

CHAPTER 8

INTERVENTION ANALYSIS THROUGH THE STUDY OF IMPULSE RESPONSE FUNCTIONS

8.1 Introduction

The VAR model, studied in Chapter 7, consists of two endogenous variables, namely, exchange rate and money supply. Consequently, the model considers two types of shocks. Some shocks are transmitted through monetary channel while others are transmitted through exchange rate channel. In this chapter we seek to examine the responses of exchange rate and money supply to such shocks. Besides, we seek also to examine the relative importance of these shocks in explaining variations in Rupee/Dollar exchange rate and money supply over time.

An *Impulse Response Function* traces the effects of a one time shocks to one of the innovations on current and future values of the endogenous variables. In other words, *Impulse Response Function* traces the response of a variable through time to an unanticipated change in ‘itself’ or other interrelated variables. Therefore, the *Impulse Response Function* may be used in any VAR system to describe the dynamic behaviors of the whole system with respect to shocks in the residuals of the time series.

8.2 Graphical Presentation of Impulse Response Functions

The relevant *Impulse Response Functions* of economic growth in response to impulses, transmitted through the channels of exchange rate and money supplies, are being presented through the Figures 8.1 and 8.2. The numerical values of these responses across different periods are given by the Table 8.1

Figure 8.1
Response of E_t to Cholesky One S.D. E_t Innovation ($\pm 2SE$)

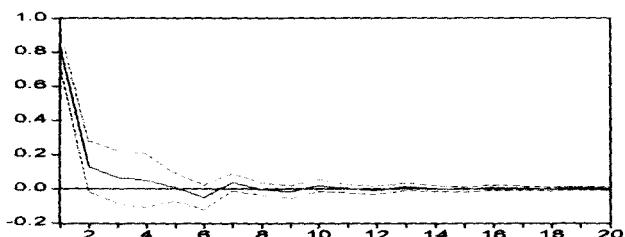


Figure 8.2
Response of E_t to Cholesky One S.D. M_t Innovation ($\pm 2SE$)

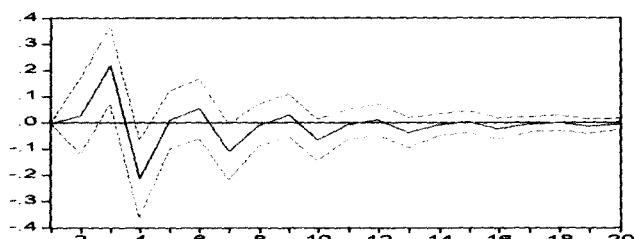


Figure 8.3
Response of M_t to Cholesky One S.D. M_t Innovation ($\pm 2SE$)

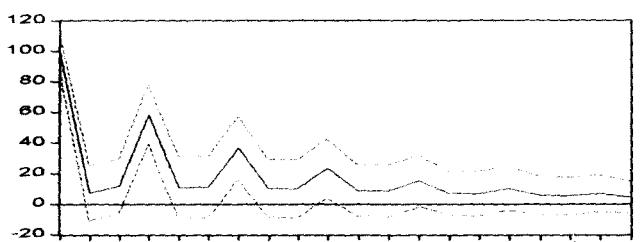


Figure 8.4
Response of M_t to Cholesky One S.D. E_t Innovation ($\pm 2SE$)

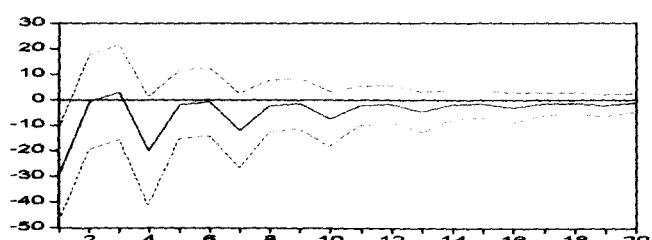


Table 8.1
Response of Exchange Rate

Period	Exchange Rate	Money Supply
1	0.830422 (0.05273)	0.000000 (0.000000)
2	0.133513 (0.07470)	0.028800 (0.07212)
3	0.068177 (0.07748)	0.221897 (0.07365)
4	0.051991 (0.07900)	-0.211745 (0.07435)
5	0.011746 (0.04090)	0.013038 (0.05567)
6	-0.047961 (0.03559)	0.056876 (0.05728)
7	0.040423 (0.02625)	-0.108226 (0.05332)
8	-0.000217 (0.01849)	-0.007245 (0.03986)
9	-0.016138 (0.01824)	0.031816 (0.04027)
10	0.021511 (0.01692)	-0.063606 (0.03948)
11	0.002930 (0.01235)	-0.006216 (0.02926)
12	-0.008532 (0.01219)	0.013328 (0.02968)
13	0.012587 (0.01146)	-0.036657 (0.02851)
14	0.002026 (0.00823)	-0.006300 (0.02098)
15	-0.003924 (0.00807)	0.004891 (0.02109)
16	0.007195 (0.00762)	-0.021826 (0.02019)
17	0.001614 (0.00552)	-0.005361 (0.01489)
18	-0.001701 (0.00533)	0.000893 (0.01485)
19	0.004241 (0.00510)	-0.013251 (0.01424)
20	0.001222 (0.00370)	-0.004330 (0.01065)

Table 8.2
Response of Money Supply

Period	Exchange Rate	Money Supply
1	-0.290904 (0.09134)	0.996108 (0.06325)
2	-0.005848 (0.09293)	0.076112 (0.09022)
3	0.033248 (0.09284)	0.120963 (0.08997)
4	-0.197232 (0.10668)	0.590295 (0.09652)
5	-0.015578 (0.06737)	0.113724 (0.10088)
6	-0.004469 (0.06664)	0.116899 (0.10114)
7	-0.117029 (0.07354)	0.371004 (0.10346)
8	-0.021877 (0.05146)	0.107946 (0.09383)
9	-0.011900 (0.04951)	0.105633 (0.09615)
10	-0.072441 (0.05352)	0.237188 (0.09675)
11	-0.020146 (0.03862)	0.093191 (0.08310)
12	-0.014014 (0.03711)	0.087579 (0.08523)
13	-0.045649 (0.03919)	0.155383 (0.08466)
14	-0.017116 (0.02945)	0.075523 (0.07217)
15	-0.013031 (0.02810)	0.069675 (0.07325)
16	-0.029500 (0.02910)	0.103872 (0.07196)
17	-0.013747 (0.02269)	0.059136 (0.06197)
18	-0.011037 (0.02155)	0.053964 (0.06191)
19	-0.019481 (0.02188)	0.070714 (0.06017)
20	-0.010702 (0.01767)	0.045296 (0.05256)

8.3 Explanation of Exchange Rate Dynamics Through the Impulse Response Functions

8.3.1 (A) Observations from the Figure 8.1

It is observed from the Figure 8.1 and Table 8.1 that, following a positive impulse transmitted through the exchange rate channel, exchange rate,

- (i) responded immediately by rising above the long-run base at $t=1$ period.
- (ii) declined for the period $2 \leq t \leq 6$.
- (iii) followed an insignificant damped oscillations above the base for $t \leq 10$ periods.
- (iv) almost collapsed on the long-run base for $t \geq 11$.

8.3.1. (B) Observations from the Figure 8.2

The Impulse Response Functions to one S.D. variation in M_t , as presented in the Figure 8.2 and Table 8.2, show that exchange rate

- (i) exhibited delayed response by rising above the base level at $t = 2$ and $t = 3$.
- (ii) fell bellow the base level at $t = 4$ period.
- (iii) exhibited damped oscillations for $4 \leq t \leq 16$ periods.
- (iv) almost collapsed on the equilibrium base level at $t > 17$.

8.3.2 Overall Findings on the Nature of Exchange Rate Responses

8.3.2. (A) The findings in section 8.3.1. (A) indicate that the shocks, transmitted through the channels of exchange rate

- (i) were very short-lived,
- (ii) failed to change the long-run equilibrium base of exchange rate,
- (iii) produced very damped oscillations in the exchange rate around the long-run base.

8.3.2. (B) The findings in Sec. 8.3.1. (B) indicate that the shocks, transmitted through the monetary channel,

- (i) were also short-lived,
- (ii) failed to change the equilibrium base of exchange rate,
- (iii) accounted for most of the short-run variations in exchange rate for $t > 4$ periods.

8.4 Economic Interpretations of the Findings in Section 8.3

It, therefore, appears that

- a. E_t , in response to any impulse, transmitted through previous period exchange rate channel, quickly attains long-run equilibrium level after a very short lived variation.
- b. E_t , in response to monetary channel, attains the long-run equilibrium level after significant short-run variations in several successive periods.
- c. E_t , exhibits overshooting phenomenon in response to impulse transmitted through monetary channel.
- d. the impulse response of E_t depicts a balancing trend in view of the fact the rise in E_t is followed by subsequent declines in E_t . Such counteracting response depicts a trend for the maintenance of long-run stability in the dynamics of exchange rate movement.

8.5 Graphical Presentations of Impulse Response Functions for Money Supply

The *Impulse Response Functions* of money supply corresponding to equation 7.2 (Chapter 7) in the VAR system and in response to impulses, transmitted through the channels of money supply and exchange rate, are being presented through the Figures 8.3 and 8.4. The corresponding numerical values of these responses are given by the Table 8.2.

8.5. (A) Observations from the Figure 8.3

Figure 8.3 depicts that following shocks, transmitted through the channel of money supply, money supply M_t

- (i) displayed immediate rise at $t = 1$ period.
- (ii) exhibited declining oscillations above the long-run equilibrium level for $1 \leq t \leq 16$.
- (iii) such variation in M_t did not collapse on the initial long-run base for $t > 20$.
- (iv) had permanent effect on the variation in M_t as it had created a new equilibrium base (above the initial base).

8.5 (B) Observations from the Figure 8.4

The Figure 8.4 shows that, following shocks, transmitted through the channel of exchange rate, money supply

- (i) exhibited a small decline below the long-run base at $t = 1$.
- (ii) registered a small rise above the base level at $t = 2$.
- (iii) remained below the base level for $t \geq 3$ periods.
- (iv) exhibited damped oscillations below the base line for $t \geq 3$ periods.
- (v) did not collapse on the base level for $t \geq 20$ periods.

8.6 Economic Interpretations of the Findings in Section 8.5

The joint study of Figures 8.3 and 8.4 indicates that

- a. short-run variations in money supply were mainly due to impulses, transmitted through the channel of money supply.
- b. monetary shocks were long-lived since these have changed the long-run equilibrium base.

- c. exchange rate shocks were weaker than the monetary shocks in generating variations in money supply.

8.7 Overview of Findings From the Impulse Response Functions Study

These findings give forth two important features of responses of exchange rate and money supply to different types of shocks. These are stated below:

- a) *Shocks, transmitted through the monetary and the exchange rate channels, were short-lived and these failed to bring forth significant changes in both the exchange rate and monetary profiles.*
 - b) *Monetary shocks were more dominant than exchange rate shocks in the matter of generating short-run variations in exchange rate and money supply.*
 - c) *Monetary shocks led to the emergence of a new long-run initial base for money supply.*
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