetary policy tools that can make or mar the Nigerian real sector. It was concluded that a sound monetary policy in Nigeria is one that encourages credit to the private sector and capital accumulation.

Keywords: Impulse response, monetary policy shocks, real sector, variance decomposition

Introduction
Monetary management has long been identified as an integral part of macroeconomic management. In Nigeria the Central Bank of Nigeria (CBN) is saddled with the task of monetary management on behalf of the government. The tool for monetary management is Monetary Policy (MP). Monetary policy is the use of instruments at the disposal of the Central Bank to influence the availability and cost of credit/money in order to achieve macroeconomic stability. The Stance/direction of monetary policy is dictated by the prevailing economic situation and Policy Objectives which have remained broadly the same over the years-Price stability; sound financial system, balance of payments viability and economic growth and development.

For most central banks the objective of price stability is given a more serious attention over others in the conduct of monetary policy. In many instances however, the laws establishing the central banks imposes a dual mandate of low inflation and high growth. Monetary Policy effects are transmitted through a chain linking CBN actions to macroeconomic goals. Macroeconomic aggregates such as output, employment and prices are in turn, affected by the stance of monetary policy through transmission channels:interest rate or money; credit; wealth or portfolio; expectations channel; and exchange rate channels. The effectiveness of the mechanism depends largely on the level of development of financial system. The identification of the dominance of the channels of monetary policy transmission mechanism (MPTM), which is critical to the proper design, management, and implementation of monetary policy, has not been clearly addressed in the Nigerian financial system. Until recently, the monetary authority in Nigeria was confronted with the enormous challenges of conducting monetary policy in the face of unclear directions and speed. Identifying the channels of transmission of monetary policy is important because they determine the most effective set of policy instruments, the timing of policy changes, and hence the main challenges that central banks face in decision making. Since there are lags in
the transmission mechanism (i.e., between monetary policy initiatives and their impact), the chain of events emanating from a change in central bank policy rate or base money needs to be studied and analyzed. The knowledge of these intricate links between economic variables will ensure that correct policy measures are taken to produce specific outcomes in the future.

The focus of this study is to empirically investigate how monetary policy shocks in Nigeria are transmitted to the real sector using a vector autoregressive (VAR) approach. Specifically, the paper examined interest rate and credit channels of monetary policy transmission with the objective of exploring their strengths.

**Literature review**

Bernanke and Blinders (1993) verified the lending channel of monetary policy transmission using US data spanning 1956 to 1978 and showed that monetary contraction (increase in Fed fund rate) led to a fall in loans and a rise in the rate of unemployment. Kashyap, Stein and Wilcox (1993) extended the data to 1990 arrived at the same conclusion. Suzuki (2004) using quarterly data from Japan, covering the period 1980Q1 to 2000Q4 showed that monetary policy tightening, represented by an unexpected increase in the overnight call rate causes the quantity of new loans to shrink as loan prices increased with the policy shock. He also showed that monetary policy worked efficiently in Japan with the observation that real GDP declined with hike in the overnight call rate. Bernanke and Gertler (1995) employing a vector autoregressive (VAR) model, revealed that monetary policy impacted differently on different components of final expenditures in the US. Raddatz and Rigobon (2003) in their study showed evidence on the differential effects of monetary policy for various sectors of the US economy. Similarly, the study Gertler and Gilchrist (1993) showed that outputs of smaller firms were more sensitive to monetary shocks as compared to large sized firms in the US. In a disaggregated study of the Canadian economy, Farès and Srour (2001) showed differing response of various sectors of the economy to innovations in monetary policy. Ganley and Salmon (1997) in their study provided evidence that the construction sector is the most interest-sensitive sector, followed by the manufacturing industry, services, and agriculture. The study of Hayo and Uhlenbrock (1999) was on Germany’s manufacturing and mining sector. They showed that heavy industries respond more strongly to interest rate shocks than nondurables industries such as clothing and food. Using disaggregated industry data from five industrialized countries, Dedola and Lippi (2005) showed sizable and significant cross-industry differences in the effects of monetary policy shocks. Using a panel of US regional data Giacinto (2002), Fratantoni, Schuh and Mae (2001) and Carlino and Defina (1999) showed differential effects of monetary policy shocks. Their analyses showed significant variation in the magnitude and duration of dynamic responses to monetary shocks across regions of the USA. Carlino and Defina (1999) further employed states impulse responses in a cross-state regression model to determine the causes of these state responses and showed that a state’s response to monetary policy is positively related to its manufacturing share and negatively related to the percentage of small banks. The study therefore concluded that the existence of disparate in states responses, underscores the difficulty of conducting a national monetary policy.

Cortes and Kong (2007) focused on the impact of monetary policy on the different province of the Chinese economy and found that bank-lending rate is a better indicator of monetary policy in China. Yue and Shuang-hong (2007) also focusing on China examined monetary policy transmission through the interest rate channel using the granger causality test and found that there was no causality between investment expenditure and the market interest nor between household consumption and the market interest rate, which suggested that the transmission of monetary policy in China was uncertain. Arnold and Vrugt (2002) in their
study which focused on Netherland measured the impact of monetary policy shocks on regional and sectoral output and observed large regional and sectoral variation in monetary policy transmission. Alam, and Waheed (2006) examined the channels of monetary policy transmission in Pakistan across seven sectors—agriculture, mining and quarrying, manufacturing, construction, wholesale and retail trade, finance and insurance, and ownership of dwellings of the economy. The study revealed that the manufacturing, wholesale and retail trade, and finance and insurance sectors declined more in response to the interest rate shocks while the agriculture, mining and quarrying, construction, and ownership of dwellings were observed to be insensitive to interest rate changes.

On the Nigerian front Nwosa and Saibu (2012) investigated the transmission channels of monetary policy impulses on sectoral output growth for the period 1986 to 2009 using secondary quarterly data. Granger causality and Vector Auto-regressive methods of analysis were employed. They showed that interest rate channel was most effective in transmitting monetary policy to Agriculture and Manufacturing sectors while exchange rate channel was most effective for transmitting monetary policy to Building/Construction, Mining, Service and Wholesale/Retail sectors, indicating that interest rate and exchange rate policies were the most effective monetary policy measures in stimulating sectoral output growth in Nigeria. Mbutor (2007) showed that bank loans rises contemporaneously with an unexpected monetary policy tightening in Nigeria. Also the quantity of loans banks made fall in response to the same policy shock, though with lag.

It is obvious from the foregoing that not much has been done in Nigeria in the area of monetary policy shocks and output response. This paper is an effort to contribution to the ongoing debate on the responsiveness of real sector output to monetary policy shocks.

Methodology

Relevant time series data were collected from the Central Bank of Nigeria Statistical Bulletin, 2011 edition. The data collected include monetary policy rate (MPR), maximum lending rate as proxy for interest rate (INTR), credit to the private sector (CPS), gross capital formation (GCF) proxy for domestic investment and real gross domestic product as proxy for real sector performance. The dataset covered the period 1970 to 2011.

3.2 Model Specification

For the purpose of analyzing and forecasting macroeconomic activities and tracing the effects of policy changes and external stimuli on the economy, researchers have found that simple, small-scale VARs without a possibly flawed theoretical foundation have proved as good as or better than large-scale structural equation systems. In addition to forecasting, VARs have been used for two primary functions, testing Granger causality and studying the effects of policy through impulse response characteristics. This study therefore estimated a VAR model to trace the responsiveness of the Nigerian real sector to monetary policy shocks. The model is specified as:

$$y_t = m + B_1 y_{t-1} + B_2 y_{t-2} + \ldots + B_k y_{t-k} + \epsilon_t$$

Where $y_t$ is a column vector of five (5) variables, that is $y_t = [MPR, INTR, CPS, GCF, GDP]$ modeled in terms of its past values. $B$ are $k \times k$ matrix of coefficients to be estimated, $m$ is a $k \times 1$ vector of constants and $\epsilon_t$ is a vector of white noise processes with the following properties

$$E(\epsilon_t) = 0 \text{ for all } t, t \neq s \Omega$$

where the covariance matrix, $\Omega$ is assumed to be positive definite. Thus the $\epsilon$’s are serially uncorrelated but may be contemporaneously correlated. The lag length, $k$ is determined empirically. To avoid the omission of relevant information estimation was done by iteration starting with the maximum lag length identified using the information criteria until the optimum model is arrived at-that is until the model becomes stable (no modulus or eigenvalue lies outside the unit circle). MPR is monetary policy rate, INTR is banks’ lending rate, CPS is credit to the private sector, GCF is
gloss capital formation and GDP is gross
domestic product.

Although the study uses the Granger Causality
test to establish instantaneous relation between
real GDP and the other endogenous variables
the study relied on the impulse response
function and the forecast error variance
decomposition to establish real sector’s
responsiveness to innovations in monetary
policy to the economy (see Greene, 2002 and
Johnston & Dinardo 1996 for a detailed
discussion of the impulse response function
and forecast variance decomposition). All the
variables in this study are logged except MPR
and INTR. This is because change in the log of
a variable approximately measures percentage
in the variable.

Results and discussions

To estimate the model specified the study
employed the lag order selection criteria for
which results are presented in table 1. Although four(4) of the criteria chose lag order
one as the optimum lag length the Akaike
information criterion chose lag five (5). Upon
estimation VAR(3) proved to be the best
model because the VAR LM-test showed no
further autocorrelation of the error terms. This
paper therefore adopted the VAR (3) model.
The VAR stability results are presented in
table 2. The granger causality test results are
presented in table 3 while the impulse
responses and forecast error variance
decomposition are presented in tables 4 and 5
respectively. For the Cholesky ordering of the
variables the economic intuition is as follows.
If there is a monetary policy shock the effect is
first on the monetary policy rate. Through
interbank borrowing this is transmitted to the
lending (interest) rate. The interest rate effect is
on money creation (the amount of money
banks are able to create and lend to the public)
this in turn impacts on the aggregate domestic
investment. All things being equal a higher
(lower) level of investment leads to increase
(decrease) in production. Thus the variables
are ordered assuming MPR is not affect by
INTR, CPS, GCF and GDP in the first period,
INTR is only affected by MPR in the first
period while CPS is only affected by MPR and
INTR in the first period. Also, GCF is affected
by MPR, INTR and CPS in the first period
while GDP is affected by all the variables in
the first period. This study is also interested in
the contemporaneous relationship between the
endogenous variables. To measure this relation
the granger causality test proves handy. The
Granger causality of the estimated VAR
presented in table 3 showed a unidirectional
relationship running from LOG(CPS) to
LOG(GDP) and from LOG(GCF) to
LOG(INTR) at the 5% level and from
LOG(GCF) to LOG(GDP) at the 10% level.
There was no instantaneous relationship found
amongst the other variables. These results
imply that credit to the private sector and gross
capital formation has direct instantaneous
impacts on real sector development while the
level of investment has a direct instantaneous
impact on interest rate. Apart from the
instantaneous relation this paper is also
interested in the indirect and total effect of the
endogenous variables on GDP. Therefore use
is made of the impulse responses and error
variance decompositions. An impulse response
function (IRF) traces the effect of Cholesky
one standard deviation shock in the
innovations of one variable in a current period
(horizon) on itself and on innovations in other
endogenous variables. A shock generated in
one variable does not only directly affect that
variable it is also transmitted to all other
endogenous variables indirectly through the
dynamic lag structure of the VAR. The IRF
results in table 4 describe the responsiveness of
innovations to Cholesky One standard
deviation or exogenous shocks over time.
The results showed that in the first forecast
horizon innovations in all the variables were
mostly driven by own shocks. While the
impact of shocks in all the variables on GDP
fluctuates over time it was MPR, CPS and own
innovations that impacted the most on real
GDP in the log-run. The impact of GCF was
mostly through the CPS channel while that of
MPR and INTR were mostly through the GCF
and CPS channels respectively. The variance
decomposition results showed in table 5
indicate that the percentage of LOG(GDP)
variance explained by innovations in MPR and
INTR increased slowly from 0.046% and 0.15% in the first horizon to 8.72% and 4.88% in the 24th horizon respectively. The percentage of innovation variance in GDP explained by CPS and GCF increased rapidly from 5.44% and 3.33% in the first forecast horizon and was able to explain 25.68% and 22.45% of variance in GDP in the 24th horizon. This means that apart from the 38% explained by own innovations CPS and CGF together explained about 48% of GDP variance in the long-run while the remaining 14% was shared between MPR and INTR. The impact of MPR on CPS and GCF increased rapidly and was able explain 29.17% and 33.63% of their respective variances in the 24th period. This means that it was MPR that explained most of the variances in GCF in the long run, which was greater than the 31.85% explained by own innovation. Also, apart from own innovations that explained 41.23% and 52.61% it was innovations in MPR that impacted most on INTR and CPS explaining 28.43 and 29.17% in the long-run respectively. These results implied that though monetary policy rate and interest rates had no instantaneous and direct impact on real sector development they indirectly do so through the credit and investment channels as expected.

Conclusion
This study showed that the responsiveness of real sector development to monetary policy shocks though weak is mostly through the interest rate-investment and credit channels. While credit availability and investment directly impacted on real sector development, interest rate and monetary policy rate impacts where through the credit and investment channels. Thus the pursuance of sound monetary policy is necessary for credit creation and investment which in turn increases the production base of the economy.

Recommendations
It is therefore recommended that banks should create more credit to the private sector while the central bank should pursue monetary policy that encourages same. Vast majority of Nigerians dwell in the rural areas where there are no bank branches thus do not patronize them but resort to saving under their “beds”. This situation coupled with bankers’ attitudes towards “small savers” deprives the deficit sector from accessing the needed capital for investment. Therefore a massive reorientation of the public especially, rural dwellers and bankers; and the opening of mini-branches in the rural areas will serve a great deal. Also, the CBN’s cashless-Nigeria policy is a welcome development.

References

Appendix

Table 1: VAR Lag Order Selection Criteria

<table>
<thead>
<tr>
<th>Lag</th>
<th>LogL</th>
<th>LR</th>
<th>FPE</th>
<th>AIC</th>
<th>SC</th>
<th>HQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-114.7328</td>
<td>NA</td>
<td>0.000445</td>
<td>6.472043</td>
<td>6.689734</td>
<td>6.548789</td>
</tr>
<tr>
<td>1</td>
<td>54.26532</td>
<td>283.1860*</td>
<td>1.88E-07*</td>
<td>-1.311639</td>
<td>-0.005489*</td>
<td>-0.851160*</td>
</tr>
<tr>
<td>2</td>
<td>71.01284</td>
<td>23.53706</td>
<td>3.18E-07*</td>
<td>-0.865559</td>
<td>1.529049</td>
<td>-0.021348</td>
</tr>
<tr>
<td>3</td>
<td>95.33533</td>
<td>27.60931</td>
<td>4.07E-07*</td>
<td>-0.828937</td>
<td>2.654129</td>
<td>0.399007</td>
</tr>
<tr>
<td>4</td>
<td>131.7464</td>
<td>31.49068</td>
<td>3.48E-07*</td>
<td>-1.445753</td>
<td>3.125771</td>
<td>0.165923</td>
</tr>
<tr>
<td>5</td>
<td>166.0870</td>
<td>20.41871</td>
<td>5.35E-07*</td>
<td>-1.950648*</td>
<td>3.709334</td>
<td>0.044761</td>
</tr>
</tbody>
</table>

* indicates lag order selected by the criterion; LR is sequential modified LR test statistic (each test at 5% level); FPE is Final prediction error; AIC is Akaike information criterion; SC is Schwarz information criterion; and HQ is Hannan-Quinn information criterion.
Source: Author’s computation
Table 2: VAR Stability Test
Roots of Characteristic Polynomial
Lag specification: 1 3

<table>
<thead>
<tr>
<th>Root</th>
<th>Modulus</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.978064</td>
<td>0.978064</td>
</tr>
<tr>
<td>0.944957 - 0.164139i</td>
<td>0.959107</td>
</tr>
<tr>
<td>0.944957 + 0.164139i</td>
<td>0.959107</td>
</tr>
<tr>
<td>0.591023 + 0.598366i</td>
<td>0.841041</td>
</tr>
<tr>
<td>0.591023 - 0.598366i</td>
<td>0.841041</td>
</tr>
<tr>
<td>-0.066741 + 0.737518i</td>
<td>0.740532</td>
</tr>
<tr>
<td>-0.066741 - 0.737518i</td>
<td>0.740532</td>
</tr>
<tr>
<td>-0.344821 - 0.649132i</td>
<td>0.735033</td>
</tr>
<tr>
<td>-0.344821 + 0.649132i</td>
<td>0.735033</td>
</tr>
<tr>
<td>0.248196 + 0.683372i</td>
<td>0.727047</td>
</tr>
<tr>
<td>0.248196 - 0.683372i</td>
<td>0.727047</td>
</tr>
<tr>
<td>0.653237</td>
<td>0.653237</td>
</tr>
<tr>
<td>-0.453881 + 0.302215i</td>
<td>0.545290</td>
</tr>
<tr>
<td>-0.453881 - 0.302215i</td>
<td>0.545290</td>
</tr>
<tr>
<td>-0.366434</td>
<td>0.366434</td>
</tr>
</tbody>
</table>

No root lies outside the unit circle.
VAR satisfies the stability condition.
Source: Author’s Computation

Table 3: Granger Causality Test

<table>
<thead>
<tr>
<th>Hypothesized relation</th>
<th>Wald Statistic</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOG(MPR) does not granger cause LOG(GDP)</td>
<td>2.184 (0.535)</td>
<td>Independence</td>
</tr>
<tr>
<td>LOG(GDP) does not granger cause LOG(MPR)</td>
<td>1.561 (0.668)</td>
<td></td>
</tr>
<tr>
<td>LOG(INTR) does not granger cause LOG(GDP)</td>
<td>4.607 (0.203)</td>
<td>Independence</td>
</tr>
<tr>
<td>LOG(GDP) does not granger cause LOG(INTR)</td>
<td>0.761 (0.859)</td>
<td></td>
</tr>
<tr>
<td>LOG(INTR) does not granger cause LOG(CPS)</td>
<td>10.000 (0.019)**</td>
<td>Unidirectional causality running from LOG(CPS) to LOG(GDP) at the 5% level</td>
</tr>
<tr>
<td>LOG(GDP) does not granger cause LOG(CPS)</td>
<td>1.170 (0.760)</td>
<td></td>
</tr>
<tr>
<td>LOG(CPS) does not granger cause LOG(GFP)</td>
<td>6.957 (0.0733)*</td>
<td>Unidirectional causality running from LOG(GCF) to LOG(GDP) at the 10% level</td>
</tr>
<tr>
<td>LOG(GDP) does not granger cause LOG(CPS)</td>
<td>3.918 (0.270)</td>
<td></td>
</tr>
<tr>
<td>LOG(GCF) does not granger cause LOG(INTR)</td>
<td>8.080 (0.044)**</td>
<td>Unidirectional causality running from LOG(GCF) to LOG(INTR) at the 5% level</td>
</tr>
<tr>
<td>LOG(INTR) does not granger cause LOG(GCF)</td>
<td>1.586 (0.663)</td>
<td></td>
</tr>
</tbody>
</table>

Note: (i) p-values in parenthesis (ii) ** (*) significant at 5% (10%)
Source: Author’s Computation

Table 4: Impulse Responses to Cholesky One Standard Deviation Innovation
<table>
<thead>
<tr>
<th>Period</th>
<th>Variable</th>
<th>MPR</th>
<th>INTR</th>
<th>CPS</th>
<th>GCF</th>
<th>GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MPR</td>
<td>0.194 (0.022)</td>
<td>0.097 (0.028)</td>
<td>0.031 (0.022)</td>
<td>-0.039</td>
<td>0.006 (0.048)</td>
</tr>
<tr>
<td></td>
<td>INTR</td>
<td>0.000 (0.000)</td>
<td>0.163 (0.018)</td>
<td>0.030 (0.022)</td>
<td>(0.038)</td>
<td>-0.011 (0.048)</td>
</tr>
<tr>
<td></td>
<td>CPS</td>
<td>0.000 (0.000)</td>
<td>0.000 (0.000)</td>
<td>0.134 (0.015)</td>
<td>0.102 (0.036)</td>
<td>0.070 (0.047)</td>
</tr>
<tr>
<td></td>
<td>GCF</td>
<td>0.000 (0.000)</td>
<td>0.000 (0.000)</td>
<td>0.000 (0.000)</td>
<td>0.030 (0.034)</td>
<td>-0.055 (0.046)</td>
</tr>
<tr>
<td></td>
<td>GDP</td>
<td>0.000 (0.000)</td>
<td>0.000 (0.000)</td>
<td>0.000 (0.000)</td>
<td>0.214 (0.024)</td>
<td>0.285 (0.032)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>MPR</td>
<td>0.025 (0.045)</td>
<td>0.036 (0.032)</td>
<td>0.060 (0.078)</td>
<td>0.117 (0.091)</td>
<td>-0.024 (0.063)</td>
</tr>
<tr>
<td></td>
<td>INTR</td>
<td>-0.007 (0.029)</td>
<td>-0.010</td>
<td>0.111 (0.051)</td>
<td>0.036 (0.066)</td>
<td>0.042 (0.051)</td>
</tr>
<tr>
<td></td>
<td>CPS</td>
<td>0.009 (0.02)</td>
<td>0.002 (0.021)</td>
<td>0.075 (0.047)</td>
<td>0.051 (0.050)</td>
<td>0.032 (0.029)</td>
</tr>
<tr>
<td></td>
<td>GCF</td>
<td>0.0003</td>
<td>0.009 (0.014)</td>
<td>-0.010</td>
<td>0.056</td>
<td>0.041 (0.047)</td>
</tr>
<tr>
<td></td>
<td>GDP</td>
<td>(0.032)</td>
<td>(0.026)</td>
<td>(0.035)</td>
<td>(0.038)</td>
<td>0.022 (0.039)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.031)</td>
<td>0.036 (0.022)</td>
<td>0.100 (0.071)</td>
<td>0.078 (0.084)</td>
<td>0.027 (0.049)</td>
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<tr>
<td></td>
<td></td>
<td>0.004 (0.03)</td>
<td>(0.025)</td>
<td>0.014 (0.087)</td>
<td>0.005 (0.086)</td>
<td>0.016 (0.047)</td>
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<tr>
<td></td>
<td></td>
<td>0.009 (0.02)</td>
<td>0.002 (0.021)</td>
<td>0.075 (0.047)</td>
<td>0.051 (0.050)</td>
<td>0.032 (0.029)</td>
</tr>
<tr>
<td>20</td>
<td>MPR</td>
<td>-0.024 (0.045)</td>
<td>-0.019</td>
<td>0.078 (0.065)</td>
<td>0.034 (0.091)</td>
<td>0.045 (0.053)</td>
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<td></td>
<td>INTR</td>
<td>0.004 (0.026)</td>
<td>0.002 (0.016)</td>
<td>0.070 (0.048)</td>
<td>0.051 (0.046)</td>
<td>0.030 (0.023)</td>
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<tr>
<td></td>
<td>CPS</td>
<td>0.005 (0.019)</td>
<td>0.006 (0.013)</td>
<td>-0.030</td>
<td>-0.055</td>
<td>0.025 (0.041)</td>
</tr>
<tr>
<td></td>
<td>GCF</td>
<td>(0.021)</td>
<td>(0.012)</td>
<td>0.046 (0.038)</td>
<td>0.054 (0.042)</td>
<td>0.003 (0.023)</td>
</tr>
<tr>
<td></td>
<td>GDP</td>
<td>(0.021)</td>
<td>(0.012)</td>
<td>0.046 (0.038)</td>
<td>0.054 (0.042)</td>
<td>0.003 (0.023)</td>
</tr>
</tbody>
</table>

Standard errors: Analytic

Source: Author’s Computation

Table 5: Forecast Error Variance Decomposition of LOG(GDP)
<table>
<thead>
<tr>
<th></th>
<th>GDP</th>
<th>MPR</th>
<th>INTR</th>
<th>CPS</th>
<th>GCF</th>
<th>GDP</th>
</tr>
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<tr>
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Note: Method of Factorization is the Cholesky Decomposition

Source: Author’s Computation