

CHAPTER 9

INTERVENTION ANALYSIS THROUGH THE STUDY OF VARIANCE DECOMPOSITION

9.1 Introduction

While *Impulse Response Functions* trace the effects of a shock to one endogenous variable on the other variables in the **VAR Model**, *Variance Decomposition* separates the variations in an endogenous variable into the component shocks. Thus the *Variance Decomposition* provides information about the relative importance of each random innovation in affecting the endogenous variables in the **VAR System**.

The *Forecast Error Variance Decomposition* reflects the proportion of forecast error variance of a variable which is explained by an unanticipated change in itself as opposed to that proportion attributable to change in other, perhaps interrelated variables. In other words, the *Forecast Error Variance Decomposition* tells us the proportion of the movement in a sequence due to its own shocks versus shocks of the other variables.

9.2 Variance Decomposition Tables and Figures

The variance decompositions of exchange rate and money supply variances over 20 quarters are being presented through the Tables 9.1 and 9.2 shown below. Graphical presentations of such decompositions are shown by the Figures 9.1 and 9.2.

Figure 9.1
Graphical Presentation of Variance Decomposition of E_t

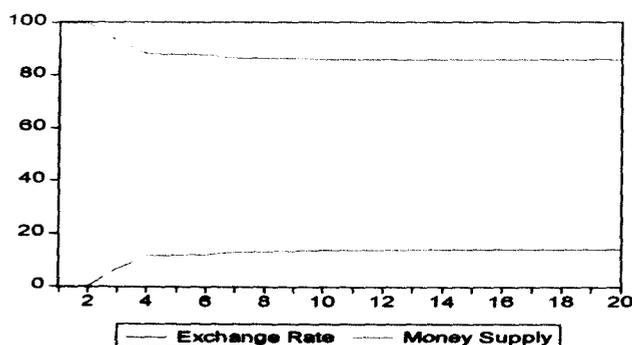


Figure 9.2
Graphical Presentation of Variance Decomposition of M_t

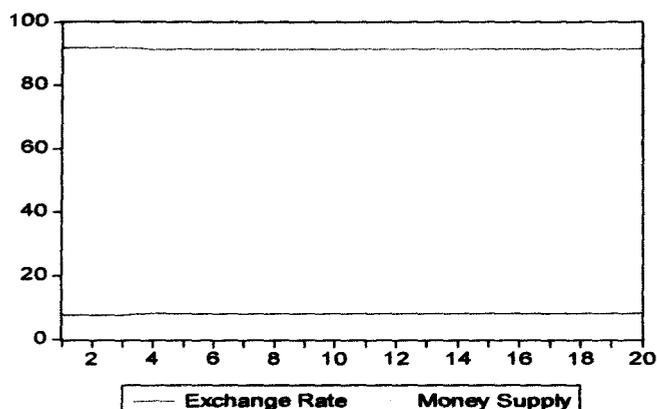


Table 9.1
Variance Decomposition of E_t

Period	S.E.	E_t	M_t
1	0.8304	100.00	0.0000
2	0.8415	99.882	0.1171
3	0.8730	93.430	6.5693
4	0.8998	88.278	11.721
5	0.8999	88.262	11.737
6	0.9030	87.945	12.054
7	0.9104	86.726	13.273
8	0.9104	86.720	13.279
9	0.9111	86.619	13.380
10	0.9136	86.206	13.793
11	0.9136	86.203	13.796
12	0.9137	86.185	13.814
13	0.9146	86.050	13.949
14	0.9146	86.046	13.953
15	0.9146	86.043	13.956
16	0.9149	85.995	14.004
17	0.9149	85.992	14.007
18	0.9149	85.992	14.007
19	0.9150	85.975	14.024
20	0.9150	85.973	14.026

Table 9.2
Variance Decomposition of M_t

Period	SE	M_t	E_t
1	0.830422	92.141	7.858
2	0.841580	92.180	7.819
3	0.873008	92.191	7.808
4	0.899823	91.609	8.390
5	0.899994	91.666	8.333
6	0.903064	91.741	8.258
7	0.910424	91.669	8.330
8	0.910453	91.700	8.299
9	0.911152	91.748	8.251
10	0.913622	91.738	8.261
11	0.913648	91.757	8.242
12	0.913785	91.783	8.216
13	0.914607	91.787	8.212
14	0.914631	91.798	8.201
15	0.914652	91.811	8.188
16	0.914941	91.816	8.183
17	0.914958	91.822	8.177
18	0.914960	91.829	8.170
19	0.915066	91.832	8.167
20	0.915077	91.836	8.163

9.3 Explanation of Exchange Rate Dynamics through the Study of Variance Decomposition

The Figure 9.1 and Table 9.1 show that

- (i) variations in Rupee/Dollar Exchange Rate in $1 \leq t \leq 20$ were mainly due to shocks transmitted through the channel of exchange rate.
- (ii) contribution of monetary shocks in exchange rate variations began to increase across subsequent periods since $t > 2$.
- (iii) exchange rate shocks dominated over the monetary shocks in generating short-run variations in exchange rate for the entire period.
- (iv) monetary shocks accounted for at most 14% of total variations in exchange rate for $t = 20$ period.
- (v) exchange rate shocks, on the other hand, accounted for at least 85% of total variations in exchange rate.
- (vi) contribution of the exchange rate shock declined over time and such declined was about 14% over a period of 20 quarters.
- (vii) contribution of monetary shock registered a rise over time and such increase was about 14% over a period of 20 quarters.

9.4 Economic Interpretations of Findings in Section 9.3

These findings indicate that

- a. current period exchange rate (E_t) makes countervailing movement following variation in previous period exchange rate (E_{t-1}) in order to attain long-run equilibrium level without any significant lapse of time.
- b. exchange rate, following domestic monetary shock, displays significant rise over a few successive periods until it reaches the long-run equilibrium level.
- c. short-run variations in exchange rate (E_t) are to a larger extent a '**Monetary Phenomenon**' since such variations are mainly due to monetary shocks.

9.5 Explanation of Money Supply Dynamics Through the Study of Variance Decomposition

The percentile decomposition of variance of exchange rate representing contribution of shocks, transmitted through the channels of two endogenous variables, is given by the Table 9.2. The corresponding graphical presentations are given by the Figure 9.2.

The Table 9.2 and Figure 9.2 show that

- (i) monetary shock accounted for 91.836% of variations in money supply at $t = 20$ period.
- (ii) monetary shock accounted for 92.141% of variations in money supply at $t = 1$ period.
- (iii) contribution of monetary shock to total variations in money supply declined by only 0.3% over a period of 20 quarters.
- (iv) contribution of exchange rate shocks to total variations in money supply increased by only 0.3% (from 7.85% to 8.163%) over this period.

9.6 Economic Interpretations of Findings in Section 9.5

These findings indicate that

- (i) long-run equilibrium base for money supply was stable and it was constituted by the monetary shocks.
- (ii) exchange rate shocks failed to produce any significant variations in money supply over a period of 20 quarters.

9.7 Overview of Findings of the Chapter 9

The main findings from the study of Variance Decomposition are as follows:

- (i) *Exchange rate shocks constitute the long-run base for the Rupee/Dollar exchange rate.*
- (ii) *Short-run variations in exchange rate are mainly a ‘monetary phenomenon’ since monetary shocks accounted for a significant part of variations in exchange rate.*
- (iii) *Exchange rate maintains a ‘stable’ long-run equilibrium relation with lagged exchange rate and money supplies since its responses revert to long-run path before long following impulses, transmitted through all the channels considered.*
- (iv) *Exchange rate shocks failed to produce any variations in monetary growth.*
- (v) *Monetary shocks, on the other hand, were the predominant factor behind the variations in money supply over a 20 quarter period.*

These observations also testify for the ‘Unidirectional Causal relation’, running from money supply to exchange rate in the economy of India over the period 1975(I) -2006(IV).