CHAPTER - 10
INTERVENTION ANALYSIS THROUGH THE STUDY OF VARIANCE DECOMPOSITION

10.1 Introduction:

One important way of characterizing the dynamics associated with *VAR* is the *Variance Decomposition. Variance Decompositions* have an immediate link to forecasting. These actually show how much of the h-step-ahead forecast variance of the variable i is explained by innovations to variable j, for h=1,2,..... Thus the *Forecast Error Variance Decompositions* provides us the proportion of the movement in a sequence owing to its own shocks versus shocks transmitted through other variables in the *VAR System*. In other words, *Variance Decomposition* indicates the relative importance of each innovation in affecting the endogenous variables in the *VAR System*.

The *VAR System* in our study, as given in Chapter 8, consists of two endogenous variables, namely, exchange rate (E_t) and relative price level (P_t). Then it becomes pertinent to examine the relative importance of the endogenous shocks in accounting for the h-step ahead forecast error variances for the variables concerned. The study in this Chapter is confined to this issue.

10.2 Variance Decomposition Tables and Figures For Exchange Rate

The Variance Decompositions of forecast error variance over 20 quarters ahead for exchange rate are being presented through the Table (10.1) shown below. Graphical presentations of such decompositions are shown by the Figures (10.1) and (10.2).

Table :10.1

Variance Decompositions of E_t

Variance Decomposition of E_t :			
Period	S.E.	E_t	P_t
1	0.004853	100.0000	0.000000
		(0.00000)	(0.00000)
2	0.005814	99.99089	0.009114
		(2.97195)	(2.97195)
3	0.005882	97.70685	2.293148
		(5.73403)	(5.73403)
4	0.006112	96.55643	3.443568
		(6.49530)	(6.49530)
5	0.006323	91.67781	8.322191
		(7.94736)	(7.94736)
6	0.006338	91.41095	8.589049
		(8.17130)	(8.17130)
7	0.006358	91.16081	8.839189
		(8.36761)	(8.36761)
8	0.006371	90.85154	9.148459
		(8.50339)	(8.50339)
9	0.006391	90.40040	9.599597
		(8.79170)	(8.79170)
10	0.006411	90.23463	9.765370
		(8.89730)	(8.89730)
11	0.006416	90.16762	9.832379
		(8.98549)	(8.98549)
12	0.006425	90.04204	9.957964
		(9.01275)	(9.01275)
13	0.006429	90.03419	9.965810
		(9.04569)	(9.04569)
14	0.006430	90.02424	9.975761
		(9.14649)	(9.14649)
15	0.006433	90.01130	9.988702
		(9.20432)	(9.20432)
16	0.006433	90.00933	9.990674
		(9.26746)	(9.26746)
17	0.006435	89.99153	10.00847
		(9.31512)	(9.31512)
18	0.006435	89.99151	10.00849
		(9.42047)	(9.42047)
19	0.006436	89.97103	10.02897
		(9.48190)	(9.48190)
20	0.006436	89.97090	10.02910
		(9.55432)	(9.55432)

Figure:10.1

Graphical Presentation of Variance Decompositions of E_t
Percent E_t Variance Due to E_t shocks

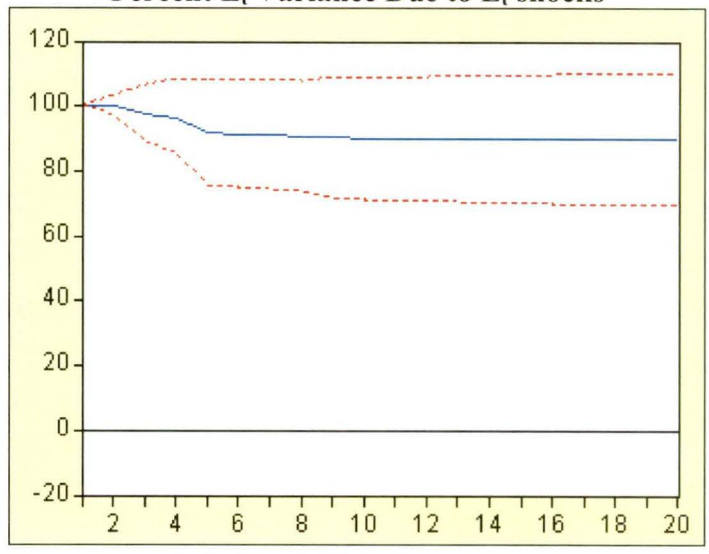
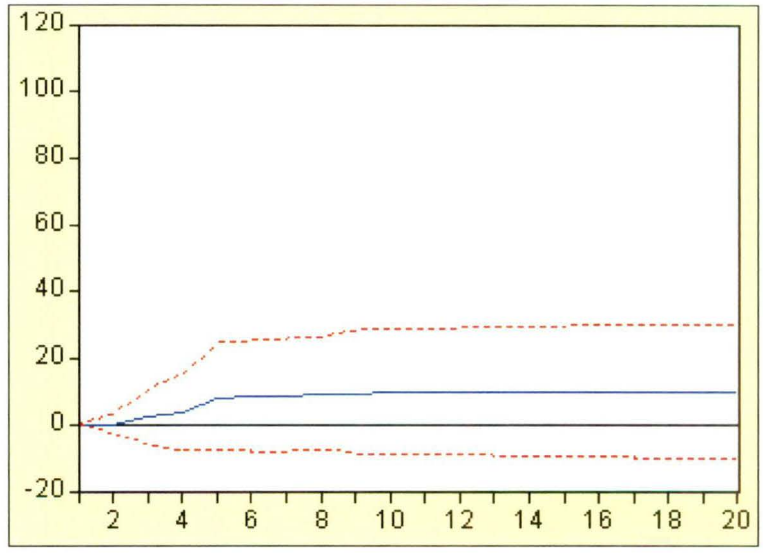


Figure: 10.2

Graphical Presentation of Variance Decompositions of E_t
Percent E_t Variance Due to P_t shocks



10.3 Explanation of Exchange Rate Dynamics Through the Study of Variance Decomposition

The Figures (10.1) and (10.2) together with the Table 10.1 show that, in case of 20 step-ahead forecasts for exchange rate

(A) exchange rate shocks account for

i. at least 95% of forecast error variances for the immediate 4 periods (periods 1 through 4).
ii. at least 90% of forecast error variances for the next 12 periods (period 5 to period 16).
iii. about 90% of forecast error variances for the next 4 periods (periods 16 through 20).

(B) relative price level shocks account for

i. at most 5% of forecast error variances for the immediate 4 periods (periods 1 through 4).
ii. at most 10% of forecast error variances for the next 12 periods (periods 5 through 16).
iii. increasing forecast error variances over extending forecasting horizon.
iv. at least 10% of forecast error variances for the last 3 periods (periods 17 through 20).

10.4 Economic Interpretations of Findings in Section 10.3

These findings indicate that in case of forecasting exchange rate over time

i. exchange rate plays the more dominant role than relative price level.
ii. relative price level gradually assumes important role as forecast distance (h) increases.

Thus relative price level emerges as a significant variable in explaining long-run forecast error variances for exchange rate.

10.5 Variance Decompositions Tables and Figures for Relative Price Level

The variance decompositions of forecast error variances for relative price level over 20 quarter-ahead are being presented through the Figures (10.3) and (10.4) along with the Table 10.2 below.

Figure 10.3

Graphical Presentation of Variance Decomposition of P_t

Percent P_t variance Due to E_t Shocks

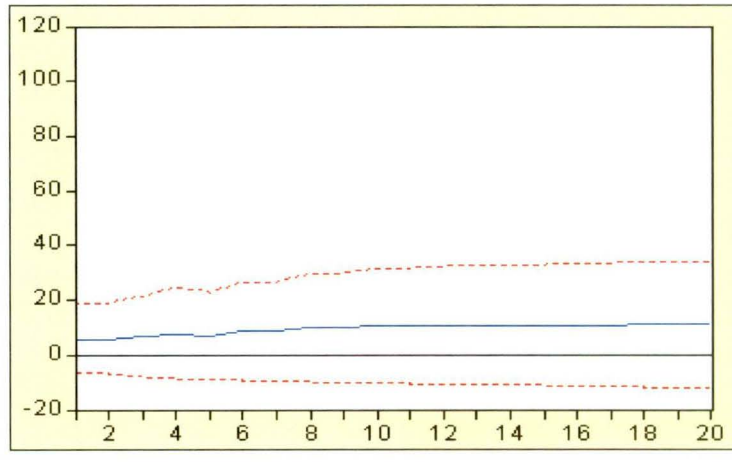


Figure 10.4

Graphical Presentation of Variance Decomposition of P_t

Percent P_t variance Due to P_t Shocks

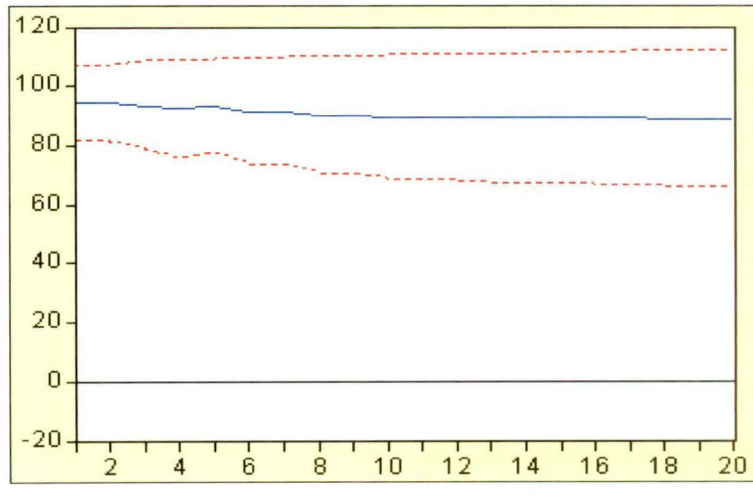


Table 10.2

Variance Decomposition of P_t

Variance Decomposition of P_t:			
Period	S.E.	P_t	E_t
1	0.008099	100.0000	0.000000
		(0.00000)	(0.00000)
2	0.008178	99.99960	0.000403
		(2.41983)	(2.41983)
3	0.008383	99.68337	0.316626
		(4.78771)	(4.78771)
4	0.008435	98.60411	1.395895
		(6.09453)	(6.09453)
5	0.009225	97.12992	2.870077
		(5.53568)	(5.53568)
6	0.009363	95.74550	4.254501
		(6.48372)	(6.48372)
7	0.009540	95.89945	4.100548
		(6.76711)	(6.76711)
8	0.009621	94.68001	5.319986
		(7.69595)	(7.69595)
9	0.009744	94.78295	5.217047
		(7.73071)	(7.73071)
10	0.009814	94.36009	5.639915
		(8.19544)	(8.19544)
11	0.009869	94.42256	5.577442
		(8.27761)	(8.27761)
12	0.009910	94.20984	5.790159
		(8.34906)	(8.34906)
13	0.009939	94.23923	5.760765
		(8.41291)	(8.41291)
14	0.009971	94.19996	5.800037
		(8.49807)	(8.49807)
15	0.009985	94.20198	5.798018
		(8.56642)	(8.56642)
16	0.010007	94.18428	5.815725
		(8.61257)	(8.61257)
17	0.010015	94.16942	5.830576
		(8.74692)	(8.74692)
18	0.010030	94.16498	5.835017
		(8.75975)	(8.75975)
19	0.010034	94.14561	5.854388
		(8.84678)	(8.84678)
20	0.010045	94.14357	5.856429
		(8.93459)	(8.93459)

10.6 Explanation of Relative Price Dynamics Through the Study of Variance Decomposition

The Figures (10.3)-(10.4) and the Table 10.2 show that, in case of 20-step-ahead forecasts for relative price level (P_t),

i. exchange rate shocks account for at most 4% of forecast variances for the first 7 periods (periods 1 through period 7).
ii. exchange rate shocks account for at most 6% over the entire spread of forecast provided (periods through 20).
iii. relative price level shocks account for uniformly at least 94% of forecast variances over the forecast horizons (periods 1 through 20).

10.7 Economic Interpretations of Findings in Section 10.6

It, therefore, appears that, in case of relative price level forecasts over a long - horizon

i. relative price level in the given VAR system appears to be the only effective variable.
ii. exchange rate fails to play any effective role.

10.8 Overview of Findings in Chapter 10

The main findings from the study of Variance Decompositions in Chapter 10 are as follows:

i. exchange rate is the dominating factor for the forecast of exchange rate over the forecast-horizon (20 quarters).
ii. relative price level also plays a significant in 20 quarter-ahead-forecast for exchange rate.
iii. relative price shocks appear to be the only effective predominant variable in explaining the forecast error variances for relative price level over the forecast horizon.
iv. exchange rate plays no role at all in explaining error variances of forecasts for relative price level.

All these findings testify that over the period of study (1993:2-2006:1)

i. *exchange rate variations were* ***'Granger Caused'*** *by those in relative price level.*

ii. *the VAR system failed to exhibit* ***'Predictive Causality'*** *i.e.* ***Granger Causality'*** *running from exchange rate to relative price level, and*

iii. *relative price level, therefore, appears virtually as an* ***exogenous variable*** *in the VAR system consisting of equations (8.1) and (8.2) which serve as the base for generating forecast error variances for relative price level.*