Output Composition of Monetary Policy Transmission in Pakistan

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Abstract

This paper employs an unrestricted vector autoregressive (VAR) model, identified using a recursive Cholesky decomposition, to examine the output composition of the monetary policy transmission mechanism in Pakistan. The results indicate that a contractionary monetary policy shock leads to a relatively larger decline in private consumption compared to private investment with a significant lag. Furthermore, preliminary analysis suggests that the consumption channel plays a more important role than investment channel in contributing to the output reactions resulting from policy rate (interbank rate) shocks during the period 1995Q3 2010Q2 analysed in this study.

Keywords

Monetary policy, output composition, consumption, investment

JEL Classification

E2, E52

1. Introduction

The monetary policy of a country plays a significant role in supporting the broader economic policies aimed at increasing the welfare of its population. Along these lines, the dual objectives of the monetary policy in Pakistan, operating under the purview of the State Bank of Pakistan (SBP), are to effectively achieve the annual inflation and output growth targets as set by the federal government.[2]

The superior objective of price stability by central banks has been argued by Bernanke (2007) and Rogroff (1985) as providing an essential complementarity to output growth by reducing distortions and uncertainty in the economy. However, there is also a general consensus on

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[2] See State Bank of Pakistan (SBP) Act of 1956

the economic phenomena that an increase in the interest rate - which is the main tool for implementing the monetary policy by most central banks, including the SBP – leads to a decrease in the economy's output (Sims 1980, Bernanke & Blinder, 1992 & Christiano et al, 1992). For example, by raising the interest rate, the aim is to decrease the excess demand for goods and services, mainly composed of consumption and investment, which is considered to be the primary driver of inflation in the economy. According to economic intuition, an increase in interest rate would increase the cost of borrowing, which would lead to a decline in private investment by firms. On the other side, consumers would be incentivized to save rather than spend currently – a decision known as intertemporal substitution.

It is widely considered that investment, being the more volatile of the two components, reacts more rapidly to a monetary policy shock. Interestingly, both sides of the coin have been examined in the economic literature by utilizing Vector Autoregressive (VAR) and/or Dynamic Stochastic General Equilibrium (DSGE) models. The relative importance of the two channels remains unique to various countries. While the investment channel has been found to be more predominant in countries like Japan (Fujiwara 2004) and Australia (Phan 2014), the United States presents an "Output Composition Puzzle" (Angeloni et al. 2003), as here the effects of monetary policy on output are mainly transmitted by the consumption channel.

It is in the above scenario that this paper finds its motivation and purpose, i.e. to investigate which of the two channels, private consumption or private investment, is predominant in transmitting the effects of monetary policy on output in Pakistan. This study is aimed to be an original and unique contribution to the academic literature on this subject, considering that no other research has been published specifically on the output composition of monetary policy transmission in Pakistan, to the best of my knowledge.

The remaining structure of the paper is as follows. Section 2 describes the methodology, including the variables, data and the VAR model being employed by this study and elaborates on the identification and ordering strategy. Section 3 presents the empirical results in the form of impulse responses, output composition analysis based on proportional and contribution effects, and finally a brief analysis of the variance decomposition. The last section concludes the study with thoughts on potential future extensions and areas of research.

2. Methodology

2.1. Variables:

This study will analyse the impacts of a monetary policy shock (i) in Pakistan on macroeconomic variables, including demand-side output components of private consumption (CONS) and private investment (INV), rest of the output components (OTHERS)[3], including government consumption, government investment and exports and imports of

[3] Calculated as Output (Y) – Consumption (CONS) – Investment (INV) = OTHERS

goods and services, and consumer price index CPI (P). Logs have been taken for values of variables CONS, INV, OTHERS and P, while interest rate is in percentage value.

2.2. Data

The SBP publishes GDP data on an annual rather than quarterly basis. Therefore, to support business cycle analysis, this study employs quarterly estimates of expenditure-side components of GDP, interpolated from SBP annual data by Hanif et al. (2013). Specifically, quarterly GDP data, based on current prices, from 1995Q3 till 2010Q2 has been used from the above publication. Quarterly CPI and interest rates (interbank rates) for the same time period have been taken from the International Financial Statistics (IFS) database.

2.3. The Unrestricted VAR Model

Following Erceg and Levin (2002), Angeloni et al (2003) and Fujiwara (2004), an unrestricted VAR model, identified using the ‘recursive’ Choleski decomposition, is utilized to analyse the impact of an interest rate (i) shock on output (Y) components, private consumption (CONS), private investment (INV) and CPI (P). There appears to be a lack of consensus in the economic literature on the transmission mechanism of monetary policy on macroeconomic variables in Pakistan, which allows this study to use an unrestricted approach to analyse the effects of its shocks on the economy (Agha et al 2005). This also implies the reactionary stance of monetary policy in Pakistan and its heavy dependence on developments in macroeconomic variables.

The Cholesky ordering of the variables is based on the assumption that a shock to the interest rate - the variable placed at the end - does not contemporaneously affect the output component variables and CPI included in this model. It further implies that the SBP has current information on all the above variables in its information set, while setting the interest rate. Compared to Erceg and Levin (2002), commodity prices are not included in analysing this VAR model.

Following Phan (2014), the VAR model with recursive identification, can generally be written as the following equation:

$$Y_t = A_0 + A_1 Y_{t-1} + \ldots + A_p Y_{t-p} + e_t \qquad (1)$$

$$e_t = B\varepsilon_t \qquad (2)$$

Where Y represents a vector of endogenous variables in this model including CONS, INV, P and I; $A_1 \ldots A_p$ are matrices of parameters, A_0 is the vector of constant terms and e is the vector of error terms; ε is a vector of uncorrelated shocks and B is an identity (5x5), lower triangular matrix with all diagonal terms equal to 1.

$$
e_t = \begin{bmatrix} e_{cons} \\ e_{inv} \\ e_{others} \\ e_p \\ e_i \end{bmatrix} \qquad B = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ t_{21} & 1 & 0 & 0 & 0 \\ t_{31} & t_{32} & 1 & 0 & 0 \\ t_{41} & t_{42} & t_{43} & 1 & 0 \\ t_{51} & t_{52} & t_{53} & t_{54} & 1 \end{bmatrix} \qquad \varepsilon = \begin{bmatrix} \varepsilon_{cons} \\ \varepsilon_{inv} \\ \varepsilon_{others} \\ \varepsilon_p \\ \varepsilon_i \end{bmatrix}
$$

This study chooses a lag length of one quarter as per the given Schwarz Information Criterion (SIC) (Table 1). This appears to be consistent with the optimal lag length chosen for analysing a small, open and dynamic economy and helps in avoiding degree of freedom issues by including more lags (Agha et al 2005). Furthermore, a VAR stability test has also been conducted, which satisfies the VAR stability condition as no root lies outside the unit circle (Table 2).

3. Results

3.1. Impulse responses:

The unrestricted, recursive VAR model, as described above, is estimated for the period from 1995Q3 till 2010Q2. The solid blue lines in figure 1 and figure 2 represent the responses, while the dashed red lines represent the error band.

Figure 1 shows the impulse responses to a shock in the policy rate (interbank rate). The responses of private consumption, private investment, other GDP components and CPI (prices) are illustrated to a Cholesky one standard deviation innovation. A positive 10 basis point (or 1%), contractionary monetary policy shock, causes a noticeable decrease in both private consumption and private investment. Both responses are observed to remain below zero with very significant lags and do not return to their steady state levels when a 20 period (almost 2 years) analysis is taken. It is, however, noteworthy that both variables return to their steady state levels at around a 200 period analysis (Figure 2).

In the case of other output components, figure 1 implies a sharp increase of around 1% by the 2nd quarter, before decreasing to a below zero level by the 3rd quarter. The response of this variable remains negative with a significant lag till gradually levelling back to steady state at around the 125th quarter (Figure 2). This phenomena may be explained through economic theory that when interest rates increase in the domestic market, it becomes more attractive for foreign investors to buy domestic assets, which leads to an appreciation of the local currency relative to foreign currency. This in turn makes exports more expensive and leads to a decline in net exports. This explanation may be appropriate considering the relatively poor export performance of Pakistan, often attributed to an appreciation of the Pakistani rupee as well other deep-rooted structural challenges in the economy (Sherani 2015). However, further decomposition of the other output components included in this model is required for a more explicit analysis.

The response of prices to a positive interest rate shock is also observed to be negative at around 3% and no 'price puzzle' is observed. A 'price puzzle' is defined as a tendency for the price level to increase after a positive interest rate shock (Hanson 2004). CPI reaches its peak decline to around 3% by the 3rd quarter as shown in Figure 1. Furthermore, it returns to its steady state levels by the 40th quarter, which implies decrease with a significant lag.

3.2. Output Composition

3.2.1. Proportional Effect:

As mentioned earlier, the responses of both private consumption and private investment are similar to a Cholesky one standard deviation innovation (Figure 1). Both variables decrease below zero from their steady state values. To present a relative proportional effect, a 10 basis point (1%) increase in the interbank rate in Pakistan leads to a peak decline of about 2% in consumption by the 2nd quarter, while investment declines to a maximum of about 1% and plateaus from 4th till 6th quarter apparently. It is also noteworthy that consumption declines slightly more sharply than investment. Although the difference in the percentage decrease between both variables is not significantly large, it still appears that consumption is proportionally more responsive to a shock in interest rate as compared to investment in Pakistan. Furthermore, consumption also tends to stay negative slightly longer than investment, which appears to be consistent with a deeper peak decline in consumption as compared to investment (Figure 2).

3.2.2. Contribution Effect:

Angeloni et al (2003), Fujiwara (2004) and Phan (2013) present a computational method to assess the overall magnitude of monetary policy shocks on output contributed through consumption and investment channels separately. Considering the extensive analysis involved, this study proposes examining its results by employing the above empirical method in further future research.

However, in order to make some preliminary analysis about each variable's contribution effect, it appears from the most recent figures in our data from 1995Q3 till 2010Q2, that total consumption is approximately a six times larger component of output in Pakistan than total investment. However, if we compare the sub-variables of private consumption and private investment, the former appears to be about fifteen times larger than the latter.

Considering that the elasticity of consumption, as analysed in the proportional effects is larger than that of investment, and that its share is also larger in the total GDP, it appears that consumption is more likely to be the predominant channel contributing to output reactions in response to a monetary policy shock in Pakistan.[4] Hence, apparently pointing towards an "output composition puzzle".

3.3. Variance Decomposition:

Table 4 presents variance decompositions for each variable in this VAR model under consideration, namely private consumption (CONS), private investment (INV), other output components (OTHERS), CPI (P) and interest rate (i) through a period of one to five years (or 20 quarters). The decompositions imply the share of variance or fluctuations in each variable caused by various shocks. For example in the short run, in quarter 4 (or year 1), a shock to private consumption accounts for 86.5% variance of the fluctuation in GDP. Similarly, a shock to private investment accounts for 1.05%, a shock to others causes 6.97%, a shock to CPI accounts for 0.0046% and a shock to interest rate causes 0.58% variance of the fluctuation in GDP, respectively. Thereby, bringing the total sum of the row to 100%.

4. Conclusion

The study is proposed to be an attempt to examine the output composition of the monetary policy transmission mechanism in Pakistan, by using an unrestricted VAR model, based on the recursive identification of the Cholesky decomposition. The results indicate the consumption channel in Pakistan is the predominant transmitter of monetary policy shocks, relative to investment, on the output reactions. It is recommended that a more definite, empirical analysis of the overall contribution of both channels be carried out as an extension of this research in the future to answer the apparent "output composition puzzle" in Pakistan's case. Additionally, the exercise is proposed to be carried out again by employing the recent most data (as and when available), to gain insight into the present scenario of output composition of monetary policy transmission in Pakistan.

[4] ***Approximate estimations (Following IDEC8012 Lecture on 15/08/2016):***
2% response of consumption to a 1% positive shock in monetary policy x 6 (size relative to investment in GDP) = 8% reduction in consumption to a 1% positive shock in monetary policy

Appendix

Table 1: VAR Lag Length Selection Criteria

VAR Lag Order Selection Criteria
Endogenous variables: LCONS LINV LOTHERS LP I
Exogenous variables: C
Date: 10/18/16 Time: 15:09
Sample: 1995Q3 2010Q2
Included observations: 55

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-166.5321	NA	0.000352	6.237530	6.420014	6.308098
1	-30.48873	242.4045	6.23e-06	2.199590	**3.294499***	2.623000
2	12.04409	68.05252	3.37e-06	1.562033	3.569366	2.338285
3	39.52688	38.97560	3.27e-06	1.471750	4.391507	2.600843
4	94.06132	67.42440*	1.26e-06*	0.397770	4.229952	1.879706*
5	124.1963	31.77868	1.28e-06	0.211044*	4.955650	2.045822

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

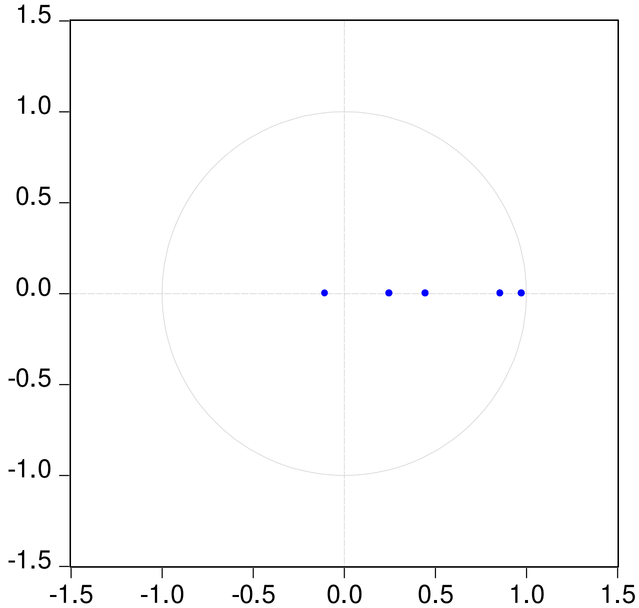
Table 2: VAR Stability Test

Roots of Characteristic Polynomial
Endogenous variables: LCONS LINV LOTHERS
LP I
Exogenous variables: C
Lag specification: 1 1
Date: 10/20/16   Time: 11:29

Root	Modulus
0.976279	0.976279
0.858378	0.858378
0.447727	0.447727
0.249094	0.249094
-0.103070	0.103070

No root lies outside the unit circle.
VAR satisfies the stability condition.

Inverse Roots of AR Characteristic Polynomial



<u>Figure 1:</u> Response to Cholesky One S.D. Innovations ± 2 S.E.

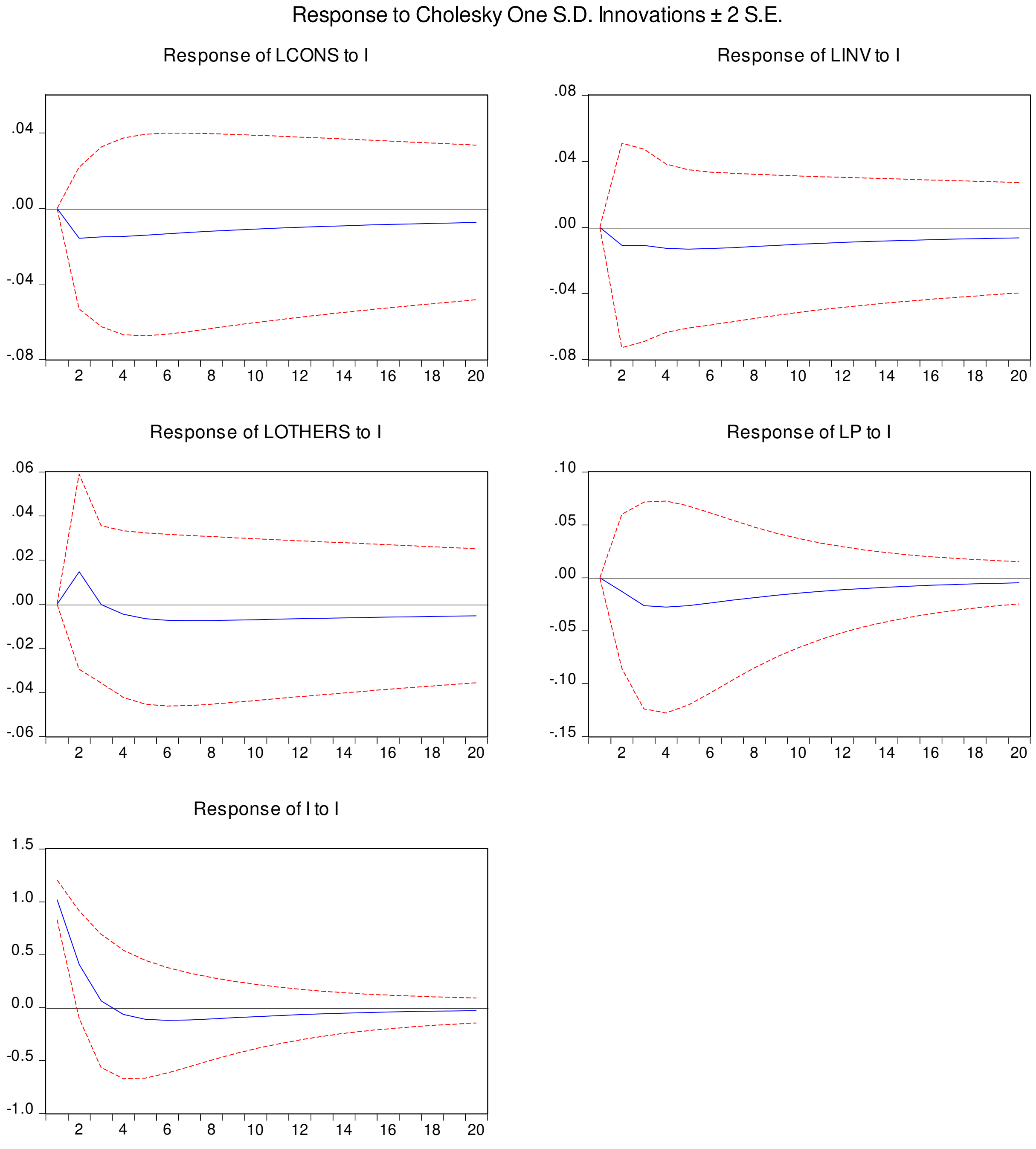


Table 3: Vector Autoregression Estimates

Vector Autoregression Estimates
Date: 10/18/16 Time: 13:49
Sample (adjusted): 1995Q4 2010Q2
Included observations: 59 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	LCONS	LINV	LOTHERS	LP	I
LCONS(-1)	0.739426	0.337595	0.662047	0.075682	1.007341
	(0.09014)	(0.14871)	(0.10624)	(0.17508)	(1.20688)
	[8.20270]	[2.27017]	[6.23134]	[0.43227]	[0.83467]
LINV(-1)	0.019562	0.298225	-0.019862	0.312097	1.663354
	(0.08548)	(0.14101)	(0.10074)	(0.16601)	(1.14437)
	[0.22886]	[2.11496]	[-0.19715]	[1.87996]	[1.45351]
LOTHERS(-1)	0.298594	0.259921	0.135280	-0.362276	-2.655314
	(0.10111)	(0.16680)	(0.11917)	(0.19638)	(1.35371)
	[2.95311]	[1.55826]	[1.13517]	[-1.84476]	[-1.96151]
LP(-1)	0.093594	0.139107	-0.163584	0.854542	2.195327
	(0.11634)	(0.19193)	(0.13712)	(0.22596)	(1.55764)
	[0.80446]	[0.72478]	[-1.19297]	[3.78176]	[1.40939]
I(-1)	-0.015462	-0.010754	0.014471	-0.012735	0.400935
	(0.01839)	(0.03034)	(0.02168)	(0.03572)	(0.24625)
	[-0.84066]	[-0.35443]	[0.66754]	[-0.35649]	[1.62819]
C	-0.352753	-0.313394	2.075414	0.426222	1.515927
	(0.58615)	(0.96697)	(0.69085)	(1.13844)	(7.84760)
	[-0.60181]	[-0.32410]	[3.00416]	[0.37439]	[0.19317]
R-squared	0.927362	0.743192	0.845052	0.736082	0.676938
Adj. R-squared	0.920510	0.718965	0.830434	0.711184	0.646461
Sum sq. resids	1.335530	3.634561	1.855202	5.037885	239.3882
S.E. equation	0.158741	0.261871	0.187093	0.308309	2.125267
F-statistic	135.3297	30.67593	57.81009	29.56393	22.21105
Log likelihood	28.03480	-1.499427	18.33917	-11.13112	-125.0336
Akaike AIC	-0.746943	0.254218	-0.418277	0.580716	4.441816
Schwarz SC	-0.535668	0.465493	-0.207002	0.791991	4.653091
Mean dependent	13.87347	11.08609	12.49503	2.041109	8.718079
S.D. dependent	0.563030	0.493978	0.454348	0.573687	3.574329

Determinant resid covariance (dof adj.)	4.31E-06
Determinant resid covariance	2.52E-06
Log likelihood	-38.29499
Akaike information criterion	2.315085
Schwarz criterion	3.371460

<u>Figure 2:</u> Response to Cholesky One S.D. Innovations ± 2 S.E.

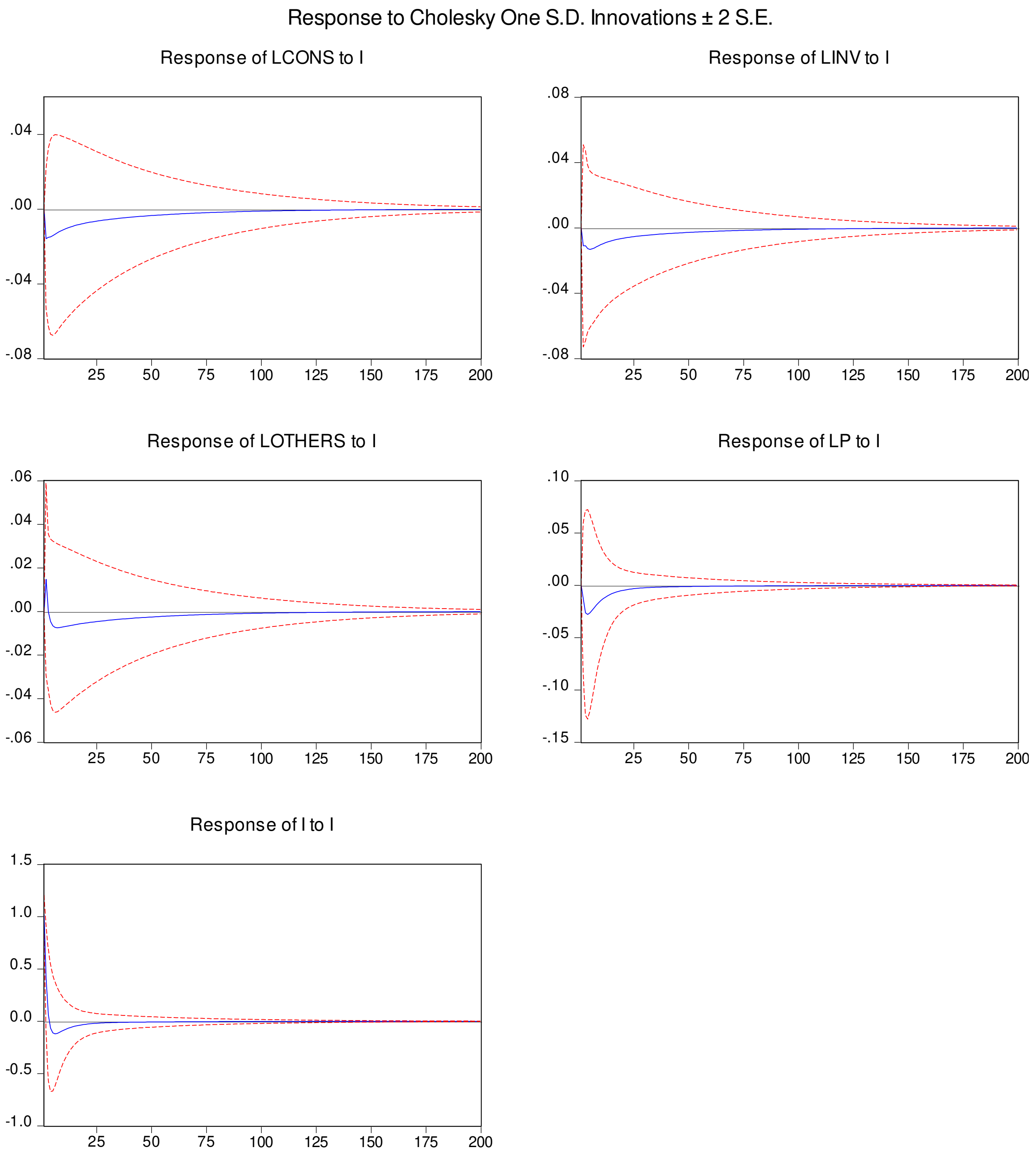


Figure 3: Variance Decomposition Graphs

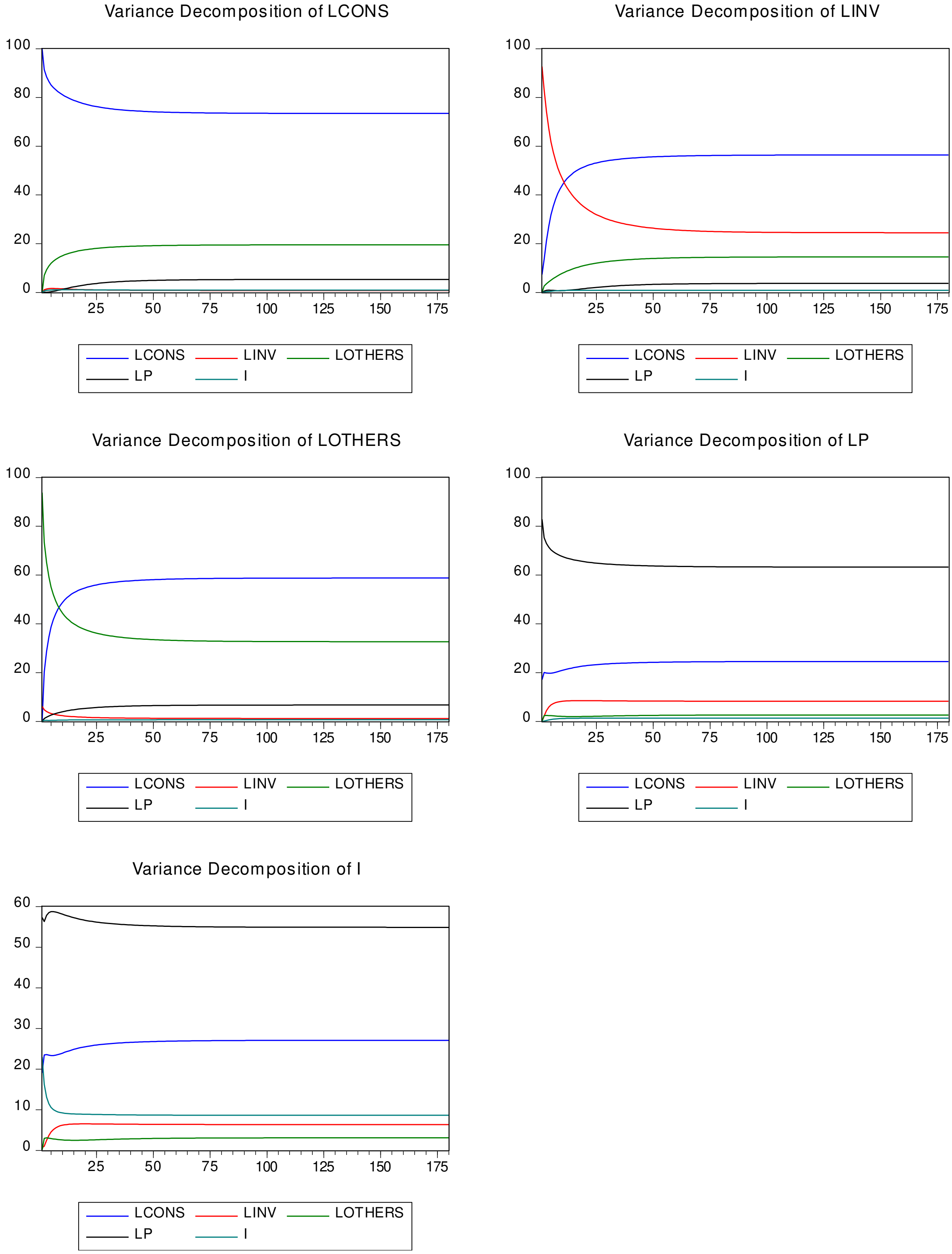


Table 4: Variance Decomposition Tables

Variance Decomposition of LCONS: Period	S.E.	LCONS	LINV	LOTHERS	LP	I
1	0.158741	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.205250	91.38200	1.051991	6.971535	0.004637	0.589838
3	0.240943	88.44668	1.413222	9.289727	0.034755	0.815618
4	**0.270160**	**86.51787**	**1.569557**	**10.84577**	**0.118815**	**0.947993**
5	0.295083	85.14473	1.619371	11.96250	0.250041	1.023363
6	0.316871	84.06972	1.617320	12.83053	0.416293	1.066132
7	0.336240	83.17876	1.589566	13.53558	0.606818	1.089277
8	0.353668	82.41204	1.549563	14.12535	0.812703	1.100344
9	0.369490	81.73600	1.504454	14.62878	1.026907	1.103865
10	0.383956	81.13044	1.458110	15.06480	1.244013	1.102643
11	0.397254	80.58237	1.412630	15.44659	1.459958	1.098457
12	0.409532	80.08292	1.369118	15.78373	1.671770	1.092459
13	0.420909	79.62566	1.328113	16.08349	1.877335	1.085403
14	0.431483	79.20567	1.289827	16.35149	2.075217	1.077791
15	0.441335	78.81902	1.254284	16.59225	2.264492	1.069956
16	0.450535	78.46244	1.221403	16.80941	2.444634	1.062119
17	0.459140	78.13314	1.191045	17.00598	2.615409	1.054426
18	0.467202	77.82870	1.163046	17.18448	2.776805	1.046970
19	0.474765	77.54695	1.137230	17.34704	2.928964	1.039809
20	0.481870	77.28599	1.113425	17.49547	3.072144	1.032976

Variance Decomposition of LINV: Period	S.E.	LCONS	LINV	LOTHERS	LP	I
1	0.261871	7.277625	92.72238	0.000000	0.000000	0.000000
2	0.293093	13.54511	83.14765	2.616756	0.550557	0.139926
3	0.313744	21.27471	74.14286	3.527694	0.810639	0.244107
4	0.331168	27.25259	67.18310	4.317407	0.880732	0.366174
5	0.346355	31.83964	61.80248	5.024048	0.855826	0.478001
6	0.359811	35.41906	57.53217	5.677330	0.801147	0.570287
7	0.371894	38.27562	54.04832	6.283348	0.750224	0.642481
8	0.382862	40.59802	51.14047	6.845650	0.718244	0.697609
9	0.392901	42.51411	48.66902	7.367103	0.710497	0.739264
10	0.402154	44.11372	46.53811	7.850422	0.727148	0.770596
11	0.410726	45.46225	44.67956	8.298216	0.765871	0.794103
12	0.418702	46.60873	43.04329	8.712994	0.823299	0.811688
13	0.426147	47.59074	41.59152	9.097155	0.895806	0.824784
14	0.433115	48.43759	40.29504	9.452982	0.979922	0.834465

15	0.439651	49.17248	39.13082	9.782630	1.072525	0.841542
16	0.445793	49.81396	38.08036	10.08813	1.170923	0.846628
17	0.451572	50.37700	37.12859	10.37136	1.272857	0.850189
18	0.457016	50.87377	36.26307	10.63410	1.376476	0.852580
19	0.462150	51.31425	35.47340	10.87797	1.480297	0.854077
20	0.466995	51.70665	34.75083	11.10448	1.583151	0.854891

Variance Decomposition of LOTHERS:

Period	S.E.	LCONS	LINV	LOTHERS	LP	I
1	0.187093	0.033436	6.175114	93.79145	0.000000	0.000000
2	0.213302	20.20162	4.751401	73.44219	1.126419	0.478376
3	0.232410	28.75027	4.055684	65.08636	1.704682	0.403012
4	0.249098	34.59458	3.581600	59.26347	2.176250	0.384099
5	0.263948	38.69974	3.239532	55.08735	2.569476	0.403896
6	0.277346	41.75753	2.977146	51.92069	2.909951	0.434681
7	0.289540	44.12071	2.767744	49.43616	3.210394	0.464994
8	0.300710	45.99875	2.595893	47.43529	3.478771	0.491300
9	0.310990	47.52355	2.451980	45.79086	3.720453	0.513153
10	0.320490	48.78299	2.329600	44.41701	3.939334	0.531070
11	0.329298	49.83809	2.224258	43.25350	4.138397	0.545755
12	0.337485	50.73271	2.132673	42.25673	4.320021	0.557857
13	0.345113	51.49918	2.052380	41.39437	4.486163	0.567905
14	0.352235	52.16186	1.981478	40.64187	4.638471	0.576319
15	0.358896	52.73944	1.918479	39.98031	4.778354	0.583423
16	0.365135	53.24646	1.862193	39.39483	4.907038	0.589471
17	0.370987	53.69444	1.811661	38.87364	5.025594	0.594660
18	0.376482	54.09256	1.766096	38.40723	5.134968	0.599143
19	0.381649	54.44823	1.724852	37.98788	5.235999	0.603044
20	0.386511	54.76750	1.687385	37.60922	5.329437	0.606460

Variance Decomposition of LP:

Period	S.E.	LCONS	LINV	LOTHERS	LP	I
1	0.308309	17.07808	0.016587	0.012304	82.89303	0.000000
2	0.410493	20.03155	2.189553	2.355496	75.32337	0.100031
3	0.470819	19.79478	4.438064	2.430314	72.94974	0.387106
4	0.511286	19.70582	5.850372	2.390620	71.43101	0.622172
5	0.539408	19.76813	6.735183	2.319871	70.38032	0.796493
6	0.559394	19.93300	7.305594	2.248200	69.59112	0.922086

7	0.573822	20.15490	7.685481	2.182884	68.96380	1.012932
8	0.584365	20.40468	7.944866	2.126249	68.44474	1.079470
9	0.592154	20.66414	8.124958	2.078883	68.00311	1.128907
10	0.597969	20.92204	8.251152	2.040656	67.62001	1.166134
11	0.602358	21.17152	8.339780	2.011076	67.28313	1.194490
12	0.605711	21.40856	8.401726	1.989456	66.98397	1.216293
13	0.608307	21.63099	8.444455	1.975006	66.71636	1.233179
14	0.610348	21.83792	8.473207	1.966900	66.47564	1.246330
15	0.611980	22.02924	8.491724	1.964311	66.25812	1.256610
16	0.613308	22.20537	8.502718	1.966445	66.06080	1.264663
17	0.614411	22.36707	8.508176	1.972560	65.88122	1.270975
18	0.615343	22.51528	8.509566	1.981974	65.71726	1.275918
19	0.616146	22.65102	8.507980	1.994075	65.56714	1.279779
20	0.616851	22.77535	8.504235	2.008321	65.42932	1.282780

Variance Decomposition of I:

Period	S.E.	LCONS	LINV	LOTHERS	LP	I
1	2.125267	19.05419	0.630091	0.004877	57.29920	23.01165
2	2.724267	23.45530	1.033422	2.949885	56.30541	16.25599
3	3.043392	23.55543	2.478360	3.073028	57.82598	13.06720
4	3.258545	23.40064	3.667323	3.013893	58.47902	11.43912
5	3.410125	23.30397	4.523285	2.913207	58.70862	10.55092
6	3.519061	23.31329	5.119399	2.816814	58.72475	10.02575
7	3.598297	23.40530	5.534681	2.733712	58.63278	9.693524
8	3.656506	23.55136	5.826253	2.664903	58.48517	9.472324
9	3.699677	23.72861	6.032652	2.609354	58.31000	9.319383
10	3.732012	23.92089	6.179641	2.565629	58.12331	9.210532
11	3.756492	24.11729	6.284623	2.532299	57.93462	9.131167
12	3.775250	24.31075	6.359538	2.508034	57.74968	9.071993
13	3.789823	24.49688	6.412716	2.491610	57.57192	9.026876
14	3.801319	24.67311	6.450057	2.481914	57.40326	8.991660
15	3.810545	24.83814	6.475790	2.477932	57.24466	8.963482
16	3.818085	24.99149	6.492982	2.478754	57.09643	8.940347
17	3.824367	25.13325	6.503878	2.483565	56.95845	8.920859
18	3.829700	25.26383	6.510129	2.491647	56.83036	8.904031
19	3.834314	25.38388	6.512959	2.502369	56.71162	8.889172
20	3.838374	25.49411	6.513279	2.515182	56.60164	8.875790

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