Research Mosaic (RM)

Volume 1, Issue 2, December 2021, PP. 01-11
ISSN: (O) 2959-1821 (P) 2959-1813
Website: https://researchmosaic.com/index.php/rm/index
Email: rm@researchmosaic.com

Measuring Monetary Policy Effects in Pakistan: An FAVAR Approach

Saba Bukhari, *National University of Modern Languages, Islamabad.*

Keywords	Abstract
Monetary Policy, VAR, Interest Rate, Money Supply	*In this study monetary policy's influence on the major macroeconomic indicators for Pakistan are examined by using a time series annual data for the period in between 1990 to 2020. The results of VAR model reveal that the influence of monetary policy on the macroeconomic variable in Pakistan is consistent with the explanations given in the theory. Interest rate is influencing the overall economic activity in the country and it is a good instrument to control inflation in the economy of Pakistan but it influences the economy after a period of five lags. A surprise in monetary variable is transmitted more quickly in prices in comparison to the output. The empirical and quantitative analysis of the data of Pakistan showed that inflation is negatively influencing the rate of output growth. In the empirical analysis output, money supply, household's consumption, inflation and interest rate have been taken and interest rate as a channel of monetary surprise transmission is analytically observed. The study of conitegration showed there are three co-intigrating equations and normalized coefficients indicated that inflation and interest rate are negatively influencing the output growth in Pakistan while household consumption, money supply and overall economic activity has positive impact. The results of Granger Causality are as per the expectations and are robust.*

1. INTRODUCTION

The ultimate goal of any macroeconomic policy is to achieve a sustained economic growth and stability in the price level. To target inflation and output growth in any economy monetary policy is considered as an effective instrument. Under the said policy the monetary management authority of the country keeps a strong control on the quantity of money that is supplied and also on the cost of borrowing money, in order to accomplish its target of growth and stabilization (Shaheen, 2013). Nowadays the dominating topic of discussion in macroeconomic debates is the channel through which monetary policy effectively transmits in any economy. Conventionally the path that monetary policy follows is like at first the central bank of the country extends reserves in the economy through its routine banking system and allows the commercial bank to supply more money in the economy which results in lowering of interest rates. The decreased cost of borrowing and increased quantity of money availability boosts spending and lifts up the economy. This conventional view about money has its primary focus on money supply and the interest rate as the chief transmission instruments of the monetary policy.

Following Kaplan, Moll and Violante (2018), two basic effect of monetary transmission mechanism are defined. The first direct channel observe the effects of a change in interest rate on

the households decision related to savings and consumption and also on an individual's net nominal income. A decrease in the bank rate will cause a decrease in interest generated incomes of households so it will discourage them to save more as the return accrued has decreased for the time being. The second indirect channel works through the channel of prices and nominal wages of workers. With a decrease in bank rate, the direct increase in spending or consumption decisions of households will cause an increase in demand for output and will provide a boost in output and increase the employment opportunities and wages indirectly.

In 1990's there was a change in policy regime and especially the monetary sector of Pakistan has gone through a revolutionary change, a large scale liberalization took place in it as a major policy measure. The economy moved towards more indirect channels and adopted more liberal measures like market-focused monetary management system was introduced. The concept that remained unexplored after restructuring and liberalization of financial system was going through an analytical analysis to check the effectiveness of a new monetary stance and also to find out the pathway of the shock in monetary policy tool in the economy of Pakistan. Keeping in view the scenario this research has the following aims

a. Firstly to find out the transmission path of a monetary surprise in the economy of Pakistan
b. Secondly to highlight the important role that monetary policy play for achieving macroeconomic stabilizations and sustained growth

The remaining of the paper constitute of section two focusing on the transmission route of a shock in monetary policy, section three is providing some relevant literature and section has model, data sources and methodology related details. In section five results are given and in last section conclusion generated from an analytical analysis is provided.

I. Transmission Pathway of a Monetary Policy Change in Pakistan

The pathway that a monetary change follows to affect the level of aggregate spending and price level in any country is known as monetary transmission channel or mechanism. It usually takes few time periods or lads to transmit any monetary phenomenon in any economy so it is bit hard to forecast the impact that a monetary policy could put on prices and other major indicators of the economy. Monetary policy has few basic channels through which it targets inflation and economic growth like interest rate channel, portfolio management channel, exchange rate channel and expectations channel.

Pakistan as an under developed country is facing several imbalances structurally and macro economically both like mounting budget and trade deficits, ever increasing debts taken from domestic and foreign sources, empty buckets of international reserves, high cost of borrowing, retarded speed of growth and development, large scale unemployment and inflation. So according to Shaheen, (2018) due to these serious issues that the economy of Pakistan is going through, it is on an average growing by merely 4% in the last four decades. More over the huge fraction of current expenditures on the fiscal stance are meeting by non-progressive and fragile tax structure. As our tax base is very narrow so the monetary authorities relies on borrowing from domestic and foreign sources which again demands for an expansionary monetary policy in Pakistan.

In Pakistan monetary policy is set to achieve the primal dual targets like enhancing economic growth and attaining the stabilization in prices. In 1990's in order to target inflation and promote the speed of economic growth financial reforms were initiated. In 1980's and before the monetary policy had very little role in the economy and it used to basically focus on provision of credit at a discounted rate to the priority sector (Chaudary, (2012). The set of financial reforms introduced during 1990s were like give supplementary autonomy to the central bank of the country, commercial banks privatization, development of local bond markets and also the introduction of Pakistani bonds at the international forums, put efforts to maintain the high quantity of foreign exchange reserves. Since 2001 the State Bank of Pakistan (SBP) is adopting such measures that is promoting market based monetary management.

2. LITERATURE REVIEW

There are a lot of researches dealing with transmission mechanism of monetary policy but still it is a very intricate and thought provocative concept. There are multiple mechanisms through which central bank drives the economy. One of the most prominent study in this regard was carried by Mishkin, (1995), highlighting the most prominent monetary diffusion mechanisms like Exchange rate channel, interest rate and equity price channel, housing and also the land price channel, balance sheet channel and channel related to bank lending and financial crisis. Furthermore Mishkin, (1996) states that when a country's central bank adopts an expansionary stance of monetary policy then it decreases the bank rate so the cost of borrowing funds decreases which puts an encouraging influence on the level of the private investment as there exists a negative relation between these two them. As a result the level of GDP of the economy also increases. Mishkin explained the whole channel by using IS-LM framework.

According to Keynesians monetary policy influences the financial conditions by the route of interest rate through its impact on investment level. Conversely Bernanke and Gertler (1995) contends that the decision to invest is more responsive to the changes on the expected cash flow in comparison to the interest rate. Subsequently, two more alternate mechanism of monetary policy transmission are identified first channels is based on assets prices more precisely stock prices, the rate of foreign exchange of currencies and wealth prices while second channels routes is through credit market which has asymmetric information more commonly this channel is known as credit mode of monetary transmission. Similarly, Munir, (2014) concluded that interest rate is the most efficient channel to influence output and the level of employment in Pakistan it is a better tool to combat inflation in the country but interest rate influences inflation with a lag of five months. Their results were aligned with the theory and FAVAR model gave no indication about the existence of dilemmas related to prices and also money supply in Pakistan. Contrary to Munir, (2014), Mukhtar, in (2019) stated that the conventional channel of interest rate is an ineffective channel of monetary change movement in Pakistan. Bernanki, (1992) exerted that innovations in fed rate affects the set of financial assets and interest rate is a good forecaster of the real variables in the US economy.

The effect of unanticipated surprise in money on aggregate the income and general price level is studied by (Khan, 2008) by adopting VAR and SVAR Models and showed that relatively the effect of a monetary shock on inflation is quicker than on level of output measured by industrial production index. Similarly Javid and Munir, (2011) through a quantitative analysis identified a

strong evidence of price puzzle existence in Pakistan. A positive surprise in interest rate causes an increase in general level of prices in the economy.

Afrin, (2017) while using SVAR framework and considering the loan sanctioning or credit as a route of transmission of monetary shock found a very strong influence on the economy of Bangladesh while the exchange rate channel was found ineffective as the foreign exchange market of Bangladesh is under strict controls. Credit channel's role in influencing the domestic prices, the rate of inflation and output is very non-trivial. While Hussain, (2009) in order to gauge the influence of monetary policy on the level of income and inflation exerted that exchange rate is an effective tool to control the level of prices and aggregate income in Pakistan. Subsequently Chaudary, (2012) conducted a study for Pakistan and by going through cointegration and causality analysis revealed that lending to private sector, REER and budget deficit are most significant indicators that are effecting the level of real GDP in the country. Montes, (2013) stated that credit as a tool to control inflation and aggregate spending's is very important especially in developing economies like Brazil whose ultimate objective is to inhibit the growth in prices in the country.

Whenever a positive surprise in credit takes place then the central bank of the country has to increase its bank rate in order to achieve its objective of stability in price level. The equity prices and also the cash flows both escalate whenever the central bank of the country raises its loan sanctioning mark up. Summing up Agha et al. (2005) concluded that bank lending is a major monetary transmission mechanism in Pakistan and it has a significant influence on the major macroeconomic variables in Pakistan. Mukhtar, (2019) while using monthly data for 2000M7-2016 M12 and focusing on lending and asset price channel of monetary transmission showed that targeting money in aggregates is still more effective in influencing output and general prices in Pakistan. Bank lending rate influences through investment and share prices, which in turn via its net wealth effect influences price level and the level of aggregate product. Along with domestic macroeconomic indicators, external shocks also putting a resilient effect on the growth in prices and level of aggregate income in Pakistan.

Taylor, (1993) has conducted a study regarding how a central bank sets its monetary policy. He considered the rate of interest in the market as a continued practice and related it with macroeconomic variables linearly. Likewise Ahsan-Ul-Haq, (2013) also tried to estimate the monetary policy rule as suggested by Taylor for Pakistan and coveted that State Bank of Pakistan can align its interest rate according to the rule prescribed by Taylor to grab the constructive effects of financial management policy.

Hassan, (2021) while studying the role of monetary policy in financial development for 1975-2018 for Pakistan concluded that the inflation and the rate of interest puts a negative influence on the GDP of the country while the rate of exchange, money supply and investment are positively influencing GDP. Moreover it is suggested that the strategies to combat inflation would be more helpful in attaining the desired level of GDP and employment in the country.

Rashid and Waheed, (2021) have estimated analytically the reaction functions of financial management related policy, by considering its accelerative and discouraging roles by using the quarterly data for Pakistan for the period 1971 to 2018. The study elucidated that central bank of Pakistan considers the leads and lags of the relevant variables in setting its interest rate and

relatively more importance is given to future rates expected inflation and exchange rate, secondly to the lagged period level of national income.

a. Literature Gap

While going through the literature few gaps are observed which could be covered in future research on the subject firstly no studied especially for Pakistan is carried about how the monetary policy affects the aggregate demand through different monetary transmission mechanism as a whole.. Secondly it is also observed that in case of Pakistan no study has been done so far, focusing on the indirect income channel of monetary transmission as a substantial driver of changes in aggregate consumptions and output.

3. METHODOLOGY

The pathway through which a change in monetary policy instrument influences the aggregate demand side and prices in any economy is known as the transmission channel of monetary policy. It generally comprises of few time lags so it is very hard to forecast the exact influence of monetary policy on the rate of inflation and total demand in any economy. Summing up the purpose of conducting this study is to determine the pathway of interest rates as a channel of monetary change transmission in case of Pakistan.

This channel transmission by affecting the interest rate that commercial banks levy on credit to business class and the interest it offers to individuals on their savings. Firstly its changes the money market rate of interest like repo rate and KIBOR and then it also influences the interest rate that is levied on long term loans and credits. KIBOR is a yardstick in lending to household and the production units. So a change in KIBOR thus causes a change in rates that is offered to consumers and the production units like industries and businesses and it acts as a stimulus to influence their decisions related to spend, save and invest. When the cost of borrowing is low people are inclined to save less and spend more. The demand for invest funds increases as it becomes cheaper for the production units and public also.

a. Empirical Model

A standard VAR model including six variables (i.e.,Y, MPV, Inf, MS, ch and I) in Cholesky ordering is considered. Thus this model includes interest rate as a policy variable and other influential variable. To observe the channel of interest rate as a monetary transmission mechanism the model is thus constructed as follows.

Functional form of the model

$$Y = f(MPV, Inf, MS, I, CH)$$

Econometric form of the model

$$\mathbf{Y_t = \beta_0 + \beta_1 MPV_t + \beta_2 INF_t + \beta_3 MS_t + \beta_4 I_t + \beta_5 CH_t}$$

Where Y is output, MPV is used as proxy for economic activity i.e. Manufacturing value added (% of GDP), inf is inflation rate, i is interest rate, CH is household consumption expenditure and MS is broad money.

b. Data

Annual time series data for Pakistan has been gathered from State Bank of Pakistan and world development indicators (WDI) for the period in between 1991-2020. The selection of the starting point for dataset is the time period when the process of monetary policy liberalization is initiated in Pakistan. For aggregate output growth GDP annual percentage growth, for economic activity manufacturing, value added (% of GDP), for interest rate the bank lending rate data is taken. While for inflation growth rate of CPI, for money supply broad money (M2) data are considered.

c. Estimation Strategy

Vector auto-regressive (VAR) introduced by Sims, (1980) is usually adopted as a technique to determine the effectiveness of monetary policy on prices, aggregate demand and output. Therefore methodology employed in this research for estimation purpose is a small structural vector auto regression (VAR) model. The impulse response functions or IRF are also estimated. The IRF are basically the shocks in VAR model that caters the influence of a shockwave in error term that is transmitted to the endogenous variables of the model. Therefore to capture the influences of a change in interest rate (as a monetary policy change transmission channel) on aggregate spendings and inflation, IRFS are generated. Gneralized IRFs are insensitive to the changes in ordering of the included variables in the model. For relative scrutiny of each regressand's influence in explaining variation in the independent variables Variance decomposition investigation is also performed. In order to investigate the direction of causality in between the variables a VAR relying granger causality test is also applied.

4. ESTIMATIONS AND RESULTS

4.1. Stationarity: ADF Unit Root Test

The results obtained by a stationarity analysis indicated that the order of integration of all variables included in the model is I(1). For Estimation of VAR Table A given below indicates the lag lengths suggested by different criterion is 2. Thus lag 2 is suggested to retrieve the structural parameters efficiently.

Table A: Suitable Lag Structure

L	LL	LR	FPE	AIC	SC	HQ
1	-295.1544	NA	4899.756	25.47341	27.21539	25.97504
2	-235.4440	64.30343*	1182.031*	23.64954	27.13350*	24.65279
3	-187.9964	29.19857	2127.035	22.76895*	27.99489	24.27383*

Moreover to check the robustness of the model several diagnostic tests were performed and it was found that there was no problem of serial correlation and heteroscedasticity and residuals are also normally distributed.

Table B(i): Cointegration Rank Test (Trace)

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.893412	177.5107	95.75366	0.0000
≤ 1 *	0.850247	117.0634	69.81889	0.0000
≤ 2 *	0.707709	65.79677	47.85613	0.0005
≤ 3 *	0.504903	32.58662	29.79707	0.0233
≤ 4	0.259122	13.60557	15.49471	0.0944
≤ 5 *	0.184530	5.507742	3.841466	0.0189

Table B(ii): Cointegration Rank Test (Maximum Eigenvalue)

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	**Eigenvalue**	**Max-Eigen Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.893412	60.44722	40.07757	0.0001
≤ 1 *	0.850247	51.26668	33.87687	0.0002
≤ 2 *	0.707709	33.21015	27.58434	0.0085
≤ 3	0.504903	18.98105	21.13162	0.0974
≤ 4	0.259122	8.097829	14.26460	0.3689
≤ 5 *	0.184530	5.507742	3.841466	0.0189

The estimated outcomes via Johansen Trace Test are accessible in above tables B (i) indicating the presence of four co integrating vector at 5 percent of significance level whereas table B(ii) indicating three cointegrating equations according to Eigen value test. Thus, the output is suggesting a long run relationship amongst the indicators under consideration. It further proposes at least one way causality among the variables.

Table C: Normalized Cointegrating Coefficients

Y	**I**	**INF**	**MPV**	**MS**	**CH**
1.000000	0.475249	0.022114	-0.432375	-0.046265	-0.611157
	(0.06040)	(0.00394)	(0.10558)	(0.01901)	(0.06341)

The results of co integrating equation show that the long run equilibrium is:

$$Y= 0.4752I + 0.02211\ INF + (-0.43237)\ MPV + (-0.04626)\ MS + (-0.61115)\ CH$$

Moreover table 4 suggests that MPV, MS and CH influences gross domestic product positively as it is found in each co integrating vector. While inf and I are negatively influencing GDP in Pakistan. Analysis of the data for Pakistan is highlighting a negative relationship in between INF and economic growth. In Pakistan the increasing rate of inflation and interest rate is a most common situation. More precisely the high lending rate is mostly accompanied by high inflation rate. This increasing interest rate is creating harm for our economy and its consumers and

influencing the growth rate of the country badly.

Table D: Error Correction (EC) Model

E C	D(Y)	D(I)	D(MS)
CE1	-0.271014	-0.052520	-0.117340
	(0.36431)	(0.36216)	(1.78661)
	[-0.74392]	[-0.14502]	[-0.06568]

Error correction results are indicating that Y, I and MS are converging to long run equilibrium but this convergence is not significant as all t-values are less than the value of 1.96

Table E: VEC Granger Causality/Block Exogeneity Wald Tests

Excluded	Chi-sq	Prob.
Causality from D(CH) to D(I)	3.540831	0.0599
Causality from D(Y) to D(INF)	7.539669	0.0060
Causality from D(MS) to INF	3.900992	0.0483
Causality from D(I) to D(MPV)	2.449410	0.0976
Causality from D(Y) to D(CH)	7.912758	0.0049
Causality from D(INF) to D(CH)	8.913384	0.0028
Causality from D(MPV) to D(CH)	4.643971	0.0312

The Modified Walds tests results are directing a one way causality is running from (CH to I), from (Y to INF), From (MS to Inf), from (i to MPV), from (Y to CH), from (Inf to Ch) and From (MPV to CH). The results are according to the economic theory.

4.2. IRF's: The Effect of a Surprise to Interest Rate

The graph given in appendix A is showing the Generalized IRF's for six indicators i.e. output, inf, MPV, Ms and CH) to a standard deviation of one unit positive shockwave to interest rate. Over the timeframe of 30 periods this shockwave is observed. It is observed that inf showed an immediate increasing trend till the 6^{th} period and later on it has started increasing at a mild rate for the rest of the periods. This predicts that traditional interest rate channel has trivial impact on inflation rate in Pakistan although both are moving with same trend. The output showed inconsistency in its response to a shock in interest rate in initial periods. And later on it started moving smoothly but at a lower level then before after almost 10 periods.

5. CONCLUSION

The principal goal of all macroeconomic policies is mainly to achieve a handsome rate of growth and the stability in price level of the economy. Best way to achieve these goals is regulating and controlling the tools of financial policy, as it effectively influences the rate of inflation and the rate of growth of output in any economy. In this study the influence of monetary policy on the major macroeconomic indicators for Pakistan are examined by using a time series annual data for the period in between 1990 to 2020. The results of VAR model are found to be consistent with the economic theory and providing the evidence for liquidity and price puzzle's existence in Pakistan. Interest rate is influencing the overall economic activity in the country so interest rate can be used

as a good instrument to control money demand in short term especially. Empirical analysis and the quantitative analysis of the data of Pakistan showed a negative relationship between inflation and rate of growth in output thus economic growth in Pakistan. Moreover there are many factors that are contributing to inflation in the country. The study of cointegration showed there are three cointigrating equations and normalized coefficients indicated that inflation and interest rate are negatively influencing the output growth in Pakistan while household consumption, money supply and overall economic activity has positive impact. The results of Granger Causality are as per the expectations.

5.1. Recommendations

1. To keep inflation in single digit in Pakistan and maintain interest rate at threshold level, SBP should be given autonomy to control its money supply according to the availability of country's financial assets.
2. For start-up of business and to minimise the unemployment in Pakistan especially for the qualified and skilled youth some steps should be taken to provide them interest free loans.

REFERENCES

Agha, A.I., Ahmed, N., Mubarik, Y.A. and Shah, H., 2005. Transmission Mechanism of Monetary Policy in Pakistan. *SBP-Research Bulletin,* 1(1), pp.1-23.

Ahmed, A.M. and Malik, W.S., 2011. The Economics of Inflation, Issues in the Design of Monetary Policy Rule, and Monetary Policy Reaction Function in Pakistan. *Lahore Journal of Economics,* 16(Special Edition), pp.213-232.

Ahsan-ul-Haq, 2013. Conduct of Monetary Policy in an Uncertain World: The Case of Pakistan. PhD Thesis, *IIIE,* International Islamic University, Islamabad.

Alves, P. M. L. (2017). *Central Banks Signals and Their Effects in the Financial Markets–a Factor-Augmented Vector Autoregressive Model Approach* (Doctoral dissertation, Universidade NOVA de Lisboa (Portugal)).

Bernanke, B., & Blinder, A. (1992). The Federal Funds Rate and the Channels of Monetary Transmission. *American Economic Review*, *82*(4), 90-2.

Christiano, L. J., Eichenbaum, M., & Evans, C. L. (1999). Monetary policy shocks: What have we learned and to what end?. *Handbook of macroeconomics*, *1*, 65-148.

Clarida, R., Galı, J. and Gertler, M., 1998. Monetary Policy Rules in Practice: Some International Evidence. *European Economic Review*, *42*(6), pp.1033-1067.

Hassan, M. U., Ali, H., Rahman, S. U., & Parveen, S. (2021). The Nexus between Monetary Policy and Economic Growth in Pakistan: Empirical Evidence Based on Bound Test Approach. *Review of Applied Management and Social Sciences*, *4*(3), 613-624

Holguín, J. S., & Uribe, J. M. (2020). The credit supply channel of monetary policy: evidence from a FAVAR model with sign restrictions. *Empirical Economics*, *59*(5), 2443-2472.

Hussain, K. (2009). Monetary policy channels of Pakistan and their impact on real GDP and inflation. *CID Research Fellow and Graduate Student Working Paper Series*.

Majeed, A., Hashmi, S. M., & Qamar, R. (2017). Monetary Policy Transmission and Firms' Investment: Evidence from the Manufacturing Sector of Pakistan. *Romanian Economic Journal*, *20*(66).

Mukhtar, T., & Younas, M. Z. (2019). Monetary policy transmission mechanism of Pakistan: Evidence from bank lending and asset price channels. *Asian Journal of Economic Modelling*, *7*(3), 121-139.

Munir, K. (2018). Dynamic effects of monetary policy on output and prices in Pakistan: a disaggregate analysis. *Journal of the Asia Pacific Economy*, *23*(1), 99-118.

Munir, K., & Riaz, N. (2020). Dynamics of inflation and inflation uncertainty in Pakistan. *International Journal of Monetary Economics and Finance*, *13*(2), 130-145.

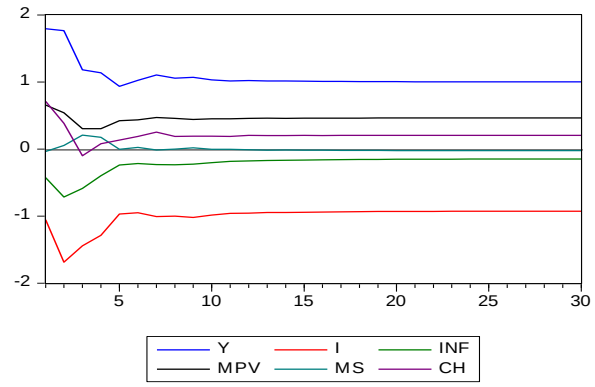
Munir, K., & Riaz, N. (2020). Fiscal Policy, Macroeconomic Flux and Inflation Volatility in Pakistan. *Journal of Applied Economics and Business Research*, *10*(4), 194-206.

Rashid, A., & Waheed, F. (2021). Forward-Backward-Looking Monetary Policy Rules: Derivation and Empirics. *Romanian Journal of Economic Forecasting*, *24*(1), 71.

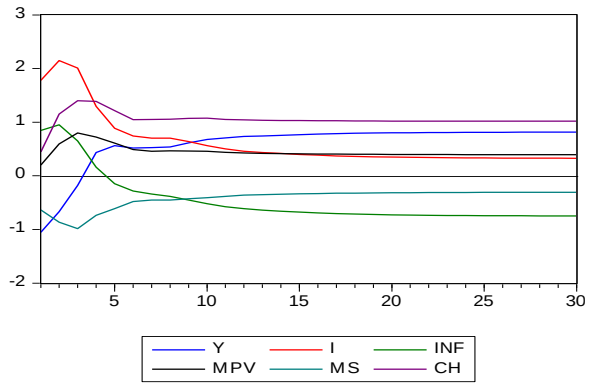
Taylor, J. B., 1993. Discretion versus Policy Rules in Practice. *Carnegie Rochester Conference Series on Public Policy*, 39(1), pp.195–214.

APPENDIX A

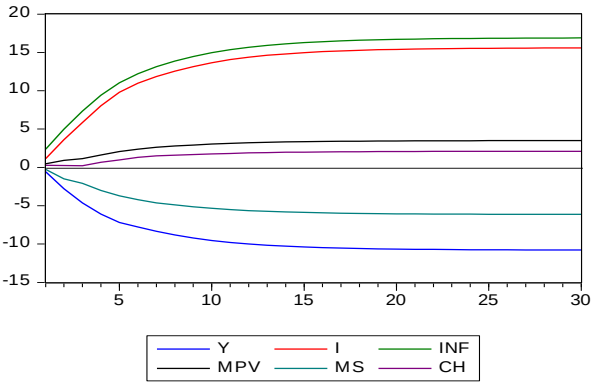
Response of Y to Generalized One S.D. Innovations



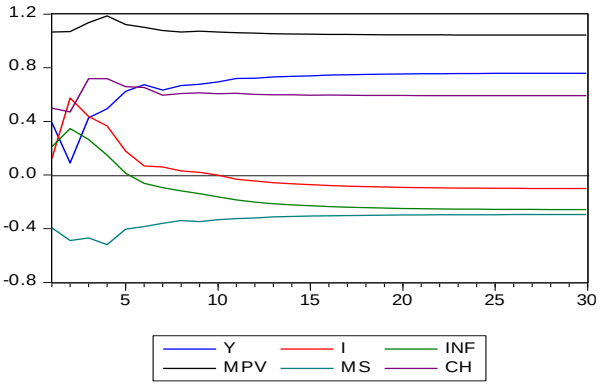
Response of I to Generalized One S.D. Innovations



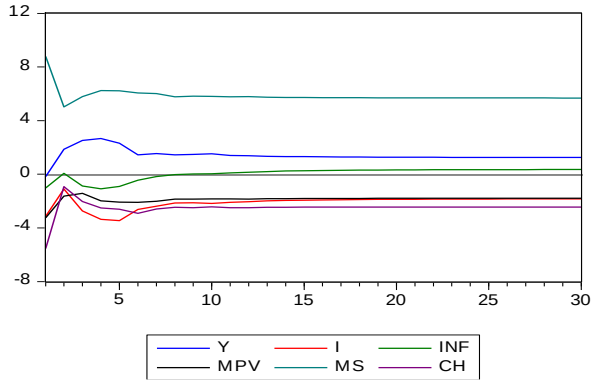
Response of INF to Generalized One S.D. Innovations



Response of MPV to Generalized One S.D. Innovations



Response of MS to Generalized One S.D. Innovations



Response of CH to Generalized One S.D. Innovations