Macroeconomic Shocks: Short-Run versus Long-Run Perspectives

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Abstract

Shocks that stem from goods and money markets are supposed to be influential as it takes some time for economic agents to realize their true impacts. Therefore, these shocks can induce uncertainty about key macroeconomic variables such as CPI inflation and real GDP growth. Impacts of nominal and real shocks are computed, evaluated and compared under short-run as well as under long-run restrictions for CPI inflation and real GDP. Furthermore, different countries with varying resource structures are incorporated to achieve a comprehensive and generalized analysis. Structural VAR models are employed in order to functionalize short-run and long-run restrictions. Impulse response analysis is done to analyze effects of nominal and real shocks on CPI inflation and real GDP in short-run as well as in long-run. Variance decompositions are done to locate main sources of uncertainties in CPI inflation and real GDP. Shocks from product market appeared to be more pervasive in comparison to shocks from money market.

Keywords: CPI inflation, real GDP, aggregate demand shock, aggregate supply shock, money demand shock, money supply shock.

JEL classification: B22, E12, E52.

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I. Theoretical Background

Keynesian revolution is the term more familiar in text books of macroeconomics in modern era (Laidler and David, 1999). This term highlights the fact that subject matter of economics no longer remained same as it used to be. This was the very revolution that gave birth to macroeconomics as a distinguished subject from microeconomics (Snowdon & Vane 2005). Role of active policy making became an established norm for stabilizing economy in this revolution. Term of laissez-fair went into extinction in heydays of Keynesian paradigm (Kuttner 1991). Systematic monetary and fiscal policies were main windows through which governments played their roles of stabilization.

Advent of empirical evidence of negative money wage inflation and unemployment relationship in shape of Phillips curve gave Keynesian paradigm a new shape (Phillips 1958). It was supposed that governments can effectively increase growth with the use of monetary policy (Samuelson & Solow 1960). Hence, a new role of government was introduced in Keynesian model. A paradigm that was established on norm of stabilization of economy was supposed to be aggressive in growth objectives. The absence of government intervention in any condition was Achilles heel of classical economics so aggression of policy making to achieve growth objects proved to be frailty of Keynesian economics.

One catastrophic event of Great Depression from 1929 to 1939 gave birth to Keynesian economics so the second ruinous event of stagflation of early 1970s proved to provide fertile ground for nurturing ideas of new-classical economics (Birol 2015). The slogan of laissez-fair rebounded after an interval of many years in the shape of new-classical economic system and casted great doubts on active government participation in economic affairs. Unsystematic monetary policy was only active window through which rational economic agents could be baffled in short-run (Lucas 1972). Hence, a consensus can be

concocted between Keynesian and new-classical economics. The concocted consensus is unsystematic monetary surprises have real effects in short-run.

This study will focus on evaluation of unsystematic monetary influences that can be purported through money supply shock and affect aggregate demand. Real shocks are also computed to provide a comparison between nominal and real shocks. Since Keynesian paradigm is based on sticky prices in short-run whereas new-classical economics is based on fully flexible prices therefore nominal and real shocks are evaluated under both restrictions.

Structural vector auto-regression (SVAR) models are estimated under restriction of complete price rigidity as well as under complete price flexibility. Hence, short-run versus long-run analysis is made possible. Impulse responses are computed on basis of above mentioned restrictions. Since unsystematic policy actions are unanticipated therefore these actions can install uncertainty in economic system. Variance decomposition analysis is done to analyze significance of different shocks on basis of level of uncertainty that is caused by these shocks.

Nominal and real shocks are assessed for key macroeconomic variables of CPI inflation and real GDP. CPI inflation represents nominal variable whereas real GDP represents real variable. Effects of demand and supply shocks that stem from goods and money market are assessed for these key macroeconomic variables. Therefore, impacts of nominal and real shocks are analyzed for these crucial macroeconomic variables as uncertainty in any one of them could have serious repercussions for economy-wide interrelated events.

Differences in resource and market structures can result in differences in behaviors of inflation and output in response to demand and supply shocks. Therefore, it is ensured by including countries that belong to different developmental structures so that one can compare potential similarities or differences that can arise from changing levels of developments.

Therefore, this analysis incorporates developing economies of Pakistan and Turkey, emerging market economy of South-Korea, and developed economies of Canada, U.K. and U.S.

Remaining sections of this study are divided in following sections. Second section of this paper provides a brief review of literature. Third section deals with methodology that is opted for modeling and acquisition of results. Second last section provides results of this study along with economic reasoning of these results. Last section of this study concludes findings of this study.

II. STRUCTURAL SHOCKS: EMPIRICAL EVIDENCES

There is an influx of empirical studies done for U.S. economy. Blanchard and Quah (1989) showed that impact of demand shock vanishes in the long-run, but supply shock retains its effect even in the long-run for this economy. King et al. (1991) showed insignificant effects of nominal shocks for U.S. economy. Cover (1992) showed no influence of positive money supply shock on the U.S. output, but negative shocks have negative impact on the output of this economy. Karras and Stokes (1999) also reached same conclusion for output of U.S. economy, but response of prices was symmetric. Gali (1992) found significant impacts of both demand and supply shocks for variability of U.S. GDP.

Cover et al. (2004) showed that demand and supply shocks for U.S. economy are highly correlated and demand shocks are dominant source of long-run forecast error variance for real GDP of U.S. economy. Ribba (2006) studies U.S. economy and finds that positive productivity shocks leads to reduce inflation and unemployment. Moreover, rise in inflation appeared to be a cause of decrease in unemployment in recession periods. Monetary policy shocks play significant role in determining inflation and unemployment in short run as well as in long run.

Funke (2000) investigated influences of relative demand, relative supply, and relative nominal shocks for U.K. and Euroland and found most of the fluctuations in relative output

of U.K. economy from supply shocks. Kasumovich (1996) showed positive money supply shock, in the short-run, influences interest rate negatively and output positively, but price level is affected positively and permanently for Canadian economy. Artis and Ehrmann (2000) found positive effects of positive aggregate supply shocks for output of Canada and U.K. whereas money supply shock influences output negatively in these economies and monetary policy shock had negative influence for Canadian prices and positive effect on U.K. prices.

Hlasny (2010) found negative relationship between unexpected inflation and unemployment in Korean economy. Kibritçioğlu and Dibooglu (2001) showed that inflation in Turkish economy responds permanently to monetary policy shock. Us (2004) showed that inflation in Turkish economy responds mostly to a shock in public sector inflation rather than monetary shock. Ozdemir (2015) showed that it takes some time for real GDP to respond significantly to a contractionary monetary policy shock. Azgun (2011) found insignificant impact of electricity consumption shock on real GDP of Turkish economy.

Ahmad et al. (2014) concluded that positive inflation increases inflation uncertainty for the economy of Pakistan. Khan (2008) found positive and diminishing impact of monetary policy shock for industrial output of Pakistan whereas positive monetary policy shock appeared to effect inflation in Pakistan positively and persistently. Adnan et al. (2008) found alternative cycles of demand and supply constitute business cycles in Pakistan. Arby (2001) correlated the growth of output to the cotton production for economy of Pakistan. Hanif et al. (2016) found dominance of supply shocks for economy of Pakistan. Sumara et al. (2017) found an increase in commodity prices due to contractionary monetary policy shock which negatively affected real economic activity in Pakistan.

III Data and Methodological Framework

This section provides details of variables and sources of data sets. Furthermore, methodological account is also provided in this section.

III-A Data

SVAR models are estimated to compute the impacts of structural shocks. Variables in this analysis are real GDP growth, CPI inflation, growth of monetary aggregate M2 for all other economies and M4 for economy of U.K. and discount rate. Sources of these data sets for economy of Pakistan are handbook of statistics published by the state bank of Pakistan (SBP) and Pakistan economic survey published by ministry of finance under federal government of Pakistan. Sources of data for economies of Turkey, South-Korea, Canada, U.K. and U.S. are OECD, IMF, World Bank and Federal Bank of St. Louis. Time span of data sets are from 1973 to 2016 for all economies and frequency of data is annual.

III-B Methodological Framework

This section explains methodology of this study. The nature of this study is comparative and restrictions are imposed according to short-run and long-run. Short-run restrictions are theoretical restrictions from orthodox Keynesian school. Long-run restrictions are theoretical restrictions from new classical school of economics. Methodological framework presents identification schemes of SVAR models.

III.B.I. Methodological Framework: Nominal and Real Shocks under Complete Price Rigidity

Kilian (2011) suggested monetary SVAR model based on restrictions from Keynesian orthodoxy. This model was based on natural logs of variables such as price level, real GDP, monetary aggregate M1, and federal funds rate. The proposed identification can be represented as

$$\begin{pmatrix} \in_{pt} \\ \in_{gdpt} \\ \in_{mt} \\ \in_{it} \end{pmatrix} = \begin{bmatrix} a & 0 & 0 & 0 \\ b & c & 0 & 0 \\ d & e & f & 0 \\ g & h & i & j \end{bmatrix} \begin{pmatrix} u_{1t} \\ u_{2t} \\ u_{3t} \\ u_{4t} \end{pmatrix} \quad (3.1)$$

Above structure is based on the assumption that aggregate supply curve is horizontal and aggregate demand curve is negatively sloped. Hence, implied restrictions are based on structure of the traditional Keynesian economics where prices are sticky in short-run. Where, $\in_{pt}$ represents aggregate supply equation that is immune to demand side disturbances. Whereas $\in_{gdpt}$is residual from aggregate demand equation that is a composite of both demand and supply side changes. Hence, in accordance with traditional Keynesian view, output is allowed to be affected by contemporaneous demand and supply shocks in the short-run.

Third innovation $\in_{mt}$ is from real money demand equation that can be influenced by demand and supply shocks as well as autonomous changes in money demand. The final equation is representative of monetary policy reaction function. Residual of interest rate is composite of demand and supply disturbances as well as money demand disturbances. The essence of last equation is that policy makers alter interest rate due to goods market supply and demand disturbances as well as money demand disturbances. Furthermore it is assumed that, the interest rate changes are achieved by accommodating changes in money supply. To make things operational for selected economies, estimation is done by using following variables.

$\Pi =$ CPI inflation in country i

$y =$ first differnce of natural logarithm of real GDP times 100

$m =$ first difference of natural logarithm of real monetary aggregate $M2$ times 100

$i =$ discount rate

The above mentioned SVAR model is estimated and impulse response functions of CPI inflation and real GDP growth are obtained. Hence, the responses of CPI inflation and

real GDP to aggregate supply shock, aggregate demand shock, money demand shock, and money supply shock will help us to assess impacts of different shocks from product and money markets under complete price rigidity. Variance decomposition is done to identify significant sources of fluctuations in nominal and real variables i.e., CPI inflation and real GDP.

III.B.II. Methodological Framework: Nominal and Real Shocks under Complete Price Flexibility

Late 1960s and early 1970s proved to be disturbing when boosting demand through policy intervention seems to create stagflation in U.S. economy. Adaptive expectations that were basis of inflation-unemployment trade-off came under severe criticism. Inclusion of rational expectations in phase of self-correcting markets, even in short-run, rendered any systematic policy to boost real economic activity was assumed as a futile attempt from policy makers from view point of new-classical economics. In this situation, only unsystematic changes in policy variables, such as money supply, can produce temporarily real effects. Hence, long-run effects of unexpected nominal changes are assumed to be insignificant for real variables.

Equations presented below represent a model based on new-classical restrictions.

$$y = u_{as} \tag{3.2-a}$$

$$\Pi = a_1 y + u_{as} \tag{3.2-b}$$

$$m = a_2 p + a_3 y + u_{md} \tag{3.2-c}$$

$$i = a_4 p + a_5 y + a_6 m + u_{ms} \tag{3.2-d}$$

Implied long-run structure based on above equations can be represented by the following long-run matrix containing new-classical restrictions.

$$C(1) = inv\begin{pmatrix} 1 & 0 & 0 & 0 \\ -a_1 & 1 & 0 & 0 \\ -a_2 & -a_3 & 1 & 0 \\ -a_4 & -a_5 & -a_6 & 1 \end{pmatrix} \tag{3.3}$$

Above restrictions are achieved from modification of Kilian's (2011) Keynesian model with short-run restrictions presented above. These restrictions are based on vertical aggregate supply and negative aggregate demand model for long-run economy. First row for inverse of *C(1)* matrix represents coefficients of moving average representation of aggregate supply equation. Restrictions for aggregate supply equation represents that real GDP can only be affected by supply side disturbances in long-run. Second row for inverse of *C(1)* matrix represents moving average coefficients of aggregate demand equation. CPI inflation, in long-run, is allowed to be affected by aggregate demand and aggregate supply shocks.

Third row shows moving average representation of demand for real money balances. Money demand is allowed to be affected by disturbances in goods market and unexpected changes in demand for real money balances. Last row shows monetary policy reaction function in moving average form. Monetary policy is allowed to counteract any unexpected changes in aggregate supply, aggregate demand, and demand for real money balances as well. Furthermore, own shocks effects are normalized.

These restrictions impose a structure in which unsystematic changes in nominal variables can affect real variables only in short-run. Therefore implied SVAR structure that arises from these restrictions is close to the belief about working of economy possess by proponents of new-classical school of economics. Impulse response functions of CPI and real GDP are obtained to evaluate these responses in a flexible price structure. Furthermore, variance decomposition is done to assess the sources of fluctuations in these variables.

IV RESULTS AND ANALYSIS

This section provides results that are obtained from methodological setting described in previous section.

IV.A Results from SVARs: Evaluation of Demand and Supply Shocks

SVAR models are estimated to achieve short-run as well as long-run results. Short-

run restrictions are according to specification given in (3.1) and long-run restrictions are according to specification in (3.3). Appendix A.1. contains results of unit root tests for variables involve in this study[4]. Appendix A.2 contains results of lag-length selection based on information criteria (Table A.2.1), results of characteristic roots for stability of VAR model (Table A.2.2) and results of autocorrelation LM-test (Table A.2.3).

It can be seen that one lag-length is selected by majority of information criteria for economy of Pakistan. Two lags are deemed as appropriate by all information criteria for Turky and two lags are selected by majority of these criteria for South-Korea. Three lags are selected by Akaike information criterion (AIC) and final prediction error (FPE) for economy of Canada[5]. For U.K. two lags are selected by AIC and FPE and one lag-length is selected for U.S. economy by all information criterions. Results of chateristic roots are shown for first four roots as subsequent roots decline futher. It can be seen that VARs for all economies are stable. Langrange multiplier (LM) tests also show no problem of autocorrelation for all economies.

IV.A.I. Impulse Responces: Short-run versus Long-run Analysis

Results from impulse response analysis are shown in Appdix A.3.1 (Figure A.1.1 to A.1.12). In the short-run, real as well as nominal variables are inflationary, but not for all economies of this study for all shocks. Aggregate supply shock is inflationary for all economies in the short-run. Negative influence of aggregate supply shock is present for CPI inflation for developing economies while this variable is positively influenced for relatively advanced economies of South-Korea and Canada in the long-run. Money demand shock has negative impact on CPI inflation of developed economies of this study as well as developing economy of Pakistan. Nominal shocks of aggregate demand and money supply shocks, in the

[4] Unit root tests are conducted for variables involve in regression analysis and KPSS test is preferred over ADF and PP tests. For further detail see Arltova & Fedorova (2016).

[5] We have given preference to FPE and AIC over Schwarz information criterion (SC) and Hannan-Quinn (HQ) criterion. For further detail see Liew (2004) and Ivanov & Kilian (2005).

long-run, are inflationary except for CPI inflation of South-Korea which is negatively affected by money supply shock.

Aggregate supply shock is negatively influencing real GDP of Pakistan and U.K. economies in short-run whereas this shock has positive impact on real GDP of all economies except economy of Canada in the long-run. Money demand shock, in short-run, is inflationary only for Turkish economy while this shock has different effects on this variable in the long-run for different countries irrespective of resource and market structures. Nominal shock of aggregate demand is affecting real GDP of all economies positively while money supply shock has positive influence only on real GDP of South-Korean economy in the short-run. In the long-run, aggregate supply shock has positive impression on real GDP of Turkish and U.S. economies while it leaves negative impact on real GDP of South-Korean economy. Money supply shock has positive influence on real GDP of South-Korea and Canada whereas this shock is negatively affecting this variable for economies of Turkey, U.K. and U.S.

It can be seen from impulse response analysis that aggregate supply shock has positive influence of real GDP of all economies, except real GDP of Canada, only in the long-run. Furthermore, this shock is inflationary for all economies in the short-run. In the short-run, nominal shock of aggregate demand has inflationary influence for all economies and positive impact on real GDP of all economies as well. Money supply shock is inflationary for majority of economies in both short-run and long-run. This shock has negative influence on real GDP of Pakistan, but positive effect after some lags can be noted for South-Korean economy in the short-run. This shock has different effects on real GDP of different countries as far as long-run is concerned.

Impulse response analysis reveal that both nominal and real shocks are influential for nominal and real variable of CPI inflation and real GDP from short-run as well as long-run perspectives. Aggregate supply shock in short-run and aggregate demand shock in long-run

are inflationary. Surprisingly, contractionary money supply shock is inflationary in both short-run as well as long-run. Aggregate supply shock is positively influential for real GDP of all economies and same can be said for money supply shock for economies of South-Korea and Canada.

IV.A.II. Variance Decomposition: Short-run versus Long-run Analysis

Results from variance decomposition analysis for respective economies are shown in appendix A.3.1. Results from this analysis reveal that aggregate supply shock is dominant source of forecast uncertainty of CPI inflation for all economies under short-run price restrictions. However, aggregate demand shock for South-Korea and U.K., and money supply for Canada share considerable portions for explaining forecast error variance of CPI inflation in the short-run.

Aggregate demand shock is most contributory factor for explaining forecast uncertainty of real GDP of all economies under short-run price restrictions for all economies of this study. Money supply shock for economies of Pakistan and U.S., and aggregate supply and money demand shocks for economy of Turkey possess some explanatory power for expositing forecast error variance of real GDP of these economies.

Aggregate demand shock is significant contributory factor of forecast error variance for CPI inflation of all economies except Canada in the long-run. Aggregate supply shock has also very important contribution in explaining forecast error variance of CPI inflation for all economies except economies of U.K. and U.S. under restrictions of complete price flexibility. Money supply shock is crucial source of forecast error variance of CPI inflation for Canadian economy in the long-run.

On the other hand, aggregate supply shock, in long-run, is dominant source of forecast uncertainty of real GDP for all economies save Canada. Whereas, money demand shock is significant source of forecast uncertainty of real GDP for Canadian economy under long-run

price restrictions. In the long-run, money demand shock is also important source of forecast uncertainty of real GDP for economy of Pakistan. Money demand and aggregate demand shocks are significant contributory factors of forecast error variance of real GDP for Turkish economy to some extent under long-run price restrictions.

V Conclusions and Policy Implications

Purpose of this study is to evaluate impacts of nominal and real shocks on nominal variable of CPI inflation and real variable of real GDP. The objective is achieved by forming SVAR models with appropriate restrictions. These restrictions are imposed on basis of short-run as well as long-run theoretical guidelines from traditional Keynesian perspective as well as from the view point of new-classical school of economics.

Aggregate supply shock has positive influence on real GDP of all economies except Canada, but it is also very important source of forecast uncertainty of this variable in the long-run for all economies. Furthermore, this shock is also crucial in explaining forecast uncertainty of CPI inflation of all economies in both short-run as well as long-run (with exception of U.K. and U.S. economies in the long-run). Aggregate demand shock has positive influence on real GDP of all economies, but it is also dominant source of forecast uncertainty of this variable as far as short-run is concerned.

Shocks from money market are also crucial for nominal variable of CPI inflation and real variable of real GDP. Money demand shock is deflationary for majority of economies in the long-run while it has different effects for different economies on real GDP in the long-run. This shock has considerable shares in forecast uncertainties of real GDP for economies of Pakistan, Turkey and Canada. Money supply shock is important for explaining forecast uncertainty of CPI inflation for Canadian economy in both short-run as well as long-run.

It can be said that shocks from product markets are more prevailing in comparison to shocks from money market. However, conditions in money market can influence conditions

in product market. Shocks from monetary side are assumed to have effects on aggregate demand therefore erratic behavior of money market can lead to erratic behavior of product market. Therefore, it seems judicious to avoid monetary shocks to influence real and nominal variables. Furthermore, systematic monetary policy that can provide cushions against uncertainties that stem from product market can be vital for smooth functioning of these economies.

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Appendix A.1: Results from Unit-Root Tests

Table A.1.1. *Results From Unit Root Tests*

		ADF		PP		KPSS	
Country	Variable	ADF test-Stat	5% Sig	Adj.t-Stat	5% Sig	LM-Stat	5% Sig
Pakistan	π	-3.45	-2.93	-3.44	-2.93	0.11	0.15
	y	-6.80	-2.93	-7.34	-2.93	0.25	0.46
	m	-4.98	-2.93	-4.91	-2.93	0.05	0.46
	i	-2.07	-2.93	-2.01	-2.93	0.14	0.46
Turkey	π	-1.37	-2.93	-1.37	-2.93	0.34	0.46
	y	-6.22	-2.93	-6.22	-2.93	0.06	0.46
	m	-5.72	-2.93	-5.72	-2.93	0.29	0.46
	i	-0.89	-3.52	-0.89	-3.52	0.20	0.46
Korea	π	-2.54	-1.94	-2.91	-1.94	0.15	0.15
	y	-5.51	-3.52	-14.37	-3.52	0.07	0.15
	m	-2.91	-2.93	-2.91	-2.93	0.15	0.15
	i	-3.20	-3.52	-2.61	-3.51	0.08	0.14
Canada	π	-2.14	-1.94	-2.73	-1.94	0.15	0.15
	y	-7.89	-2.93	-7.89	-2.93	0.33	0.46
	m	-4.04	-2.93	-4.04	-2.93	0.11	0.46
	i	-3.38	-3.51	-3.46	-3.51	0.10	0.14
U.K.	π	-2.14	-1.94	-2.66	-1.94	0.15	0.15
	y	-4.26	-2.93	-4.30	-2.93	0.10	0.46
	m	-2.22	-1.95	-2.16	-1.94	0.13	0.46
	i	-3.95	-3.52	-2.98	-3.51	0.15	0.15
U.S.	π	-2.55	-2.93	-2.56	-1.94	0.15	0.15
	y	-4.66	-2.93	-4.64	-2.93	0.20	0.46
	m	-3.66	-2.93	-3.66	-2.93	0.31	0.46
	i	-4.03	-3.52	-2.44	-3.51	0.06	0.14

ADF test = Augmented Dickey-Fuller test
PP test = Phillips Perron test
KPSS test = Kwiatkowski-Phillips-Schmidt-Shin test

Appendix A.2: Results for Testing of Lag-Length, Stability and Autocorrelation

Table A.2.1. *Selection of Lag-length*

Country	FPE	AIC	SC	HQ
Pakistan	1	2	1	1
Turkey	1	1	1	1
Korea	2	2	1	2
Canada	3	3	1	2
U.K.	2	2	1	1
U.S.	1	1	1	1

Table A.2.2. *Results for Stability of VAR Model*

Country	Root1	Root2	Root3	Root4
Pakistan	0.82	0.82	0.60	0.60
Turkey	0.89	0.89	0.26	0.13
Korea	0.91	0.54	0.54	0.50
Canada	0.93	0.93	0.69	0.69
U.K.	0.88	0.88	0.61	0.61
U.S.	0.82	0.71	0.45	0.45

Table A.2.3. *Results for Autocorrelation LM-Test*

Country	Lags	Probability
Pakistan	1	0.96
Turkey	1	0.74
Korea	2	0.36
Canada	3	0.76
U.K.	2	0.13
U.S.	1	0.50

Appendix A.3.1: Impulse Responses

Figure A.1.1: Impulse Responses for Economy of Pakistan under Fixed Price Restrictions

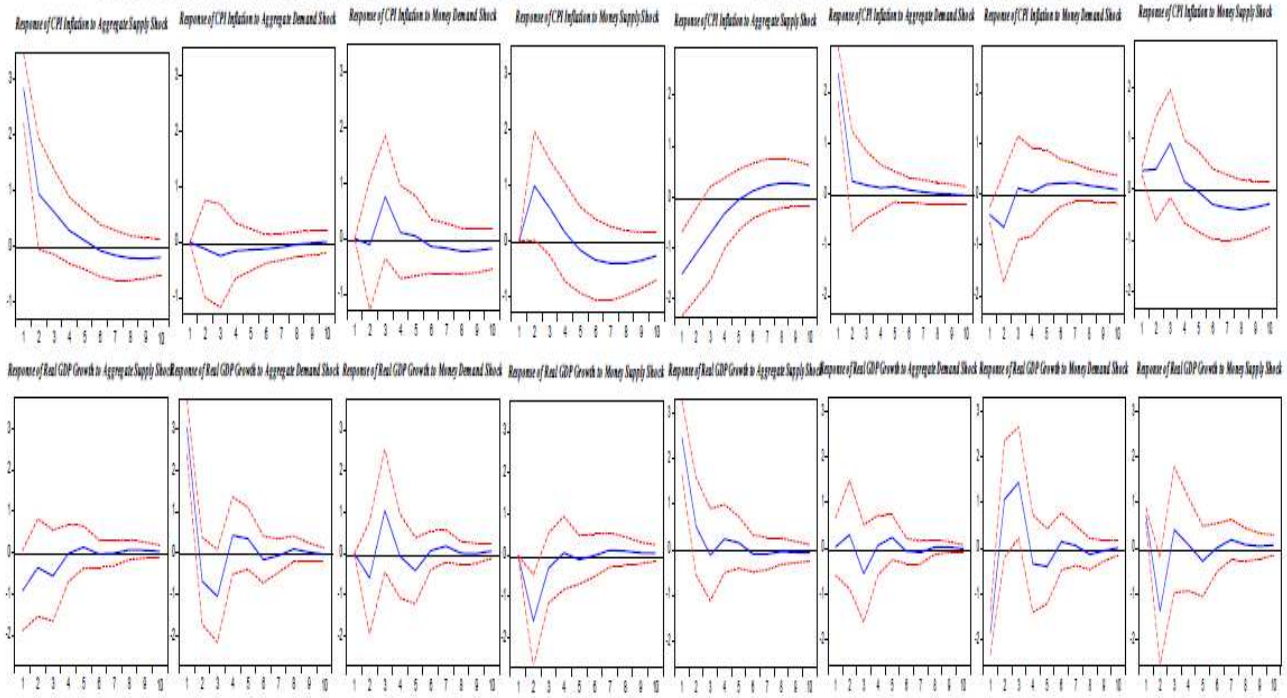


Figure A.1.2: Impulse Responses for Economy of Pakistan under Flexible Price Restrictions

Figure A.1.3: Impulse Responses for Economy of Turkey under Fixed Price Restrictions

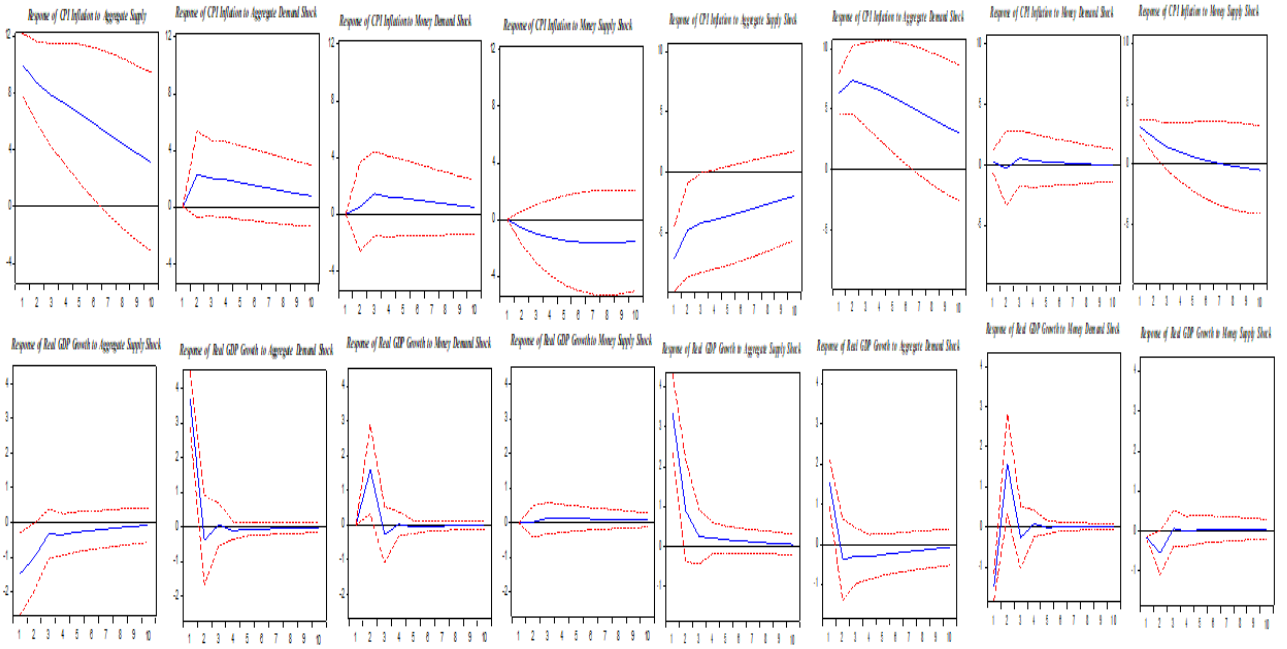


Figure A.1.4: Impulse Responses for Economy of Turkey under Flexible Price Restrictions

Figure A.1.5: Impulse Responses for Economy of South-Korea under Fixed Price Restrictions

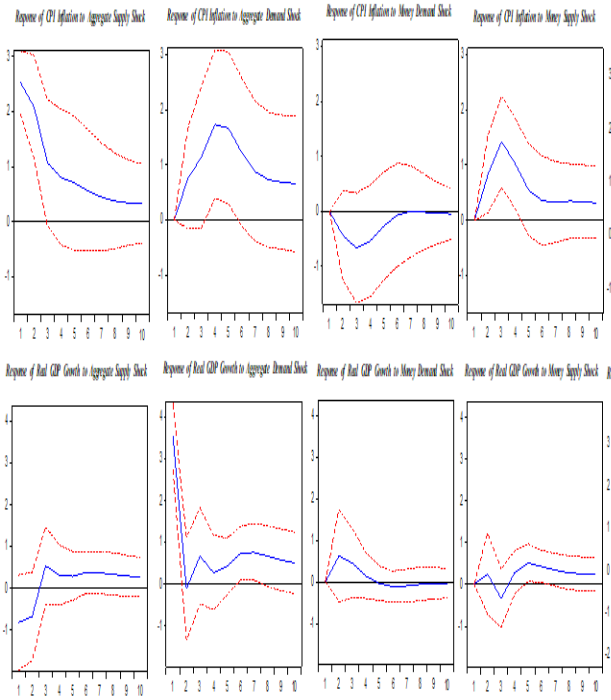


Figure A.1.6: Impulse Responses for Economy of South-Korea under Flexible Price Restrictions

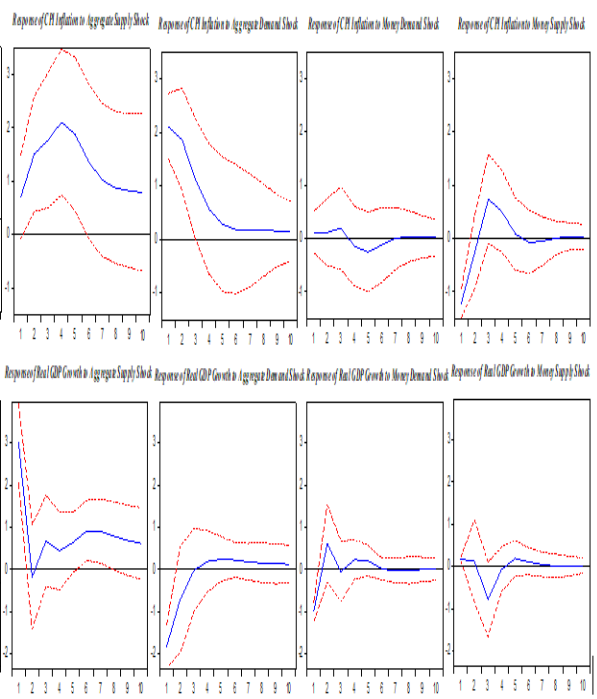


Figure A.1.7: Impulse Responses for Economy of Canada under Fixed Price Restrictions

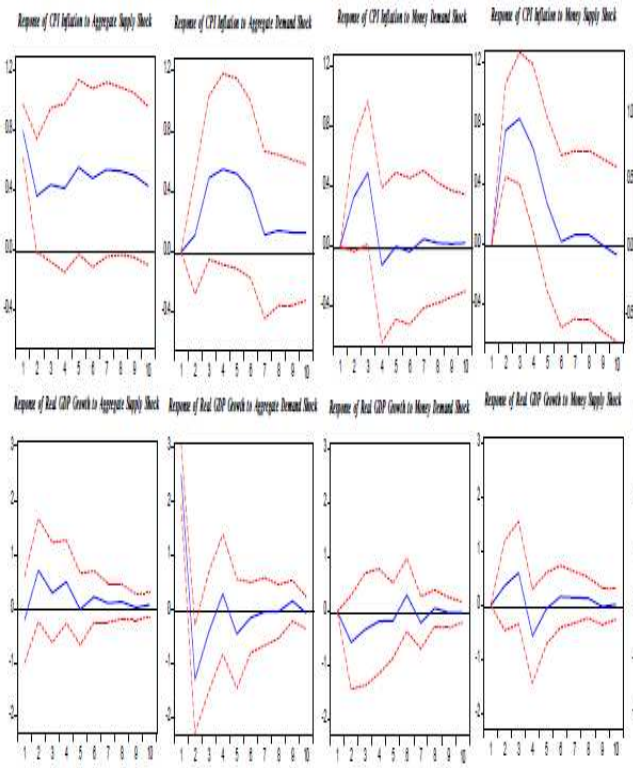


Figure A.1.8: Impulse Responses for Economy of Canada under Flexible Price Restrictions

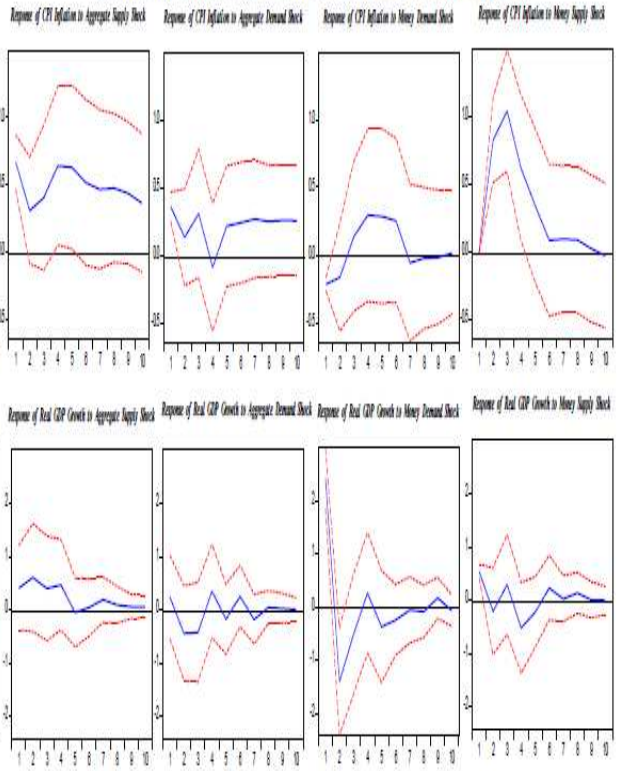


Figure A.1.9: Impulse Responses for Economy of U.K. under Fixed Price Restrictions

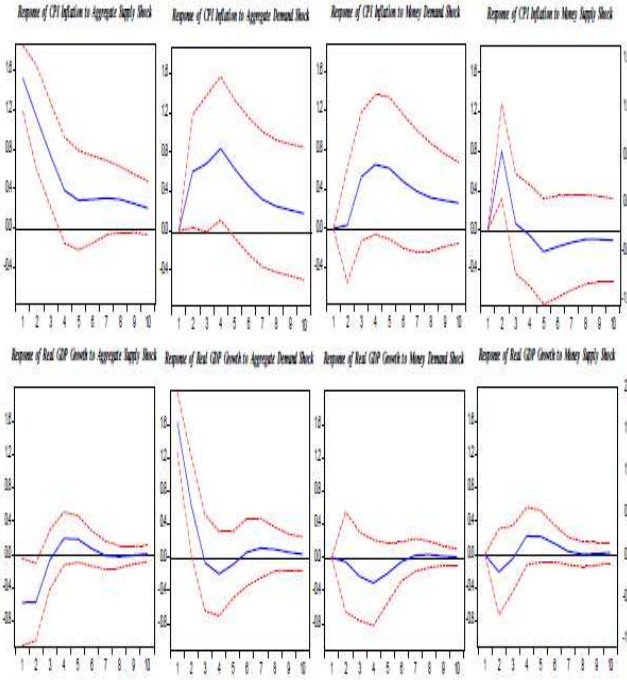


Figure A.1.10: Impulse Responses for Economy of U.K. under Flexible Price Restrictions

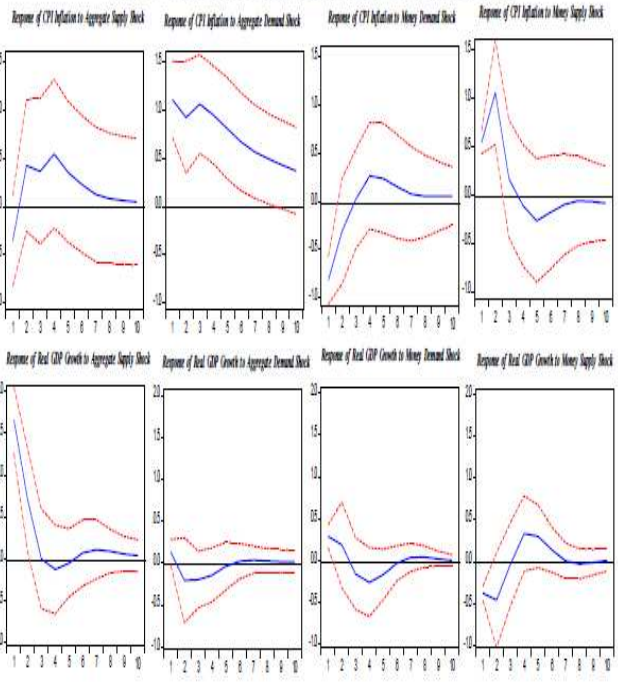


Figure A.1.11: Impulse Responses for Economy of U.S. under Fixed Price Restrictions

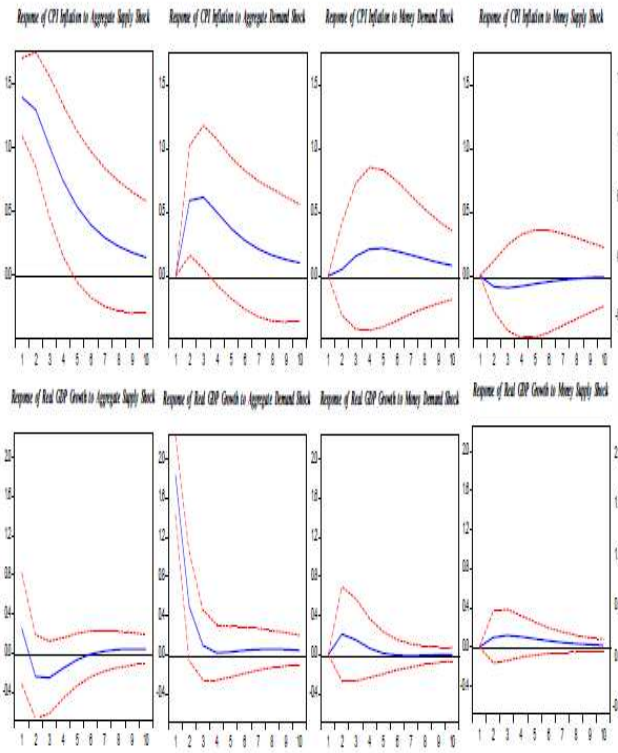
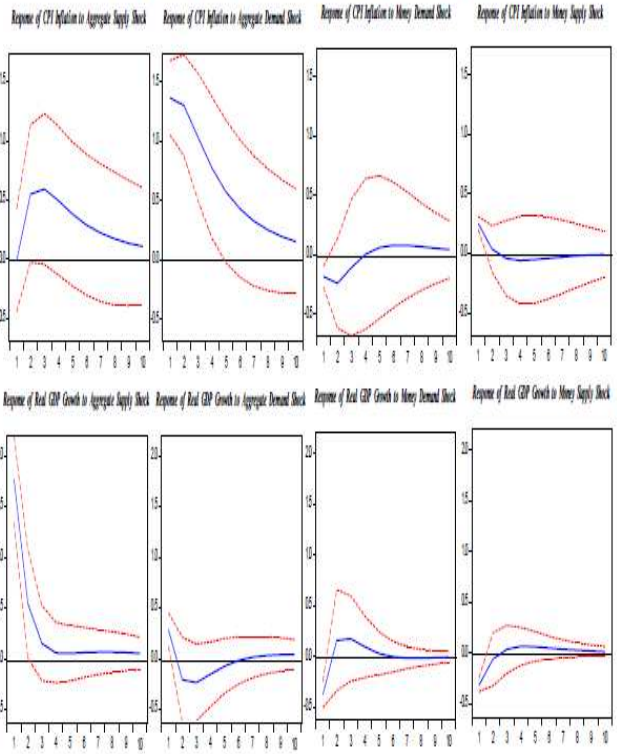


Figure A.1.12: Impulse Responses for Economy of U.S. under Flexible Price Restrictions



Appendix A.3.2: Variance Decomposition Analysis

Table A.3.1: Variance Decomposition for Economy of Pakistan

Variance Decomposition under Fixed Price Setting for CPI of Pakistan					Variance Decomposition under Fixed Price Setting for Real GDP of Pakistan			
Period	AS Shock	AD Shock	MD Shock	MS Shock	AS Shock	AD Shock	MD Shock	MS Shock
1	100	0	0	0	8.35	91.64	0.00	0.00
2	90.02	0.14	0.09	9.73	7.18	71.81	2.52	18.46
3	82.63	0.63	5.08	11.67	7.94	67.10	8.89	16.05
...	...	...	...	...	...	...	...	...
8	78.28	1.13	5.65	14.92	7.79	66.63	9.84	15.71
9	77.31	1.11	5.90	15.67	7.81	66.60	9.84	15.73
10	76.73	1.10	6.08	16.08	7.81	66.57	9.86	15.74
Variance Decomposition under Flexible Price Setting for CPI of Pakistan					Variance Decomposition under Flexible Price Setting for Real GDP of Pakistan			
Period	AS Shock	AD Shock	MD Shock	MS Shock	AS Shock	AD Shock	MD Shock	MS Shock
1	28.01	68.28	2.01	1.68	60.37	0.01	34.20	5.41
2	35.08	56.07	5.85	2.99	47.02	0.67	34.13	18.16
3	35.34	49.61	5.26	9.77	39.54	2.49	41.67	16.27
...	...	...	...	...	...	...	...	...
8	34.91	46.53	6.21	12.34	38.68	2.84	42.00	16.46
9	34.88	45.73	6.24	13.13	38.68	2.85	42.00	16.46
10	34.91	45.22	6.23	13.62	38.68	2.84	41.97	16.48

Table A.3.2: Variance Decomposition for Economy of Turkey

Variance Decomposition under Fixed Price Setting for CPI of Turkey					Variance Decomposition under Fixed Price Setting for Real GDP of Turkey			
Period	AS Shock	AD Shock	MD Shock	MS Shock	AS Shock	AD Shock	MD Shock	MS Shock
1	100.00	0.00	0.00	0.00	13.99	86.00	0.00	0.00
2	96.69	2.96	0.15	0.18	16.49	70.31	13.18	0.01
3	94.68	3.80	0.97	0.53	16.90	69.56	13.43	0.09
...	...	...	...	...	...	...	...	...
8	90.68	4.82	1.66	2.81	18.07	68.30	13.20	0.42
9	90.22	4.84	1.68	3.24	18.10	68.23	13.19	0.46
10	89.81	4.84	1.69	3.63	18.12	68.19	13.18	0.49
Variance Decomposition under Flexible Price Setting for CPI of Turkey					Variance Decomposition under Flexible Price Setting for Real GDP of Turkey			
Period	AS Shock	AD Shock	MD Shock	MS Shock	AS Shock	AD Shock	MD Shock	MS Shock
1	50.51	40.03	0.07	9.37	70.47	15.10	14.24	0.18
2	40.15	51.87	0.08	7.87	61.05	13.00	24.26	1.67
3	36.05	57.25	0.19	6.49	60.67	13.28	24.35	1.67
...	...	...	...	...	...	...	...	...
8	31.84	64.09	0.15	3.90	60.05	14.35	23.91	1.68
9	31.71	64.34	0.15	3.78	60.02	14.39	23.88	1.69
10	31.64	64.48	0.14	3.72	59.99	14.41	23.87	1.70

Table A.3.3: Variance Decomposition for Economy of South-Korea

Variance Decomposition under Fixed Price Setting for CPI of Korea					Variance Decomposition under Fixed Price Setting for Real GDP of Korea			
Period	AS Shock	AD Shock	MD Shock	MS Shock	AS Shock	AD Shock	MD Shock	MS Shock
1	100.00	0.00	0.00	0.00	4.98	95.01	0.00	0.00
2	88.19	4.60	1.58	5.62	7.85	88.89	2.80	0.45
3	69.57	10.83	3.70	15.88	9.19	85.69	3.94	1.16
...	...	...	...	...	...	...	...	...
8	46.39	35.26	3.37	14.97	10.84	80.75	3.50	4.89
9	45.70	35.98	3.29	15.01	11.04	80.43	3.41	5.10
10	45.11	36.62	3.23	15.01	11.18	80.16	3.35	5.29
Variance Decomposition under Flexible Price Setting for CPI of Korea					Variance Decomposition under Flexible Price Setting for Real GDP of Korea			
Period	AS Shock	AD Shock	MD Shock	MS Shock	AS Shock	AD Shock	MD Shock	MS Shock
1	7.63	69.18	0.20	22.98	67.38	24.87	7.50	0.22
2	22.55	64.66	0.21	12.56	63.21	26.79	9.66	0.32
3	34.12	53.38	0.35	12.13	61.76	24.91	9.01	4.31
...	...	...	...	...	...	...	...	...
8	58.98	32.56	0.55	7.89	66.52	21.65	7.95	3.86
9	59.84	31.89	0.54	7.71	67.29	21.19	7.74	3.76
10	60.58	31.31	0.53	7.56	67.87	20.84	7.59	3.68

Table A.3.4: Variance Decomposition for Economy of Canada

Variance Decomposition under Fixed Price Setting for CPI of Canada					Variance Decomposition under Fixed Price Setting for Real GDP of Canada			
Period	AS Shock	AD Shock	MD Shock	MS Shock	AS Shock	AD Shock	MD Shock	MS Shock
1	100	0.00	0.00	0.00	0.69	99.30	0.00	0.00
2	52.21	0.83	7.61	39.33	6.06	88.93	3.58	1.41
3	33.52	8.95	12.48	45.03	6.50	84.02	4.47	4.99
...	...	...	...	...	...	...	...	...
8	41.24	19.13	6.94	32.67	8.70	77.40	5.84	8.04
9	43.70	18.52	6.62	31.14	8.68	77.45	5.83	8.02
10	45.29	18.15	6.40	30.14	8.72	77.42	5.83	8.02
Variance Decomposition under Flexible Price Setting for CPI of Canada					Variance Decomposition under Flexible Price Setting for Real GDP of Canada			
Period	AS Shock	AD Shock	MD Shock	MS Shock	AS Shock	AD Shock	MD Shock	MS Shock
1	71.63	20.73	7.60	0.02	2.73	0.92	91.71	4.63
2	37.67	10.22	5.26	46.83	6.08	2.78	87.32	3.80
3	25.23	8.68	3.37	62.70	7.33	4.42	83.81	4.42
...	...	...	...	...	...	...	...	...
8	41.81	9.25	6.19	42.72	9.03	6.29	77.09	7.58
9	43.32	10.03	5.91	40.72	9.04	6.28	77.11	7.56
10	44.12	10.83	5.71	39.32	9.06	6.28	77.10	7.55

Table A.3.5: Variance Decomposition for Economy of U.K.

Variance Decomposition under Fixed Price Setting for CPI of U.K.					Variance Decomposition under Fixed Price Setting for Real GDP of U.K.			
Period	AS Shock	AD Shock	MD Shock	MS Shock	AS Shock	AD Shock	MD Shock	MS Shock
1	100.00	0.00	0.00	0.00	11.19	88.81	0.00	0.00
2	77.98	7.98	0.02	14.01	17.61	81.14	0.076	1.17
3	70.08	14.18	4.73	11.00	17.44	79.86	1.46	1.23
...	...	...	...	...	...	...	...	...
8	49.89	25.08	16.85	8.17	17.57	74.13	4.52	3.76
9	49.49	25.03	17.37	8.10	17.56	74.15	4.53	3.76
10	49.13	24.96	17.81	8.09	17.55	74.15	4.53	3.76
Variance Decomposition under Flexible Price Setting for CPI of U.K.					Variance Decomposition under Flexible Price Setting for Real GDP of U.K.			
Period	AS Shock	AD Shock	MD Shock	MS Shock	AS Shock	AD Shock	MD Shock	MS Shock
1	5.42	53.03	28.86	12.69	91.93	0.58	2.78	4.69
2	6.69	45.48	16.71	31.11	86.12	1.56	3.13	9.18
3	7.47	54.73	13.05	24.75	84.65	2.55	3.73	9.05
...	...	...	...	...	...	...	...	...
8	10.21	62.56	10.05	17.18	77.78	2.89	5.76	13.56
9	10.03	63.22	9.87	16.87	77.78	2.89	5.76	13.55
10	9.90	63.66	9.75	16.68	77.78	2.90	5.76	13.55

Table A.3.6: Variance Decomposition for Economy of U.S.

Variance Decomposition under Fixed Price Setting for CPI of U.S.					Variance Decomposition under Fixed Price Setting for Real GDP of U.S.			
Period	AS Shock	AD Shock	MD Shock	MS Shock	AS Shock	AD Shock	MD Shock	MS Shock
1	100.00	0.00	0.00	0.00	1.92	98.08	0.00	0.00
2	90.98	8.78	0.06	0.17	3.21	95.30	1.22	0.27
3	85.73	13.49	0.48	0.29	4.68	92.89	1.78	0.64
...	...	...	...	...	...	...	...	...
8	79.44	17.43	2.72	0.40	5.33	91.45	1.88	1.32
9	79.23	17.50	2.85	0.40	5.37	91.41	1.88	1.33
10	79.10	17.55	2.93	0.40	5.41	91.36	1.88	1.35
Variance Decomposition under Flexible Price Setting for CPI of U.S.					Variance Decomposition under Flexible Price Setting for Real GDP of U.S.			
Period	AS Shock	AD Shock	MD Shock	MS Shock	AS Shock	AD Shock	MD Shock	MS Shock
1	0.01	94.93	1.77	3.29	90.61	2.36	4.18	2.84
2	7.57	88.45	2.33	1.64	89.65	3.25	4.42	2.67
3	12.02	84.81	1.93	1.24	87.72	4.59	5.05	2.63
...	...	...	...	...	...	...	...	...
8	16.47	80.75	1.72	1.06	86.56	5.28	5.21	2.93
9	16.58	80.62	1.75	1.05	86.52	5.32	5.21	2.94
10	16.66	80.53	1.76	1.05	86.49	5.35	5.20	2.94