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IMPACT OF MONETARY SHOCKS ON STOCK PRICES AND OTHER MACROECONOMIC VARIABLES: A Comparative Study on India and the U.S. Market

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Abstract: This paper examines the response of stock prices and other macroeconomic variables of the U.S. and India to monetary policy shocks. Comparison between the U.S. and India gives information on how effective respective central banks are to achieve stock market and other macroeconomic objectives. Results show that response of the U.S. variables is much stronger than that of India, suggesting that central bank of the former is more efficient in driving economic activities through monetary policy actions. For the U.S., the relationship between monetary shocks and stock prices is in line with the economic and finance theory. However, for India stock market does not always respond logically to policy shocks.

I. INTRODUCTION

Although money is thought to be neutral in the long run, it affects the output in the short run. Thus, it is always interesting to know how the economy responds to exogenous monetary policy shock. However, the relationship between policy shocks and macroeconomic variables such as output, employment, and inflation is indirect. The immediate effect of policy shocks are observed in equity prices through changes in cost of capital and wealth effects, which may help policy makers to achieve ultimate economic objectives (Bernanke and Kuttner, 2005). Thus, understanding the relationship between monetary policy changes and stock price movement is important to know the policy transmission mechanism. In the context of a developed country such as the U.S. huge research has been conducted on this issue (Christiano *et al*., 1997; Christiano *et al*., 1998).

Economists and academicians have been in continuous search to improve the econometric models to have a better knowledge about the monetary policy issues. However, over the years with various identification schemes there are some agreements as follows: after a contractionary monetary policy shock, short term interest rates rise, aggregate output, employment, profits and various monetary aggregates fall and price level responds very slowly (Christiano *et al*., 1998). On the other hand, relatively few investigations have been conducted to trace the effect of monetary shocks on the financial markets of developing countries. India, a fast

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growing economy, is no exception in this regard. Reasons are probably the import-substitution policy adopted by India until 1980s and less autonomy of the central bank in the determination of exchange rate and monetary policy interference before early 1990s. Moreover, a longer data series is needed to come to a reasonable conclusion, which now India to some extent fulfills.

Stock price is the present value of all the future cash flows. The cash flows depend on firm-specific as well as market conditions. From the viewpoint of a portfolio manager the firm-specific risk can be diversified away in a large portfolio of many assets, but market risk cannot be eliminated. Market risk arises from the macroeconomic condition of the country concerned or even the world economic and political conditions. Thus any monetary shock is supposed to affect stock prices through the output channel. In the past two decades, the importance of the stock market of an emerging country such asIndia has increased many folds. The main reason is the low correlation between stock returns of emerging markets and that of developed markets. Portfolio managers have the opportunity to diversify the portfolio even more efficiently in terms of risk-return trade-offs.

In this paper we investigate how monetary shocks may be related to stock market in a high-performing emerging market such as India. In case of an organized developed economy like the U.S. stock price may even work as an indicator for the future growth of the economy (for example, Schwert, 1989). Schwert (1990) points out that a change in discount rate may affect stock price and investment in the similar fashion, but the change in output appears with a delay. Moreover, stock price changes indicate wealth changes, which affect consumption and investment. Since Indian stock market is believed to be as one of the emerging stock markets in the world, it may not be capable of predicting the future real activity of the economy. In this study, thus, we have assumed that the stock price is the contemporaneous outcome of all the effects of the policy and macroeconomic performances.

Lastrapes (1998) finds that expansionary money supply shocks raise real stock prices and lower interest in short run and money supply shocks explain one-third of the variation in real stock prices in the short run. Patelis (1997), Thorbecke (1997), and Neri (2004), among many others, have also used VAR framework to study the relation between monetary policy and stock returns. All of these papers find that stock returns respond negatively tocontractionary shocks of monetary policy, but such shocks can only explain a small portion of stock return variation. Rapach (2001) examines the effects of money supply, aggregate spending and aggregate supply shocks on real U. S. stock prices in a structural VAR (Vector Autoregression) framework. Findings show that macroeconomic shocks affect stock prices and interest rate has a negative relation with real stock returns. Barnanke and Kuttner (2005) also use structural VAR model to investigate the reaction of stock prices with regard to innovations in monetary policy and find that an unanticipated 25 basis-point cut in Federal funds rate results in one per cent increase in broad stock indexes.

Zeng (2010) uses event study method to find that a 25-basis-point rate cut surprise results in 0.62 per cent to 0.70 per cent increase in the Australian stock market index.Bredinand Hyde (2007) and Gregoriou and Kontonikas (2009) also find that U. K. stock market reacts significantly to any surprise in monetary policy changes. Thorbecke (1997) and Ehrmann and Fratzscher (2004) also find similar results with respect to domestic monetary shock. Laeven and Tong (2012) document that global stock prices go up after unexpected U.S. monetary loosening and go down after unexpected U.S. monetary tightening.

Maysami and Koh (2000) report that a positive relationship between innovation in money supply and stock returns in Singapore. Wongbangpo and Sharma (2002) examine the relationship between stock prices and selected macroeconomic factors in five ASEAN countries. Their results show that stock prices are positively related to output in the long run. Moreover, in the short-run, stock prices are related to past and current values of macroeconomic variables. Bhattacharyya and Sensarma (2008) report that the impact of monetary policy shock on Indian stock market is negligible during the 1996-2006 period, which is in fact a by-product of their research on effect of monetary shocks to the economy. Hosseini *et al.* (2011) suggest that there are both short and long run linkages between macroeconomic variables and stock market index for India and China.

The objective of this paper is to examine the impact of monetary shocks (T-bill shocks in the absence of monthly data of policy instrument such as Federal fund rate) onother macroeconomic variables and the prices of India and that of the U.S. stocks. Then the impact can be analyzed from the viewpoint of developed and emerging markets. As a corollary, the monetary impact on macroeconomic variables, both contemporaneous and lagged, are examined and compared. Macroeconomic variables used in this study are industrial production, money supply (M1), consumer price index, and 91-day T-bill rates (Federal fund rate for the U.S.). All these variables are considered in a structural VAR framework. Appropriate restrictions are imposed to explore the likely contemporaneous and lagged relation among stock returns and macroeconomic policy shocks.

Two types of identification schemes are used. In the first type, restrictions are imposed such that stock price acts as the outcome of all the contemporaneous relation with other variables. In this setting, results show how long the impact stays in the stock prices after an innovation occurs. In an efficient market, stock prices must adjust tonew information very quickly. For example, the market is comprised of huge number of analysts who should contribute to help adjust the macroeconomic information into the stock prices promptly. Violation of this means opportunity for abnormal profit for some investors. In the second set up, the stock price reacts to all the macroeconomic variables contemporaneously, but T-bill/fund rate is not influencing other variablesnow, rather T-bill/fund rate is reacting to the state of the economy. Consequently, the T-bill/fund rate influences the output, consumer price, commodity price and exchange rate next period. Similar identification scheme is used in Christianno *et al.* (1998).

The paper is organized as follows. Following section gives a very brief review of the changes that occurred in India since early 1990s. Section III gives details about the sources of data and the necessary transformation or modification of data. This section also provides how required restrictions are imposed in this study. Section IV explains the empirical results. Section V provides concluding remarks.

II. INDIAN ECONOMY AND CAPITAL MARKET SINCE EARLY 1990s

In the early 1990s, Indian economic policy suffered a serious balance of payment crisis. This resulted in a series of economic policy reforms. Subsequently, Indian government introduced economic reforms in foreign exchange management, industrial policies, fiscal policies, monetary policies and international trade policies. Private sector and market were expected to play stronger role in the allocation of resources.

In 1990s, India was one of the top 10 countries in the world in terms of average growth of GDP (Bhide, 2001). The higher growth rate was a source of risk due to more exposure to both domestic and international monetary shocks. The sources of domestic shock were various state subsidies, support to non-performing government enterprises, etc. Some of the important international shocks were debt-servicing of foreign loans, exchange rate fluctuations, inflow and outflow of foreign investments, confidence of foreign investors, etc. The main concern of India in the 1990s was to continue high growth and increase domestic income (in order to reduce fiscal deficit). Government also reduced taxes to achieve the target. The initiative to reduce external exposure started with the withdrawal of governmental intervention in foreign exchange market. Thus, Reserve Bank of India (RBI), the central bank of India started giving only indicative rates to the market and allowedmarket forces to determine exchange rates (Bhide, 2001). As a part of encouraging foreign investment, tariff and non-tariff trade barriers were reduced by decreasing duties and relaxing many key import restrictions. Capital markets relaxed control on prices. Industrial policy changes permitted easy licensing, more foreign collaboration, import of machinery, and less bureaucracy. Monetary policy also changed to cope with other changes. There were substantial reforms in the banking sector. Statutory reserves were reduced. The monetary authorities started using open market operations to control money supply of the economy to a greater extent.

During 2000-2005, market capitalization to GDP ratio skyrocketed to 77 per cent, a strong indication of the trend in the foreign capital inflows and growth in the capital market (Purfield *et al.*, 2006). Foreign investors held about 10 per cent of GDP in equity assets. The participation of domestic institutional investors grew significantly during the time. Insurance, pension and mutual funds' assets amounted to almost 15 per cent of GDP, with significant investment in stock market

(Purfield, 2007). The SENSEX increased at an annual compound rate of 17 per cent during the period 2003-2005. The inflow of foreign capital was approximately $26 billion. This phenomenon was probably the outcome of prevailing low interest rates in the U.S. and growing attraction of Indian stock market. Market was relatively stable as India was able to nicely handle situation like Asian financial crisis. Such events boosted the confidence of both domestic and foreign investors, which could be illustrated by the Price-Earnings ratio of more than 20 (Purfield, 2007).

The year 2006 alone saw about 31 per cent growth in initial public offering. The BSE SENSEX jumped from 8,929 in 2006 to 14,724 in February 2007. Obviously it raised questions whether or not the price could be supported by the fundamentals of the economy.Over optimism sometimes gripped the stock market, which waspotentially very harmful for general investors since eventually the bubble must bust. A good example could be the economic turmoil Malaysia faced when the Asian financial crises broke out in the region after initial high optimism. In this backdrop, this paper may give some idea about how the stock prices react to the monetary policy shocks. A weak relationship would mean the possible detachment of financial market from the economy and inability of the stock market to act as a vehicle for economic growth – a serious concern for the policy makers.

III. DATA AND METHODOLOGY

Monthly data for the period February 1993 through December 2006 have been used for India. The U.S. data covers the period January 1959 through September 2007. Industrial production, consumer price index (CPI), money supply (M1), stock indexes, and exchange rates(Rupee to U.S. dollar) are collected from the International Financial Statistics (IFS) published by the International Monetary Fund (IMF).[1] 91-day T-bill rates are collected from RBI.[2] All the data except T-bills and fund rates are used in natural log form. T-bill and fund rates are used as short term interest rate for India and U.S., respectively. Commodity price index is constructed from equally weighted food, beverage, agricultural raw material, metal, and oil price indices.[3] All the variables are set up in a VAR framework. We have used 14 lags for the U.S. model. Due to smaller dataset, India has only 4 lags.[4]

In the first identification, we have used the framework used previously by Sims (1992). In this case, fund rate or T-bill affects other variables contemporaneously. So, stock priceis influenced byall other variables contemporaneously. The restrictions are shown in the following matrix format.

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ f_{21} & 1 & 0 & 0 & 0 & 0 & 0 \\ f_{31} & f_{32} & 1 & 0 & 0 & 0 & 0 \\ f_{41} & f_{42} & f_{43} & 1 & 0 & 0 & 0 \\ f_{51} & f_{52} & f_{53} & f_{54} & 1 & 0 & 0 \\ f_{61} & f_{62} & f_{63} & f_{64} & f_{65} & 1 & 0 \\ f_{71} & f_{72} & f_{73} & f_{74} & f_{75} & f_{76} & 1 \end{bmatrix} \begin{bmatrix} FFR/TBL_t \\ FEX_t \\ COM_t \\ M1_t \\ CPI_t \\ IND_t \\ STP_t \end{bmatrix} = \beta_1 \begin{bmatrix} FFR/TBL_{t-1} \\ FEX_{t-1} \\ COM_{t-1} \\ M1_{t-1} \\ CPI_{t-1} \\ IND_{t-1} \\ STP_{t-1} \end{bmatrix} + \ldots + \beta_p \begin{bmatrix} FFR/TBL_{t-p} \\ FEX_{t-p} \\ COM_{t-p} \\ M1_{t-p} \\ CPI_{t-p} \\ IND_{t-p} \\ STP_{t-p} \end{bmatrix} + \begin{bmatrix} U_{1t} \\ U_{2t} \\ U_{3t} \\ U_{4t} \\ U_{5t} \\ U_{6t} \\ U_{7t} \end{bmatrix} \quad (1)$$

where *FFR* or *TBL* is federal fund rate or 91-day T-bill rate, *FEX* isforeign exchange rate, *CPI* isconsumer price index, *M1* is money supply, *IND* is industrial production, *COM* is commodity price index and *STP* is stock price.

In the second setting, the VAR model used by Christiano *et al*. (1998) is considered.[5] As they did, we estimate this model where T-bill/fund rate is used as a policy instrument and in addition we have included stock price.Therefore, T-bill/fund rate is used here to be influenced by contemporaneous events in industrial production and price indices. Thus, this identification scheme is a close approximation to the benchmark identification scheme used by Christiano *et al*. (1998). In this setting, we hypothesize that output affects other variables including stock prices contemporaneously. The setup for this model is

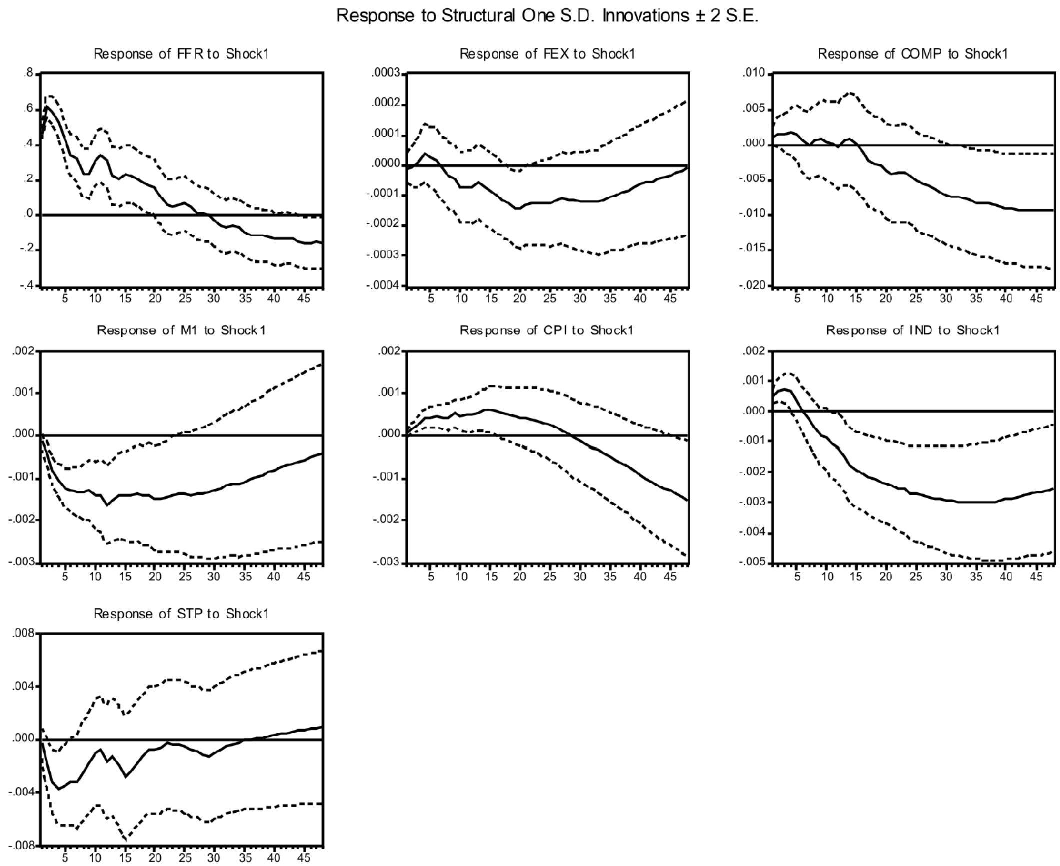
$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ f_{21} & 1 & 0 & 0 & 0 & 0 & 0 \\ f_{31} & f_{32} & 1 & 0 & 0 & 0 & 0 \\ f_{41} & f_{42} & f_{43} & 1 & 0 & 0 & 0 \\ f_{51} & f_{52} & f_{53} & f_{54} & 1 & 0 & 0 \\ f_{61} & f_{62} & f_{63} & f_{64} & f_{65} & 1 & 0 \\ f_{71} & f_{72} & f_{73} & f_{74} & f_{75} & f_{76} & 1 \end{bmatrix} \begin{bmatrix} IND_t \\ CPI_t \\ COM_t \\ FEX_t \\ TBL_t \\ M1_t \\ STP_t \end{bmatrix} = \beta_1 \begin{bmatrix} IND_{t-1} \\ CPI_{t-1} \\ COM_{t-1} \\ FEX_{t-1} \\ TBL_{t-1} \\ M1_{t-1} \\ STP_{t-1} \end{bmatrix} + \ldots + \beta_p \begin{bmatrix} IND_{t-p} \\ CPI_{t-p} \\ COM_{t-p} \\ FEX_{t-p} \\ TBL_{t-p} \\ M1_{t-p} \\ STP_{t-p} \end{bmatrix} + \begin{bmatrix} U_{1t} \\ U_{2t} \\ U_{3t} \\ U_{4t} \\ U_{5t} \\ U_{6t} \\ U_{7t} \end{bmatrix} \quad (2)$$

Finally, for India and the U. S. we have used GARCH(1,1)-AR(1) model to generate the conditional volatility series for all the variables.[6] Then these volatility series are considered in a VAR framework. Only Sims' identification scheme is used. This provides us the information about how T-bill/fund rate volatility innovations affect stock prices and other macro variables' volatility.

IV. EMPIRICAL RESULTS

Figure 1 presents the impulse response function (IRF) derived from model (1) which is similar to Sims (1992). The only difference is that the data are extended to 2007:09 and a new variable, the log of stock price is included in the model.The IRF of this paper and that of Sims' study are not that much different. Only the responses of all the variables with respect to the impulses to the Federal fund rate (or Treasury bill rate) are reported. The fund rateinnovation affects all other variables contemporaneously. Only the effect of exchange rate from fund rate shock seems to be different. We find a negative impact on exchange rate that lasts from month six through month 48. In his study, Sims explains the positive effect as exchange rate appreciation. We calculate exchange rate as the US$ to SDR ratio.[7] Thus the decrease in the ratio means the appreciation in US$ and therefore our result is not different from Sims'. The result is also supported by theory since monetary policy contraction should raise the value of the domestic currency.

Figure 1: Impulse Response Function with respect to One Unit of Monetary Shock (U.S.)



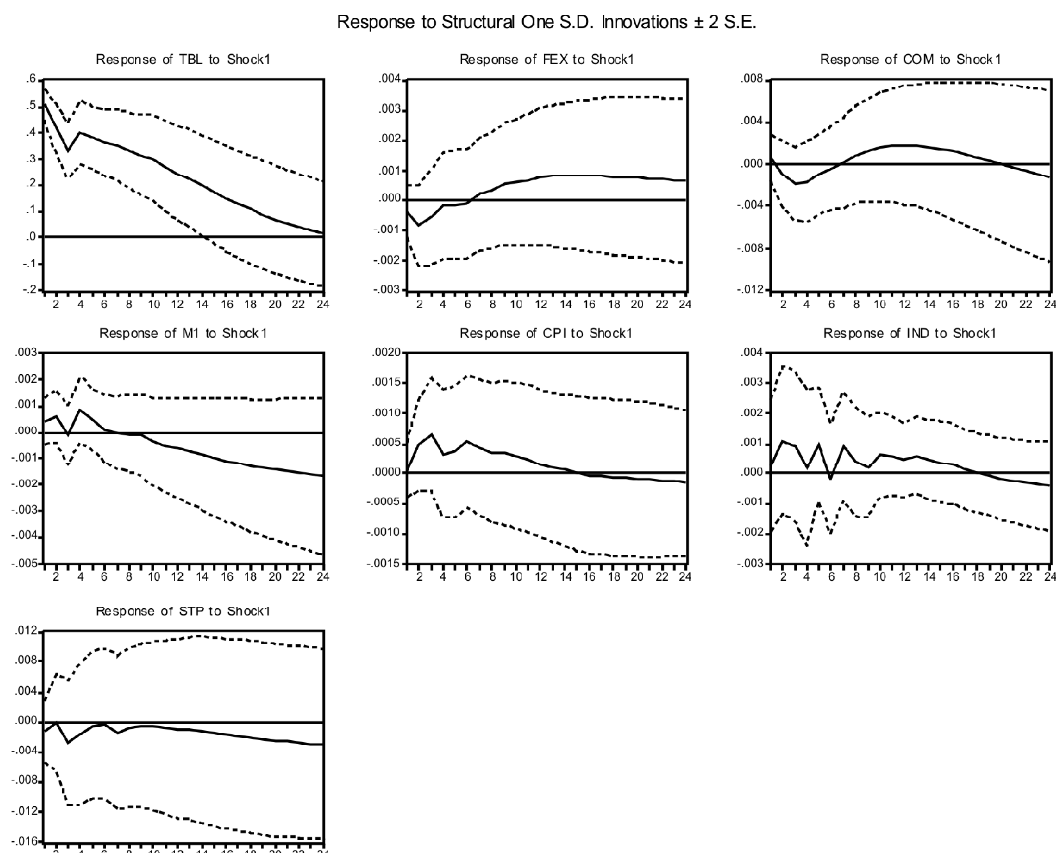
Shock 1 represents innovation in fund rate

Although not reported in the paper, interestingly like Sims we find a positive shock to money creates negative impact on industrial production. However, it is plausible that policy makers may feel the forthcoming inflationary pressure and take policy for contraction. Price may rise after contraction and the output may fall due to contraction of nominal demand and output.[8] The interest rate innovation causes stock prices to go down. Obviously as interest causes a positive innovation, the cost of capital or expected return goes up. Since the stock price is the present value of all the future cash flows (or dividends), stock price consequently goes down. It takes more than 30 months to absorb this shock.[9] This result is also supported by the fact that industrial production decreases after a positive shock to interest rates.

Identification as suggested by Christianno *et al.* (1998) is also used, but the results do not change much. Sims (1992) also admits that correlationsamong variables are so low that different identification schemes under structural VAR framework do not give different results. This is probably a peculiarity when monthly macroeconomic data are used. Therefore, we do not report the results from the VAR identification of Christianno *et al.* (1998).

Figure 2 presents the responses of all the variables of India to one standard deviation innovation in T-bill rate (contemporaneously) and stock prices (with one-month lag). Individual responses suggest weak relationship between monetary instrument and macroeconomic variables. The effect on output is positive for the first 17 months and then it tends to be negative. This contrasts sharply with the results for the U. S. economy. The reason for such surprising result could be that the economies of developing countries are relatively more segregated from rest of the world and that the macroeconomic variables are less logically interlinked (partially due to less autonomy and expertise of central bank to take effective and timely monetary decisions).

Figure 2: Impulse Response Function with Respect to One Unit of Monetary Shock (India)

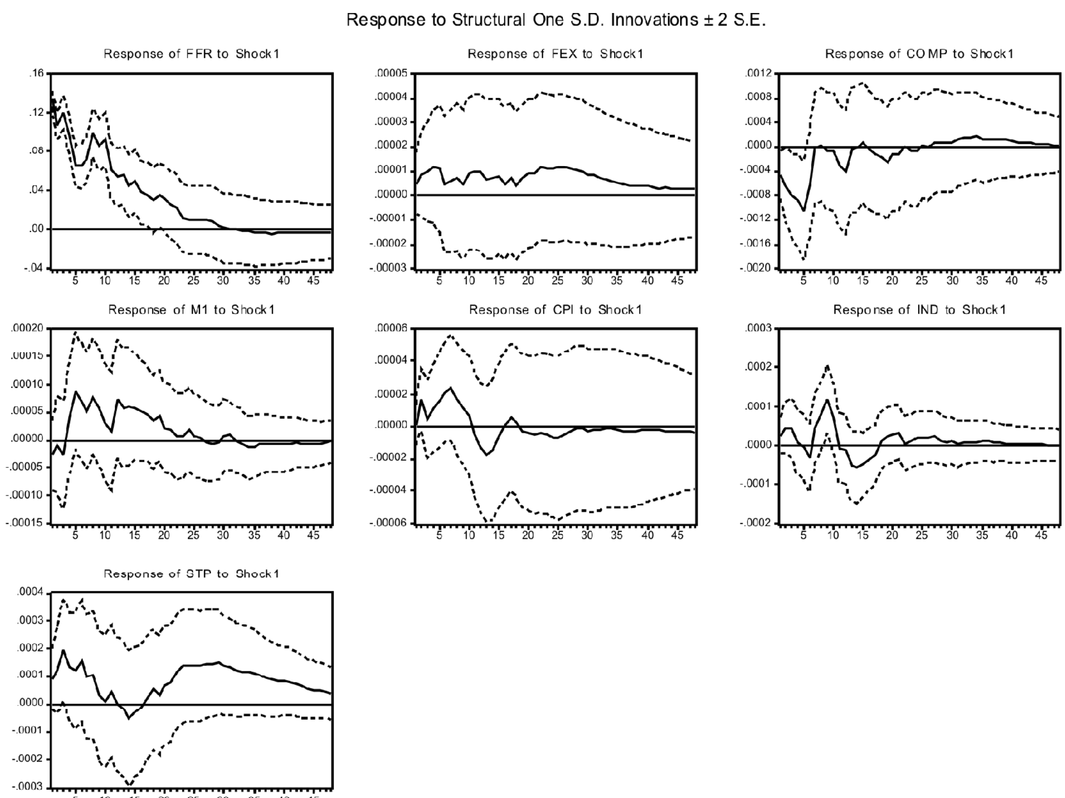


Shock 1 represents innovation in T-bill rate

Innovations in T-bill rates cause negative response in stock price, which satisfies the notion that risk-free rate plays an important role in determining the risk-adjusted discount rate for the estimation of stock prices. However, the impact of interest rate on the Indian stock prices appears to be weaker than that on the U.S. stock prices. The effect on exchange rate is initially negative. For India, the exchange rate is defined as Rupee/Dollar, which means negative response stands for appreciation of Rupee against dollar. Thus, this result is also in line with the result for the U.S. However, Rupee starts depreciating against dollar after approximately seven months.

The response of money supply is initially positive and then becomes negative after six months. For the U.S., this response is much larger compared to India. Although slightly, money supply initially increases. This result clearly shows how effective interest rate is to control money supply in the U.S. compared to India. Therefore, there is a kind of inertia in Indian economy for the response of money supply to take place. Same thing happens for response of industrial production to

Figure 3: Impulse Response Function for Conditional Volatility of Macro-variables with Respect to Innovation in Conditional Volatility of Monetary Shock (U.S.)

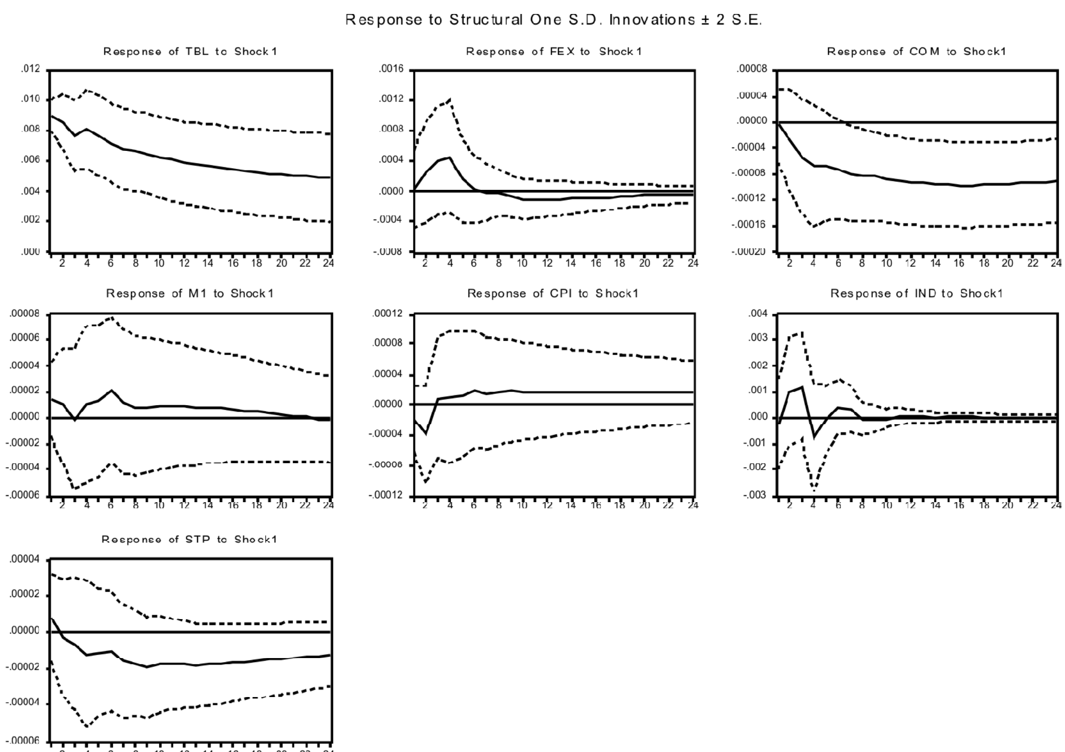


Shock 1 = Innovation in federal fund rate volatility interest rate innovation. For India, output take like 18 months to become negative whereas for the U.S. it takes about eight months. Moreover, for India the response is smaller in magnitude.

Figure 3 provides impulse response of all the variables' volatility to a one-standard deviation shock to fund rate volatility. Almost all the responses are positive. Thisis an expectedresult since fund rate volatility has information regarding future macroeconomic volatility. Any positive change in interest rate volatility might imply uncertain future and thus it should increase the macroeconomic and stock market volatility. The noteworthy finding is the positive response of stock price volatility. This means a shock to interest volatility increases stock price volatility, making stocks more risky. Consequently, expected return should go up and the stock price should ultimately go down. This explanation is also supported by the impulse response of figure 1.

Figure 4 presents the impulse responses of conditional volatility of macroeconomic variables with respect to a one-standard deviation innovation in conditional volatility of T-bill rate. Once again, Sims' identification is used. The

Figure 4: Impulse Response Function for Conditional Volatility of Macro-variables with Respect to Innovation in Conditional Volatility of Monetary Shock (India)



Shock 1 = Innovation in T-bill rate volatility relationship between stock price volatility and T-bill rate volatility is as same as that found in Figure 2. A shock to T-bill rate volatility also causes permanent shift in response for price level volatility. A shock to T-bill volatility should cause positive response for stock price volatility due to higher future uncertainty. In case of India, the response is surprisingly negative. This response indicates a persistent reduction of stock market volatility after interest rate volatility shock. Existing finance theory does not support this result. This finding is also just opposite of what is found for the U.S stocks. This kind of mismatch is a source of under/over valuation of asset prices in markets such as India, suggesting possible scope for abnormal return. Shocks to T-bill volatility cause immediate large impact on foreign exchange rate volatility and then adjusts very quickly. It probably indicates the rising importance of trade in Indian economy in the past one and half decades. A Shock to T-bill causes positive responses (although small) for money supply volatility, but it dies out after about two years.

Table 1 of Appendix 1 provides the variance decomposition of each variable for the U.S. It gives the proportion of the movements in the macroeconomic variables and stock prices that are due to their own shocks, versus shocks to other variables. Thus it gives information about the relative importance of each shock to the variables in the VAR. In case of U.S., commodity price, money supply, and industrial production account for most of the forecast error variance of stock prices at 24-step ahead.

Table 2 of Appendix 1 furnishes variance decomposition of each variable's forecast error. Interestingly, for stock price, apart from itself, mostly variance is caused by foreign exchange rate, money supply and CPI. Both for India and the U.S., a small portion of forecast error variance is explained by short term interest rate, whereas money supply appears to be an important factor. Probably, the effect of interest rate is taken away by the money supply, since both are very closely related. Results also show that exchange rate is important for Indian stocks, which suggests the vulnerability of Indian firms to currency fluctuations.

V. CONCLUSION

We have used Sims' (1992) identification scheme in a VAR framework to investigate the effect of short term interest rate innovation on macroeconomic variables and stock price of India and the U.S. Moreover, we do the same type of investigation using the conditional variance of interest rates for both the countries. Conditional variance series are created from a GARCH process.

Findings show that there are some similarities between the U.S. and Indian economy with respect to policy shocks. In most cases, responses of macroeconomic variables are similar, but responses of India are smaller in magnitude. In case of India, interest rate innovation results in depreciation of local currency, which contradicts exchange rate theory. However, the results for the U.S.satisfy the theory in this regard. There are some dissimilarities when responses of stock prices are taken into account. For both India and the U.S., the response of stock price is negative with regard to an innovation to interest rate, which supports theory. But, when conditional volatility series is used, interest rate volatility decreases Indian stock market volatility, which goes against the standard finance theory. However, for the U.S. market, both the volatilities are positively related. This finding probably indicates that Indian stock market does not capture the economic shocks logically, thereby creating scopes for stock price valuation mismatch and resultant opportunity for abnormal return. Nonetheless, this finding is not unusual if we consider the fact that Indian stock market has less liquidity, less number of analysts, relatively weak central bank and stock market regulatory body compared to the U.S. counterpart.

Notes

1. Reason for choosing the data from 1993 is the fact that India started economic reform in 1991 and some elapse from that period is helpful for model estimation, analysis and inference. Also India started permitting rupee to float against other currencies since 1993. The exchange rates are closely monitored by RBI, but there are no fixed target and fluctuation band.
2. T-bill is used for India due to few changes in the historical fund rates.
3. This index is created since IFS does not provide world price index for this long period. However, index for food, beverage, agricultural raw material, metal, and oil price indices are available. We construct the composite series by using equal weight for all the commodity prices.
4. For India lag length measures give conflicting results. Out of six measures in EVIEWS three suggest up to lag length of four or less, other three suggest 12 or more.
5. Sims (1992) also finds same results when he uses almost same variables for five countries, namely, USA, France, UK, Japan and Germany.
6. GARCH stands for Generalized Autoregressive Conditional Heteroskedasticity.
7. SDR (Special Drawing Right) is issued by the IMF. Not a currency, SDRs instead represent a claim to currency held by IMF member countries for which they may be exchanged. The value of the SDR is determined by the value of several currencies important to the world's trading and financial systems.
8. Eichenbaum(1992) comments on the paper by Sims (1992) in the same journal and also supports Sims' explanation.
9. Here we explain in terms of Capital Asset Pricing Model (CAPM). Even from the viewpoint of APT (Arbitrage Price Theory), we have same theoretical explanation. It is because both asset price theories take into account risk premium for one additional unit of systematic risk.

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APPENDIX

Table 1
Variance Decomposition of Innovations (U.S., logged Data)

Variance Decomposition of FFR:							
Period	*FFR*	*FEX*	*COM*	*M1*	*CPI*	*IND*	*STP*
12	59.6809	1.8524	13.2220	0.9976	1.3120	16.1346	6.8006
18	53.1482	3.4027	13.7951	1.0174	1.8784	18.1488	8.6094
24	48.6821	4.9552	14.4072	1.0726	1.9263	20.3240	8.6325
Variance Decomposition of FEX:							
12	1.1015	87.5521	1.6465	6.4769	1.2712	0.5067	1.4452
18	2.8102	73.8091	1.5704	15.3004	1.4558	0.6947	4.3594
24	5.1221	59.9570	3.5812	19.8859	3.0495	1.5630	6.8413
Variance Decomposition of COMP:							
12	0.3028	6.1472	88.3975	0.7857	1.4166	0.6424	2.3079
18	0.3940	5.1243	88.8259	0.8119	1.6552	0.5985	2.5902
24	1.3300	4.8685	88.5216	0.8072	1.5931	0.5816	2.2980
Variance Decomposition of M1:							
12	15.5982	5.3710	4.7172	70.7627	0.7065	2.1156	0.7288
18	14.9348	5.3473	9.7552	63.0554	2.2159	2.1455	2.5458
24	13.9993	3.9221	12.6292	57.9346	4.4584	1.6012	5.4552
Variance Decomposition of CPI:							
12	8.4012	0.6818	55.0553	4.4479	30.1097	0.9287	0.3753
18	7.0862	0.3924	61.0259	4.7724	24.1428	1.8725	0.7079
24	5.3861	0.8766	64.1784	5.0787	20.5269	3.4309	0.5224
Variance Decomposition of IND:							
12	3.5450	0.6259	0.4265	1.1538	9.0720	77.0228	8.1540
18	10.1871	1.1003	3.2669	3.9431	10.8401	62.7853	7.8772
24	16.1869	1.0404	7.5958	7.8354	10.3858	51.3765	5.5792
Variance Decomposition of STP:							
12	2.9823	1.2995	6.7784	5.7278	7.9493	7.4943	67.7684
18	2.7098	1.2583	12.8766	13.6360	6.4229	10.0402	53.0563
24	2.3175	1.0828	15.5608	17.6177	6.2362	10.0582	47.1268

Factorization: Structural

Table 2
Variance Decomposition of Innovations (India, logged data)

Period	*TBL*	*FEX*	*COM*	*M1*	*CPI*	*IND*	*STP*
Variance Decomposition of TBL:							
12	71.9533	1.0355	16.8579	0.7809	1.0193	0.7637	7.5895
18	56.7755	3.5776	19.9288	1.0378	1.0467	0.5458	17.0877
24	49.4196	6.5718	19.1147	1.2821	0.9718	0.4874	22.1527
Variance Decomposition of FEX:							
12	1.0227	87.5042	2.0372	1.5808	6.6989	0.8619	0.2943
18	1.7255	73.9994	3.3601	2.9100	16.0463	1.4799	0.4788
24	2.0243	63.6364	4.0030	4.1472	22.8077	2.4459	0.9355
Variance Decomposition of COM:							
12	0.9581	24.0956	32.6940	11.1429	22.9851	2.9995	5.1246
18	0.8877	26.6106	21.1926	16.9020	25.6705	3.0006	5.7359
24	0.7778	27.0305	15.2520	20.3012	28.1039	3.3854	5.1492
Variance Decomposition of M1:							
12	1.0396	15.3779	0.5055	74.9957	4.7094	0.1666	3.2053
18	2.5839	15.2089	0.5978	69.5834	8.1289	0.3266	3.5706
24	4.6459	14.2281	1.2935	64.8240	11.7437	0.5466	2.7182
Variance Decomposition of CPI:							
12	1.8060	5.8246	4.1856	0.1661	71.9647	11.7879	4.2650
18	1.4527	6.2095	3.4800	0.2350	72.5352	10.7395	5.3481
24	1.3053	6.0940	3.3455	0.6435	70.3691	11.4172	6.8254
Variance Decomposition of IND:							
12	1.3767	5.6931	4.5222	3.2347	19.5811	61.3947	4.1976
18	1.3599	7.6858	4.6568	7.1371	18.1802	54.7121	6.2680
24	1.3332	8.9850	4.2693	11.0215	17.2909	49.9227	7.1774
Variance Decomposition of STP:							
12	0.2540	20.8821	0.3272	6.2939	3.4841	0.4118	68.3469
18	0.3928	23.9670	0.3097	9.1148	7.9071	0.6601	57.6484
24	0.7960	24.7684	0.5127	11.7768	12.4766	1.1006	48.5690

Factorization: Structural