Journal of Business Thought, *DOI: 10.18311/jbt/2024/44735, Vol 15, 2024*

Monetary Policy and Financial Stability in India

Neha Verma[1] and Deepika Goel[2*]

[1]Department of Economics, Kirori Mal College, University of Delhi, Delhi – 110007, India; nverma@kmc.du.ac.in
[2]Department of Economics, Aryabhatta College, University of Delhi, New Delhi – 110021, India; deepika@aryabhattacollege.ac.in

Received: 29 June 2024 **Accepted:** 17 November 2024 **Published:** 18 December 2024

Abstract

With rising geoeconomic tensions and financial fragmentation, financial instability concerns are becoming deeper and more persistent for emerging economies like India. Post the Global Financial Crisis (GFC) of 2008, the spotlight turned to the possible role of monetary policy in ensuring financial stability in addition to the mandated goals of price and output stability. This paper aims to estimate the dynamics between monetary policy and financial stability in India using a Structural Vector Auto Regressive (SVAR) model based on monthly data from January 2011 to April 2024. Financial stability is measured along three dimensions: banking, stock market, and external stability. We find significant evidence of bank credit and exchange rate channels, while the asset price channel has weaker evidence. There is evidence of high risk-taking behaviour of banks in the case of expansionary monetary policy, pressing for the role of regulatory and prudential policies.

Keywords: Financial Stability, Macroprudential Regulations, Monetary Policy, Risk-taking Channel
JEL Classification: E43, E44, E52, F34

1. Introduction

The issue of whether monetary policy should encompass the pursuit of financial stability alongside its conventional objectives of price and output stability has long been a subject of discourse among central bankers worldwide. The focus on the debate has been sharper since the Global Financial Crisis (GFC) of 2008, which resulted from reckless and risky lending by banks and financial institutions, especially after a prolonged period of low monetary policy rates in the economies. The GFC debunked the myth that monetary policy and financial stability reinforce each other as the collapse of the global financial system was in the midst of a phase of price stability (Subbarao, 2012). The lesson from the crisis is that an extended period of stable inflation and growth can trigger the risk-taking behaviour of an economy's banking and financial system and increase their complacency, leading to the accumulation of financial instability risks. A series of economic crises since the Asian crisis of the late 1990s was followed by a similar pattern of low short-term interest rates spurring the risk-taking behaviour of financial institutions.

Recently, the financial instability risks have been exacerbated by the 'Great Lockdown' (Gopinath, 2020) of the COVID-19 pandemic, wherein the prices of risky assets took a dip, the global liquidity worsened and the emerging markets witnessed capital flight (Halder & Sethi, 2021; Dash & Sethi, 2022).

Financial stability has a multifaceted nature and its definitions vary across the literature. Mishkin (1997) describes financial stability as a condition in which disruptions to the financial system hamper the flow of information, thereby preventing the efficient allocation of funds to productive investment opportunities. The Reserve Bank of India, in its first financial stability report (2010), acknowledges that financial stability should be pursued as an explicit policy goal to counter the vulnerability stemming from domestic and global shocks.

To deal with the risks of financial instability, macroprudential policies designed to target specific sectors of the financial system have gained significant

*Author for correspondence

relevance after the GFC. These regulatory measures operate on dual fronts, firstly, by diminishing incentives for excessive risk-taking *ex-ante* and secondly, by ensuring that participants in financial markets factor in the systemic risk implications of their decisions. However, studies find evidence of implementation lags and limited scope in the effectiveness of macroprudential reforms (Adrian *et al.*, 2017) along with political constraints (Viñals, 2013). Therefore, the focus shifted to the efficacy of monetary policy in maintaining financial stability.

Studying the Indian economy in this context is relevant for several reasons. First, the financial system has undergone significant developments and diversification over recent decades, driven by economic reforms, and it emerged relatively unscathed from the global financial crisis. Second, India implemented an inflation-targeting monetary policy framework in 2016, with the focus shifting from direct instruments like reserve requirements to indirect instruments like interest rates and liquidity adjustment facilities, facilitating an analysis of the relationship between monetary policy instruments and financial stability indicators. Third, the evolving transmission mechanism of monetary policy in India warrants further research.

This paper examines the effectiveness of monetary policy in maintaining financial stability in India using the Structural Vector Autoregressive (SVAR) model for 2011 M01 to 2024 M04. The paper contributes to the existing literature in a significant way as it explores the intersection of financial stability with monetary policy across three varied dimensions, namely banking, stock market, and external stability.

The rest of the paper is organised as follows. Section 2 briefly discusses the theoretical background for the monetary policy transmission mechanism. Section 3 discusses the relevant literature. Section 4 explains the econometric methodology used for estimation. Section 5 presents the variables used in the model along with their macro-theoretic linkages and identification scheme. Section 6 discusses the results and Section 7 presents the conclusion of the paper followed by policy implications.

2. Monetary Policy Transmission Mechanism: Theoretical Background

Fundamental macroeconomic theories relate the monetary policy intervention with real economic activities, which can lead to a build-up of financial vulnerabilities in the economy. A change in the policy interest rate is transmitted to the entire spectrum of interest rates in money and bond markets along with the lending and deposit rates in the banking system (interest rate channel). The effect on asset prices can lead to a change in consumption spending due to the associated wealth effect (asset price channel). The monetary policy intervention also influences the assets and liabilities of the banks, thereby affecting their willingness to extend credit to the borrowers (credit channel). In the event of an expansionary monetary policy, banks and investors may pursue higher-risk investments to offset income losses from low rates, prompting looser lending standards and greater risk-taking (risk-taking channel). A change in policy rates can also affect external competitiveness and inflation in the economy through its effect on the demand for domestic currency relative to foreign currency (exchange rate channel). These channels of monetary policy transmission are relevant for financial stability in the economy.

3. Review of Literature

3.1. Relationship Between Monetary Policy and Financial Stability

During the period preceding the GFC, central banks predominantly focused on preserving price stability while fostering robust economic growth, relying on short-term interest rates as their primary policy tool. Capital markets were presumed to operate flawlessly within this monetary policy framework, with the macroeconomic ramifications of financial market imperfections often overlooked in forecasting models. Consequently, conventional models of monetary policy failed to account for the risk-taking channel of transmission, leading to an underestimation of the impact of the policy interventions on both the likelihood and magnitude of financial crises. It is argued that expansionary monetary policy sparks the risk-taking behaviour of banks and financial institutions due to their reliance on short-term funding, thereby fuelling instability in the asset and financial markets (Diamond & Rajan 2009, 2012).

Smets (2014) divided the literature into three different categories. Firstly, leaning against the wind refers to monetary policy with a somewhat higher policy interest rate than warranted by simply reaching the inflation target

and stabilising the real economy without considering the effects on financial stability (Boris & Lowe, 2002; Borio & White, 2004; Svensson, 2017). The second category of literature emphasises that financial stability and price stability are closely related and financial stability should be given priority as a monetary policy objective as the latter also affects price stability significantly (Brunnermeier & Sannikov, 2014). Finally, the third view assumes that there should be separate policies to achieve financial stability and price stability. Financial stability can be safeguarded through macroprudential policies which involve designing policies that can make the banking system more resilient (Nachane, 2014).

A large and growing body of empirical literature has examined synergies between monetary policy intervention and financial stability with the emergence of several contrasting themes. A stable financial system is crucial for effective monetary policy transmission in the economy and maintaining a low and stable inflation rate (Billi & Verdin, 2014). On the other hand, there is literature to suggest that price stability is a necessary condition for a stable financial system (Venter, 2020; Borio & Lowe, 2002; Blinder, 1999). Patnaik *et al.,* (2019) suggest that a trade-off between price and financial stability constrains the ability of the monetary authority to use monetary policy as a tool to target financial stability. This view has contributed to the surfacing of financial risks during the crisis periods beneath a low-inflation regime by fostering optimistic expectations about economic growth, thereby exacerbating indebtedness and discrepancies in the asset market (Shirakawa, 2012). Thus, the nature of the relationship between monetary policy and financial stability does not appear to be unidirectional. In the context of the Indian economy, monetary policy is found to facilitate financial stability (Padha *et al*., 2021) with a significant bi-directional causal link between banking stability and macroeconomic indicators (Dhal *et al*., 2011). Bernanke (2020) suggests that monetary easing encourages private players to take risks (risk-taking channel). However, there may be excessive risk-taking if investors are less than perfectly rational about the trade-off between risk and return or if institutional arrangements distort incentives for risk-taking. All these concerns can lead to economic damage. In light of this evidence, an evolving question is whether policy interest rates should be increased beyond the necessary level to control financial booms and be more accommodating during financial downturns (Nair & Anand, 2020). A report by Deutsche Bundesbank (2015) recommends that monetary policy should be symmetrical throughout the financial cycle tightening during economic upswings even without inflationary pressures and easing aggressively during significant downturns but maintaining a less prolonged expansionary policy after an economic downturn. Another strand of the literature suggests that monetary policy should not aim for financial stability and that leaning against the wind is unjustified without a thorough cost-benefit analysis, which may attract the problem of moral hazard and increase volatility in the market. (Svensson, 2017; Bernanke, 2015; Ferguson, 2002). Smets (2013) argues that a central bank's focus on financial stability necessitates involvement in distributional policies, increasing political pressure, and risking time inconsistency issues that could lead to excess liquidity and financial dominance (Deutsche Bundesbank, March 2015).

Rangarajan (2021) remarks that to deal with the objectives of financial stability, standard instruments of monetary policy will not be adequate, regulation and supervision along with an appropriate monetary stance will help in maintaining financial stability.

3.2. Measures of Financial Stability

The literature extensively examines how monetary policy impacts various dimensions of financial stability, including banking, stock market, and external stability. The central bank policy interest rates inversely affect stock market indices, suggesting that interest rate adjustments can correct asset mispricing in the economy (Venter, 2020; Singh & Nadkarni, 2020). However, in the case of the Indian economy, Prabu *et al.* (2016) find that monetary policy impulses work through the banking channel with relatively ineffective transmission through the asset price channel.

Regarding banking stability, the literature suggests that monetary policy can influence the risk tolerance of banks, potentially leading to excessive risk-taking and undermining financial stability (Deutsche Bundesbank March 2015). Mishra & Burns (2017) find that in India, monetary policy shocks immediately reduce bank lending, while Chen *et al*., (2017) find that banks tend to take on more risk during periods of loose monetary policy. However, this behaviour is less prominent in well-consolidated banking sectors and under transparent monetary policy regimes.

4. Econometric Methodology

This section explains the econometric methodology used in the paper to estimate the responses to monetary policy intervention. The data is checked for seasonality, stationarity and structural breaks. VAR models (Sims, 1980) are extensively used in the literature to study the interaction of monetary policy with real variables in the economy. However, the standard reduced-form VAR model has faced criticism because its residuals are a mix of structural shocks from all the endogenous variables in the system and this system of equations is over-parameterised (Paramanik & Kamaiah, 2014). To understand the effect of a policy, it is essential to identify and isolate purely exogenous and independent shocks to the variable of interest and examine how other variables in the model react to it.

To study the monetary policy transmission in the US economy, Sims (1986) used a structural VAR (SVAR) model in which the empirical results are closely related to the real macroeconomic scenario in the economy, validating the appropriateness of the method. Subsequently, the SVAR model is widely used in the literature to examine monetary policy transmission (Blanchard & Quah, 1989; Elbourne, 2008). Based on the approach of the leading studies, the present study also uses the Structural VAR (SVAR) model, wherein the structural shocks are orthogonal, which allows us to examine the effect of a shock on one variable while the other shocks are constant (Sims, 1986). The SVAR model allows structural restrictions on the VAR model using economic theory to examine the impact of structural shocks on other variables. Consider the following structural model[1]

$$\boldsymbol{A}\boldsymbol{y}_t = \boldsymbol{C}_1\boldsymbol{y}_{t-1} + \ldots + \boldsymbol{C}_k\boldsymbol{y}_{t-k} + \boldsymbol{u}_t \quad (1)$$

where y_t represents the (n×1) vector of endogenous variables, A refers to the (n×n) matrix of contemporaneous relationship between the endogenous variables, C_i refers to the (n×n) matrix of coefficients of the lagged values of the variables and u_t refers to the (n×1) vector of uncorrelated structural errors with diagonal covariance matrix as $\boldsymbol{E}(\boldsymbol{u}_t\boldsymbol{u}_t') = \Sigma_u$. The structural parameters to be estimated include matrices **A, C**$_i$, and Σ_u. The reduced-form VAR model is estimated to obtain the structural parameters. If matrix **A** is invertible, the following reduced-form VAR model can be written.

$$\boldsymbol{y}_t = \boldsymbol{A}^{-1}\boldsymbol{C}_1\boldsymbol{y}_{t-1} + \ldots + \boldsymbol{A}^{-1}\boldsymbol{C}_k\boldsymbol{y}_{t-k} + \boldsymbol{A}^{-1}\boldsymbol{u}_t \quad (2)$$

$$\Rightarrow \boldsymbol{y}_t = \boldsymbol{B}_1\boldsymbol{y}_{t-1} + \ldots + \boldsymbol{B}_k\boldsymbol{y}_{t-k} + \boldsymbol{e}_t \quad (3)$$

where $\boldsymbol{A}^{-1}\boldsymbol{C}_i = \boldsymbol{B}_i$ and $\boldsymbol{A}^{-1}\boldsymbol{u}_t = \boldsymbol{e}_t$. The errors in the reduced-form VAR (equation 3) are correlated and represent the weighted average of the structural shocks. The estimation of VAR coefficients **(B**$_i$**)** is by an equation-by-equation OLS technique. The covariance matrix of the errors in the VAR model $\left(\boldsymbol{E}\left(\boldsymbol{e}_t\boldsymbol{e}_t'\right) = \Sigma_e\right)$ is estimated from the sample covariance matrix of the residuals $\left(\widehat{\Sigma_e}\right)$. The relationship between the Σ_e and Σ_u is as follows

$$\Sigma_e = \left(A^{-1}\right)\Sigma_u(A^{-1})' \quad (4)$$

The estimates of the parameters of the VAR model (**B**$_i$ and Σ_e) are used to estimate the structural parameters (**A, C**$_i$ and Σ_u) of SVAR model.

To understand the identification of structural parameters, assume a model with one lag. The error covariance matrix of the VAR model (Σ_e) has $\frac{n(n+1)}{2}$ pieces of information as it is a symmetric matrix, while **B**$_i$ has n^2 elements. On the other hand, under the SVAR model, the matrix **A** requires $(n^2 - n)$ parameters to be estimated[2], Σ_u requires n variances to be estimated (covariances are zero in SVAR), and **C**$_i$ requires n^2 unknown coefficients to be estimated. For the exact identification of the structural parameters, $2n^2 - \left(\frac{n(n+1)}{2} + n^2\right) = \frac{n(n-1)}{2}$ restrictions are required on the SVAR model. The model would be over-identified if more than $\frac{n(n-1)}{2}$ restrictions are imposed.

Various identification schemes are employed in the estimations of SVAR. This paper imposes the zero short-run restrictions identification scheme (Cholesky identification scheme) that assumes some shocks in the model do not have a contemporaneous effect on one or more endogenous variables. It is imposed by assuming matrix **A** to be lower triangular where the elements above the diagonal are zero, and this matrix can be recovered by taking a Cholesky decomposition of Σ_e. This restriction

[1] The model can be generalised to include an intercept and a set of exogenous variables.
[2] The diagonal elements of matrix A are unity.

imposes a causal ordering on the endogenous variables, whereby shocks to a specific equation contemporaneously impact the variables listed after it. At the same time, they influence the variables ordered before it only after a lag. Given this perspective, the causal sequence selected by a researcher indicates their assumptions about the interconnections among the variables in the VAR model. The orthogonality of structural shocks in the SVAR model allows the impulse-response analysis by constructing impulse-response functions (IRFs).

5. Data and Identification Scheme

5.1. Data and Macro-Theoretic Linkages

The paper examines the impact of monetary policy intervention on financial stability measures. Following Bernanke & Gertler (1995) and Sims (1998), this paper considers the short-term policy rate (repo rate) as the monetary policy variable. An increase in the repo rate increases the interest rate that the RBI charges commercial banks for short-term loans, decreases liquidity in the financial system, and thus represents a tightening of monetary policy. This measure is reflective of the distress of the financial sector in the economy and is thus superior to the monetary aggregate measures. Moreover, the repo rate shows significant variation over time, thus allowing us to examine the monetary policy transmission.

For financial stability measures, we consider three dimensions, namely, banking, stock market-related and external stability. The banking stability is gauged through the growth of domestic credit in the economy. The synergies between credit growth and crisis are well-studied in the literature (Jordà *et al*., 2013; Calvo & Reinhart, 2000). Therefore, it is incorporated into the model to examine the effect of monetary policy on credit cycles and thereby examine the credit channel of monetary policy. Moreover, the response of bank credit to policy shock facilitates examining the risk-taking channel as well[3].

The other measure of financial stability is based on the stock market. As the policy rate increases (contractionary policy), the equity is expected to become less attractive than bonds as an asset class. Therefore, the equity prices are expected to fall and, through Tobin's Q ratio, reduce investment. The fall in equity prices can also hamper the consumption of households through the wealth effect. The Bombay Stock Exchange Sensex is used to capture the equity prices in India and the effectiveness of the asset price channel of monetary policy.[4].

The third measure of stability is through the feedback from the open economy channel, and the exchange rate is used to capture it. The sudden movement in the direction and magnitude of international capital flows and changes in export competitiveness are reflected in the exchange rate. An increase in the policy rate is expected to lead to exchange rate appreciation due to capital inflows. However, the actual effect largely depends on India's level of capital account openness and the ratio of interest-sensitive capital flows in the total movement. There is also a possibility that tightening monetary policy depresses the expectation of growth prospects and leads to capital outflows, thereby leading to currency depreciation. Therefore, the expected response under the exchange rate channel is ambiguous.

Oil prices are included in the model to account for external supply shocks, while the US monetary policy measure is a proxy for international financial conditions. The mandate of monetary policy requires controlling inflation and maintaining economic growth; therefore, inflation (based on CPI) and output growth (based on the index of industrial production)[5] are included in the model. The data is found to have a structural break during the COVID-19 pandemic period, and a dummy variable is added as an exogenous variable to control for it.[6] The period of analysis is from January 2011 to April 2024. The details of variables with their definitions and sources are presented in Table 1.

[3] We used total bank credit and non-food credit in the model to check for robustness. The results were found to be similar.
[4] We also used the Nifty 50 index and found similar results for the same.
[5] Real GDP should be used to measure the output growth in the economy. However, given its unavailability in monthly frequency, we have used IIP as a proxy. Note that IIP only covers the manufacturing sector. Therefore, its response to policy shock should be read with caution (Mishra *et al*., 2016). Seasonality adjustment is done for the IIP and CPI inflation series using the Census Bureau's X-12 routine.
[6] The dummy variable is based on National Bureau of Economic Research (NBER) business cycle dates. https://www.nber.org/research/data/us-business-cycle-expansions-and-contractions

5.2. Identification of the Empirical Model

The SVAR model estimations require restrictions to be imposed on its coefficients, and this paper employs the Cholesky Identification scheme. This scheme assumes that the shocks onto the equation of one variable contemporaneously affect all the variables below that equation and affect the variables above that equation with a lag. Based on the methodology discussed, the matrix **A** is lower triangular, and the ordering of the variables is as follows

$$\begin{pmatrix} u_{oil_price} \\ u_{tb3us} \\ u_{iip} \\ u_{cpi_inflation} \\ u_{credit_growth} \\ u_{sensex} \\ u_{repo_rate} \\ u_{exchange_rate} \end{pmatrix} = \begin{pmatrix} b_{11} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ b_{21} & b_{22} & 0 & 0 & 0 & 0 & 0 & 0 \\ b_{31} & b_{32} & b_{33} & 0 & 0 & 0 & 0 & 0 \\ b_{41} & b_{42} & b_{43} & b_{44} & 0 & 0 & 0 & 0 \\ b_{51} & b_{52} & b_{53} & b_{54} & b_{55} & 0 & 0 & 0 \\ b_{61} & b_{62} & b_{63} & b_{64} & b_{65} & b_{66} & 0 & 0 \\ b_{71} & b_{72} & b_{73} & b_{74} & b_{75} & b_{76} & b_{77} & 0 \\ b_{81} & b_{82} & b_{83} & b_{84} & b_{85} & b_{86} & b_{87} & b_{88} \end{pmatrix} * \begin{pmatrix} e_{oil_price} \\ e_{tb3us} \\ e_{iip} \\ e_{cpi_inflation} \\ e_{credit_growth} \\ e_{sensex} \\ e_{repo_rate} \\ e_{exchange_rate} \end{pmatrix}$$

The equations of the SVAR model assume a recursive transmission mechanism. The first equation of the model ensures that oil price inflation is independent of all the variables in the model and contemporaneously affects them all in this forward-looking monetary policy framework. The second equation assumes that the treasury bill rate of the US economy is dependent on oil prices but has a contemporaneous effect on all other variables in the model except oil price inflation. The third equation shows the impact of oil price inflation and US monetary policy on the output growth of the Indian economy. The output growth (measured by IIP) has a contemporaneous effect on the equations below it. The fourth equation shows the dependence of inflation on oil price inflation, US monetary policy and IIP in the Indian economy. The measures of financial stability follow in the next two equations. Credit growth is assumed to contemporaneously affect the Sensex, policy rate and exchange rate, while Sensex only has an immediate impact on the policy rate and exchange rate. The seventh equation is the monetary policy reaction function that depends on the assumptions of information delays (Sims and Zha, 1998). Therefore, policy rate change has no contemporaneous effect on output and price levels in the economy and only has a sudden impact on the exchange rate.

6. Results and Discussion

The first step under VAR estimation is to check for time series properties of the variables. The unit root tests are conducted for all the endogenous variables. The variables are found to follow the I(1) process. Consequently, the long-run relationship between the endogenous variables

Table 1. Definitions and sources of the variables.

Variable	Definition	Transformation	Source
Oil_Inflation	Crude oil (petroleum) is a simple average of three spot prices: Dated Brent, West Texas Intermediate, and the Dubai Fateh.	Log Difference (twelfth difference)	IMF Primary Commodity Database https://data.imf.org
Tb3USA	3-month treasury bill of the US, secondary market		Federal Reserve Bank of St. Louis Economic Data www.fred.stlouisfed.org
IIP	Index of industrial production seasonally adjusted using Census X12	Log Difference (twelfth difference)	RBI Database of Indian Economy www.dbie.rbi.org.in
CPI_Inflation	CPI-Combined since 2012, extrapolated using growth rate of CPI-IW for the period before 2012 Annual growth rate	Log Difference (twelfth difference)	RBI Database of Indian Economy www.dbie.rbi.org.in
Credit_Growth	Bank Credit	Log Difference (twelfth difference)	RBI Database of Indian Economy www.dbie.rbi.org.in
Sensex	BSE Sensex index (average values of every month, 1978-79=1000)	Log Difference (twelfth difference)	RBI Database of Indian Economy www.dbie.rbi.org.in
Repo_Rate	Policy Rate		RBI Database of Indian Economy www.dbie.rbi.org.in
Exchange_Rate	Indian rupee /US dollar spot exchange rate	Log Difference (twelfth difference)	RBI Database of Indian Economy www.dbie.rbi.org.in

was examined and the presence of the same provides support for estimating the VAR in levels[7].

The next step was to choose the appropriate lag length for VAR estimation. The Akaike information criterion and LR test suggest 8 lags. The joint lag exclusion test rejects the null of zero coefficients at 1, 2, 3, 4, 5, and 8 lags.[8]. Therefore, 8 lags were used for estimation and the Lagrange Multiplier (LM) test provided evidence that the residuals are not serially correlated with the chosen lag. After imposing the identification restrictions on the VAR model to estimate the SVAR model, the results for the Impulse Response Functions (IRFs) are obtained. The paper estimates generalised impulse response functions which are not affected by the ordering of the variables.

The IRFs trace out the dynamic responses of variables in the system to the shocks to other variables in the system. Figure 1 shows Cholesky IRFs of IIP, inflation and `in repo rate.[9]. Each figure shows the 95per cent bootstrapped confidence band for the impulses. There is a fall in output growth in response to an increase in the policy rate, with the evidence of positive response only after six months of the shock. However, the effect of the repo rate on IIP is not significant. An increase in the repo rate (contractionary monetary policy) is found to have a significant negative impact on inflation two months after the shock, with a peak in the seventh month after the shock. The effect dies out in the long run. Thus, we do not find evidence of a price puzzle in the case of the Indian economy, in line with Sengupta (2014). The fall in the price index persists for a long period after the intervention. Therefore, monetary policy intervention can maintain price stability in India.

The negative response of domestic credit growth to policy rate innovation signals that monetary policy can be used as a tool to tame the credit cycles in the economy. The slow response of bank credit to monetary policy shock in the first few months is expected because the loans are contractual commitments, and their stock is relatively less flexible in the short run (Sengupta, 2014). However, the bank credit falls considerably in subsequent months, providing evidence of the bank credit channel of monetary policy transmission, and the effect dies out after twenty-two months from the shock. The IRF here also implies that in the case of expansionary monetary policy (negative shock to repo rate), the domestic credit growth increases by a large magnitude and becomes significant four months after the shock. Thus, the paper

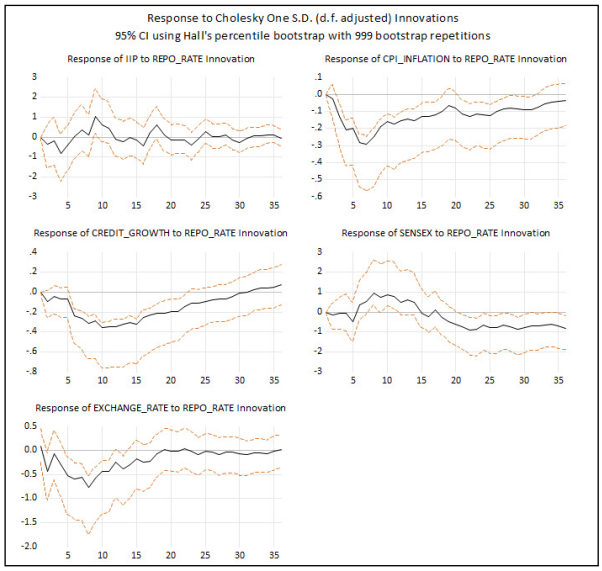


Figure 1. Response of domestic variables to repo rate shock.

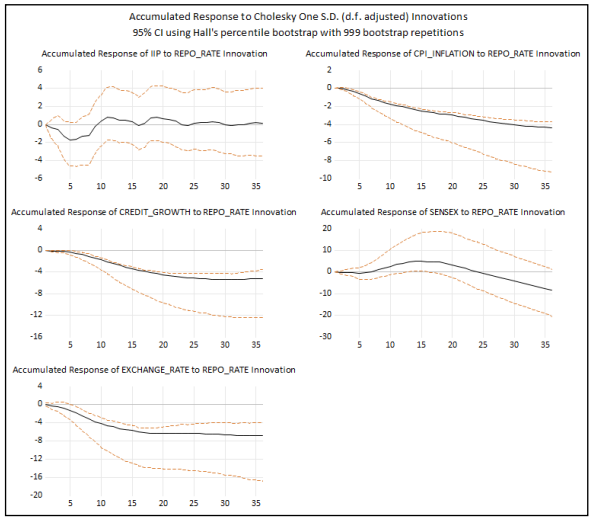


Figure 2. Accumulated responses of domestic variables to repo rate shock.

[7] The results for unit root and cointegration tests are not presented here for the sake of brevity. The study uses Johansen's cointegration approach to test for long-run relationships between the endogenous variables.
[8] The estimation and the impulse response functions are also obtained for 4 and 5 lags, which are similar to the current results obtained.
[9] The responses are examined for 36 months after the shock to discern the short-, medium-, and long-term effects and identify the period when the effect is dying out (Dhal *et al*., 2011).

finds evidence of the risk-taking behaviour of banks in the event of loose monetary policy. This may lead to the creation of credit bubbles in the economy, thereby elevating the vulnerability and instability of the financial system.

The stock market index response to the policy rate is insignificant and negative on impact but turns positive and significant after six months from the shock. In the medium term, the effect turns significant and negative, as expected.

The response of the exchange rate shows an appreciation as a result of an increase in the repo rate, with the effect being significant after four months and dying out in the long run.

The responses over short, medium, and long-term horizons are examined through the accumulated responses (Figure 2). An increase in repo rate has a short-term impact of reducing output growth, but the effect dies out in the medium and long run. The inflation responds well to the monetary policy shock in India. The effect on credit growth picks up pace after five months from shock and persists in the medium term (till 24 months from the shock). The immediate impact on Sensex is a fall in the index, followed by an increase in the medium term and a fall in the long term. Thus, there is no clear movement in the Indian stock exchange index in response to monetary policy shock. The exchange rate appreciates on impact, and the effect persists for fifteen months after the shock.

7. Conclusion and Policy Implications

This paper aims to study the impact of monetary policy intervention through the repo rate on the banking, stock market and external stability of the Indian economy for the period 2011 M01 to 2024 M04. Results suggest that the bank lending channel is more responsive to monetary policy shock in India than the asset price (stock market) channel. However, there is also evidence of financial vulnerabilities stemming from the risk-taking behaviour of banks in case of loose monetary policy with excessive credit lending. Therefore, there is a need for macroprudential regulations on banks and financial institutions to restrict risky lending and address financial imbalances. Since 2004, India has been using macroprudential policy in the form of counter-cyclical measures and adjusting for risk in sectors like residential and commercial real estate, capital market, other retail sectors and Non-Banking Financial Companies (NBFCs) (Sanyal & Singh, 2023). A recent empirical study by Kumar *et al*., (2022) finds that tightening of the macroprudential policy affects bank credit and housing prices, whereas a loose policy affects housing credit.

The exchange rate channel shows a significant response in the expected direction, possibly due to the influx of foreign capital. The results indicate that monetary policy in India effectively controls inflation, while the insignificant response of output growth suggests the lack of overheating risk in the economy.

The paper has some important policy implications. Firstly, the objective of price stability by setting an inflation target could be achieved through an expansionary monetary policy based on low interest rates. However, the banks could take additional risks by giving excessive credit leading to a higher risk of default and thus banking failures. Hence flexible inflation targeting framework could be improved in India by including financial stability as an objective of monetary policy. Secondly, changes in monetary policy in the global economy may have a spillover effect on the domestic economy through an impact on the currency, trade flows, capital flows, and increasing volatility in the financial markets. Monetary policy in such circumstances has to constantly monitor changes in the world economy, and adequately adjust policies to combat external vulnerability. To manage expectations and avoid surprises, the RBI must communicate policy choices to the public and markets in an effective and timely manner.

8. References

Adrian, T., de Fontnouvelle, P., Yang, E., & Zlate, A. (2017). Macroprudential policy: a case study from a tabletop exercise. *Economic Policy Review*, (23-1), 1-30.

Bernanke, B. S. (2015). *Should monetary policy take into account risks to financial stability?* Speech in London, May 20, 2014.

Bernanke, B. S., & Gertler, M. (1995). Inside the black box: The credit channel of monetary policy transmission. *Journal of Economic perspectives, 9*(4), 27-48. https://doi.org/10.1257/jep.9.4.27

Bernanke, B. S. (2020). The new tools of monetary policy. *American Economic Review, 110*(4), 943-83. https://doi.org/10.1257/aer.110.4.943

Billi, R. M., & Vredin, A. (2014). Monetary policy and financial stability-a simple story. *Sveriges Riksbank Economic Review, 2.*

Blanchard, O., & Quah, D. (1989). The dynamic effects of aggregate demand and supply shocks. *American Economic Review, 79*(4), 655–73.

Boris, C. E., & Lowe, P. W. (2002). *Asset prices, financial and monetary stability: exploring the nexus*. Bank of International Settlements (BIS). https://doi.org/10.2139/ssrn.846305

Boris, C., & W. White (2004). "Whither monetary and financial stability? The implications of evolving policy regimes," *BIS Working Paper 147*. https://doi.org/10.2139/ssrn.901387

Brunnermeier, M., & Y. Sannikov (2014). "A Macroeconomic Model with a Financial Sector," *American Economic Review, 104*, 379-421. https://doi.org/10.1257/aer.104.2.379

Calvo, G., & C. Reinhart. (2000). *When capital inflows come to a sudden stop: Consequences and policy options*. In Reforming the international monetary and financial system, ed. P. Kenen and A. Swoboda. Washington, D.C: International Monetary Fund.

Chen, M., Wu, J., Jeon, B. N., & Wang, R. (2017). Monetary policy and bank risk-taking: Evidence from emerging economies. *Emerging Markets Review, 31*, 116-40. https://doi.org/10.1016/j.ememar.2017.04.001

Dash, D. P., & Sethi, N. (2022). Pandemics, lockdown, and economic growth: A region-specific perspective on COVID-19. *Bulletin of Monetary Economics and Banking, 25*, 43-60. https://doi.org/10.21098/bemp.v25i0.1841

Deutsche Bundesbank. "*The importance of macroprudential policy for monetary policy.*" March 2015.

Dhal, S., Kumar, P., & Ansari, J. (2011). Financial stability, economic growth, inflation and monetary policy linkages in India: An empirical reflection. *Reserve Bank of India Occasional Papers, 32*(3), 1-35.

Diamond, D. W., & Rajan, R. G. (2009). Illiquidity and interest rate policy (No. w15197). National Bureau of Economic Research. https://doi.org/10.3386/w15197

Diamond, D. W., & Rajan, R. G. (2012). Illiquid banks, financial stability and interest rate policy. *Journal of Political Economy, 120*(3), 552-91. https://doi.org/10.1086/666669

Elbourne, A. (2008). The UK housing market and the monetary policy transmission mechanism: An SVAR approach. *Journal of Housing Economics, 17*(1), 65-87. https://doi.org/10.1016/j.jhe.2007.09.002

Ferguson, R. W. (2002). Should financial stability be an explicit central bank objective? *Challenges to Central Banking from Globalized Financial Systems,* 16-17.

Gopinath, G. (2020). *The great lockdown: Worst economic downturn since the great depression*. IMF-Blog. https://www.imf.org/en/Blogs/Articles/2020/04/14/blog-weo-the-great-lockdown-worst-economic-downturn-since-the-great-depression

Halder, A., & Sethi, N. (2021). The news effect of COVID-19 on global financial market volatility. *Bulletin of Monetary Economics and Banking, 24*, 33-58. https://doi.org/10.21098/bemp.v24i0.1464

Jordà, Ò., Schularick, M., & Taylor, A. M. (2013). When credit bites back. *Journal of Money, credit, and Banking, 45*(s2), 3-28. https://doi.org/10.1111/jmcb.12069

Kumar, S., Prabheesh, K. P., & Bashar, O. (2022). Examining the effectiveness of macroprudential policy in India. *Economic Analysis and Policy, 75*, 91-113. https://doi.org/10.1016/j.eap.2022.04.011

Mishkin, F. S. (1997). *The causes and propagation of financial instability: Lessons for policymakers*. Federal Reserve Bank. 55-96

Mishra, P., Montiel, P., & Sengupta, R. (2016). *Monetary transmission in developing countries: Evidence from India*. 59-110. Springer India. https://doi.org/10.1007/978-81-322-2840-0_3

Mishra, A., & Burns, K. (2017). The effect of liquidity shocks on the bank lending channel: Evidence from India. *International Review of Economics & Finance, 52*:55-76. https://doi.org/10.1016/j.iref.2017.09.011

Nachane, D. M. (2014). Monetary policy, financial stability and macro-prudential regulation: An Indian perspective. *Market, Regulations and Finance: Global Meltdown and the Indian Economy*. 17-39. https://doi.org/10.1007/978-81-322-1795-4_2

Nair, A. R., & Anand, B. (2020). Monetary policy and financial stability: Should central bank lean against the wind? *Central Bank Review, 20*(3), 133-42. https://doi.org/10.1016/j.cbrev.2020.03.006

Padha, V., Jena, P. K., Mishra, B. R., & Mahalik, M. K. (2021). Is monetary policy safeguarding financial stability in India? *Journal of Public Affairs, 21*(2), e2196. https://doi.org/10.1002/pa.2196

Paramanik, R. N., & Kamaiah, B. (2014). A Structural Vector Autoregression Model for Monetary Policy Analysis in India. *Margin, 8*(4), 401-29. https://doi.org/10.1177/0973801014544580

Patnaik, Shalini Mittal and Radhika P. (2019), "Examining the trade-off between price and financial stability in India." *NIPFP Working paper series, 248*. https://www.nipfp.org.in/media/medialibrary/2019/01/WP_248_3QaIR8x.pdf

Prabu, E., Bhattacharyya, I., & Ray, P. (2016). Is the stock market impervious to monetary policy announcements: Evidence from emerging India. *International Review of Economics & Finance, 46*, 166-79. https://doi.org/10.1016/j.iref.2016.09.007

Rangarajan, C. (2021). Evolving Contours of Monetary Policy. *Economic & Political Weekly, 56*(20), 35.

Sanyal, A., & Singh, S. (2023). Macroprudential Policy and Tail Effects on Growth in India. *Reserve Bank of India Occasional Papers, 44*(2).

Sengupta, N. (2014). Changes in transmission channels of monetary policy in India. *Economic and Political Weekly*, 62-71.

Shirakawa, M. (2012). *Deleveraging and growth- Is the developed world following Japan's long and winding road?* Yale School of Management.

Sims, C. A. (1980). Macroeconomics and reality. *Econometrica: Journal of the Econometric Society*. 1-48. https://doi.org/10.2307/1912017

Sims, C. A. (1986). Are forecasting models usable for policy analysis? *Quarterly Review, 10*(Win), 2-16. https://doi.org/10.21034/qr.1011

Sims, C. A. (1998). Comment on Glenn Rudebusch's" Do measures of monetary policy in a VAR make sense?". *International Economic Review, 39*(4), 933-41. https://doi.org/10.2307/2527345

Sims, C. A., & Zha, T. (1998). Bayesian methods for dynamic multivariate models. *International Economic Review*. 949-68. https://doi.org/10.2307/2527347

Singh, B., & Nadkarni, A. R. (2020). Role of credit and monetary policy in determining asset prices: Evidence from emerging market economies. *The North American Journal of Economics and Finance, 51*, 100874. https://doi.org/10.1016/j.najef.2018.11.003

Smets, Frank. "Financial stability and monetary policy: How closely interlinked?" *Economic Review (Sveriges Riksbank) 3*, 121-59.

Subbarao, D. (2012). Price stability, financial stability, and sovereign debt sustainability policy challenges from the new trilemma. *Macroeconomics and Finance in Emerging Market Economies, 5*(2), 246-59. https://doi.org/10.1080/17520843.2012.686921

Svensson, L. E. (2012). The relation between monetary policy and financial policy. *International Journal of Central Banking, 8*(supplement 1), 293-5.

Svensson, L. (2017). "Cost-benefit analysis of leaning against the wind," *Journal of Monetary Economics 90*, 193-213. https://doi.org/10.1016/j.jmoneco.2017.07.004

Venter, Z. (2020). The interaction between conventional monetary policy and financial stability: Chile, Colombia, Japan, Portugal, and the UK. *Comparative Economic Studies, 62*(3), 521-54. https://doi.org/10.1057/s41294-020-00129-w PMid:32836740 PMCid: PMC7396729.

Viñals, J. (2013). *Making macroprudential policy work*. Speech delivered at the Brookings Institution, Washington, DC, September 16.