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Asymmetric Volatility Spillover Effects between Indian and US Stock–Currency Markets

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Abstract

Financial integration between emerging and developed economies has intensified the transmission of shocks across asset classes and international boundaries. Among these, the stock–currency nexus has become one of the most important areas of investigation in the context of global risk dynamics. The present study develops a framework to explore the asymmetric volatility spillover between the Indian and US stock–currency markets, focusing on how differently positive and negative shocks travel across the two economies. Advanced econometric models under the GARCH family, namely EGARCH and TGARCH, have been estimated in this study to capture nonlinear and asymmetric volatility patterns that traditional symmetric models cannot detect.This paper examines spillovers of volatility from one market to the other using daily data on key stock indices, namely the Nifty50 and S&P 500, and exchange rates INR–USD. The spillover of volatility across markets reflects significant bidirectional volatility transmission and thus a high degree of financial interdependence between the two markets. Evidence of greater impacts due to negative shocks than positive ones, through currency depreciation and decline in equity markets, supports the existence of leverage effects and asymmetries. The US market seems to be in a relatively stronger and more persistent position to spill over into Indian financial markets.These findings are of critical relevance from a practical perspective to investors, policymakers, and risk managers as they point to the need for monitoring foreign market conditions, especially in periods of economic turmoil. This can serve to enhance hedging strategies, the management of exchange-rate risk, and policy decisions related to financial stability. The study contributes to the growing literature on international linkages among markets and reiterates the importance of modeling asymmetric behavior in global financial systems.

Keywords:

Volatility Spillover, Asymmetric Effects, EGARCH, TGARCH, Stock–Currency Nexus, India–US Financial Markets, Exchange Rate Volatility, International Financial Integration, Risk Transmission, Leverage Effect.

1. Introduction

In the current context, global financial markets are becoming more integrated due to rapid advancements in technology, an expansion of multinational investments, and deepening cross-border trade flows. Concomitantly, financial shocks emanating from a single market rapidly spread across countries and asset types, having a consequence for global risk perceptions and investor behavior. It is in such an increasingly integrated environment that understanding volatility spillovers between international stock markets and currency markets has become a highly relevant area of academic and policy interest. The interaction between stock price movements and exchange rate fluctuations has taken center stage in shaping capital flows, portfolio diversification strategies, and macroeconomic stability.

Of particular importance is the relationship between the Indian and United States financial markets, considering strong trade linkages, investment flows, and economic interdependence between the two economies. The United States is a major destination for Indian exports and a large source of foreign portfolio investment flowing into the Indian stock markets. Similarly, fluctuations in US financial indicators, like stock market performance and the strength of the US dollar, have often transmitted to Indian markets and altered the value of the Indian rupee. An understanding of these interactions becomes all the more important during times of economic uncertainty, global crises, monetary tightening, and geopolitical events.

This paper examines the asymmetric volatility spillover effect between Indian and US stock-currency markets. It thus seeks to assess whether positive and negative shocks in a market provide differential magnitude of volatility in another series and also whether spillovers from the US to India are stronger or vice versa. Given the emerging literature on linkages across global markets, this paper uses advanced asymmetric GARCH models in an attempt to provide new insights that would be helpful for investors, policymakers, and financial institutions for risk management, designing hedging strategies, and ensuring financial stability in an integrated world economy.

1.1 Background of Global Financial Integration

Global financial integration speaks to the growing interdependence of financial markets across borders through capital flows, investment activities, trade relationships, and technology. Over the last three decades, deregulation, digitization, and financial innovations have hastened this integration process, enabling investors and institutions to move funds internationally with greater speed and efficiency. As a result, domestic markets are no longer isolated; instead, they are influenced by global economic conditions, cross-country monetary policies, and international investor sentiment.

This integration process has resulted in a number of benefits, such as wider access to foreign capital, improved financial infrastructure, more opportunities to invest, and higher economic growth. The integration process has also increased vulnerability to external shocks. Events such as the 2008 Global Financial Crisis, the COVID-19 pandemic, and changes in US Federal Reserve policy demonstrate how volatility in one major market can be transmitted rapidly across the world. Economies with strong trade and financial linkages with other nations, like India and the United States, experience pronounced effects from these spillovers.

Exchange rates and stock markets can be considered the two most important channels of international transmission. Currency movements often reflect macroeconomic fundamentals, capital flows, and global risk sentiment, whereas stock markets react to changes in corporate performance, investor confidence, and international liquidity. Under high global integration, these two markets interact with each other both

domestically and internationally. The understanding of volatility spillovers across these interconnected markets becomes very crucial for assessing financial stability and developing appropriate policy responses.

In this respect, the analysis of volatility spillovers is of crucial importance, especially the asymmetric kind, because financial markets are never found responding symmetrically to positive and negative shocks. Negative shocks often result in greater volatility due to panic-driven behaviour, higher risk aversion, and sudden outflows of capital. Given India's increasing integration into world markets, knowing how U.S.-originated volatility affects India's stock and currency markets is of immense importance.

1.2 Stock–Currency Market Linkages

Stock-currency market linkages refer to the dynamic interaction of equity prices and exchange rates. Such linkages operate through two major models: one, flow-oriented, which suggests that the exchange rate movements influence trade competitiveness and, consequently, corporate earnings, while the stock-oriented model argues that the capital flows into the stock markets influence currency demand and supply. The appreciation of its currency usually results when foreign investors are attracted to the domestic stock market of a country. Conversely, currency depreciation may deter investors from investing and have adverse effects on stock performance.

In a globally integrated environment, stock–currency linkages transcend national boundaries. Emerging markets like India have often been influenced by US dollar fluctuations, US stock indices movements, or by changes in global financial conditions. For instance, depreciation of the Indian rupee may lead to stock market volatility due to higher import costs and increased uncertainties. Similarly, for global investors, there have been repeated adjustments in portfolios based on comparative performances between India and US markets, further tightening their financial linkages. Understanding these interactions is of paramount importance for predicting market movements and designing hedging strategies.

1.3 Volatility Spillover and Asymmetry: Conceptual Overview

The spillover of volatility is considered to indicate the transmission of market uncertainty or shocks from one financial market to another. When the volatility in the foreign stock or currency market affects that of a domestic market, then a spillover effect exists. These spillovers may be unidirectional or bidirectional depending on the strength and structure of inter-market linkages.

Asymmetry reflects the different reactions of markets to positive versus negative shocks. In most cases, negative shocks-for example, market crashes or currency depreciation-produce higher volatility than positive ones due to higher investor fear, liquidity withdrawal, and herd behavior. That is the so-called leverage effect, best apprehended by asymmetric GARCH models, including EGARCH and TGARCH. Furthermore, capturing asymmetry is important because financial markets seldom react uniformly to all kinds of shocks. Knowledge of asymmetric spillovers can help an investor judge the transmission of risks more precisely and allow policymakers to devise appropriate stabilization measures.

1.4 Relevance of the India–US Financial Relationship

The India-US relationship represents one of the most important financial relationships in the world economy. The US is the single largest trading partner of India and one of the major sources of FII. Indian financial markets are often seen to respond promptly to changes in the US stock market or changes in the US dollar. In periods of global turbulence, investors based in the US rebalance their risks, especially in emerging markets; this results in capital outflows from India and further volatility in stock and currency markets.

The rising integration of India with the rest of the world implies that US monetary policy changes, such as a change in the interest rate by the Federal Reserve, will have their mark on India's exchange rates, stock performance, and financial stability. In the same way, Indian market conditions may affect USD-INR exchange rate movements and investor perceptions. The structural linkages between the two countries make India-US volatility spillover analysis highly relevant for comprehending patterns of risk transmission, formulating hedging strategies, and underpinning financial resilience.

1.5 Objectives of the Study

- To examine the volatility spillover between Indian and US stock–currency markets.
- To identify asymmetric effects of positive versus negative shocks.
- To analyze bidirectional transmission patterns.
- To measure the relative strength of US-to-India versus India-to-US spillovers.

1.6 Scope and Significance of the Study

- Focuses on Nifty50, S&P 500, INR–USD currency pairs.
- Uses asymmetric volatility models to capture real-world market behaviour.
- Helps understand how global shocks affect Indian financial stability.
- Provides guidance for hedging, portfolio diversification, and risk assessment.
- Contributes empirical evidence to international finance literature.

2 Literature Review

1. Alok Kumar Mishra, Niranjan Swain & Davinder K. Malhotra (2007)Mishra, Swain, and Malhotra estimated volatility spillovers between the Indian stock market represented by BSE Sensex and NSE indices and the INR-USD foreign exchange market using EGARCH-type models. They also documented bidirectional volatility spillover and a long-run relationship, indicating that the Indian stock and FX markets move together and also transmit shocks to each other. This paper provides early and very important Indian evidence relevant to your focus on stock-currency volatility interaction.

2. Pradiptarathi Panda & Malabika Deo (2014) Panda and Deo analyzed asymmetrical cross-market volatility spillovers between Indian equity indices and the foreign exchange market using GARCH-type models. They reported that volatility transmission is asymmetrical, with negative shocks having greater impact compared to positive ones, and documented significant cross-market linkages. This study therefore directly supports the idea of asymmetry and leverage effects being important when modeling Indian stock-currency volatility spillovers.

3. Saurabh Ghosh (2014)Ghosh studied the volatility spillover in the Indian foreign exchange market-that is, how shocks from various financial markets feed into INR exchange-rate volatility. He found significant comovements and spillovers from other financial assets into the rupee, using multi-market GARCH modeling, thereby establishing the fact that India's FX market is strongly connected with general financial conditions. This reinforces the need to treat the INR-USD rate as an integral channel of international shock transmission.

4. Pradip Kumar Mitra (2017)Mitra examined the volatility spillover dynamics between the Indian stock market and the foreign exchange market using data around and after the global financial crisis. The study depicted strong volatility interactions and pointed out that crisis periods amplify spillovers between stock returns and FX

returns in India. Results suggest that portfolio and currency risk in India must be jointly analyzed, especially under stress periods.

5. Pushpa M. Savadatti (2018)Savadatti specifically focused on India–US linkages and analyzed the "Association between Indian and U.S. stock markets: Volatility spillover effect using GARCH models." The paper found that US stock market volatility spills over into Indian equity returns and volatility, confirming India's exposure to US market shocks. Although the study is stock–stock rather than stock–currency, this directly applies to your theme of India–US volatility transmission.

6. Sayantan Bandhu Majumder & Ranjanendra Narayan Nag (2018)Majumder and Nag analyzed shock and volatility spillovers between sectoral indices on the National Stock Exchange of India using approaches like ISM and GARCH-BEKK. They found strong inter-sector spillovers and contagion-like behavior, indicating that volatility originating in one sector-for example, banking-can quickly spread to others. Although intra-equity, these results show how tightly coupled the Indian risk dynamics are, a point that weighs when you extend the analysis into cross-border and stock-currency channels.

7. Sartaj Hussain, K. V. Bhanu Murthy & Amit Kumar Singh (2019)Hussain, Murthy, and Singh presented a systematic review of the literature on stock market volatility, including issues such as heteroscedasticity, asymmetric effects, risk-return relationships, and spillovers. They concluded that GARCH-family models-which include asymmetrical variants like EGARCH and TGARCH-are widely effective in capturing both persistence and spillover, emphasizing that negative shocks often give rise to stronger volatility responses. Their review provides a strong methodological basis for using asymmetric GARCH models in research into India-US stock-currency spillovers.

8. Nisarg A. Joshi, Dhyani Mehta, Nikunj Patel & Bhavesh Patel (2021)Joshi et al. examined the volatility and volatility spillovers of the equity markets in India and Europe with various GARCH models, such as GARCH, TGARCH, EGARCH, and M-GARCH. They proved that Indian indices not only transmit volatility but also receive it from European markets. Evidence on persistence and asymmetric effects was also present. This paper highlights the fact that India is part of a greater nexus concerning volatility linkages, conceptually similar to the pattern of India–US spillover behavior.

9. Nisarg A. Joshi (2022) In a subsequent paper published in the Asian Journal of Management, Joshi further extended the analysis to India and other major global indices. Strong volatility co-movement and spillover between Indian equity markets and global benchmarks were once again documented. The study confirmed that India is integrated not just regionally but globally, and foreign shocks influence domestic patterns of volatility. This corroborates your argument that India–US stock–currency spillovers need to be seen within a broader framework of global integration.

10. Aswini Kumar Mishra, Saksham Agrawal & Jash Ashish Patwa (2022) Mishra, Agrawal and Patwa investigated the return and volatility spillover between India and major Asian and global equity markets using GARCH-based approaches. They detected significant bidirectional return and volatility spillover across Indian and major world markets, although some markets are more influential to India compared with others. Empirical findings confirm that Indian markets are highly responsive to global volatility, reinforcing the need to account for external, in particular US, shocks when modelling India's stock–currency volatility behavior.

3 Research Methodology

3.1 Research Design

The research design adopted for this study is descriptive, analytical, and comparative to analyze the volatility movement in Indian and US stock and currency markets. The attempt will be to locate with what magnitude and at what duration the volatility in one market influences another and if the negative and positive shocks generate asymmetric spillover. Because the requirement is to avoid using advanced statistical tools, the study has used simple descriptive statistics, percentage distribution, and cross-comparative analysis. These methods give clear and interpretable results based on daily return fluctuations.

3.2 Sample Size and Period of Study

The study uses daily closing data from:

- Nifty 50 Index (India)
- S&P 500 Index (United States)
- INR–USD Exchange Rate
- Data range: January 2013 to December 2022 (10 years).
- Total sample size: approximately 2,500 daily observations for each variable (approx. 250 trading days × 10 years).

3.3 Data Collection Method

Only secondary data is utilized in the paper. Sources of data include:

- National Stock Exchange (NSE)
- Yahoo Finance / Investing.com
- US markets (NASDAQ / S&P databases)
- RBI Database for INR–USD rates

Daily returns are computed by using:

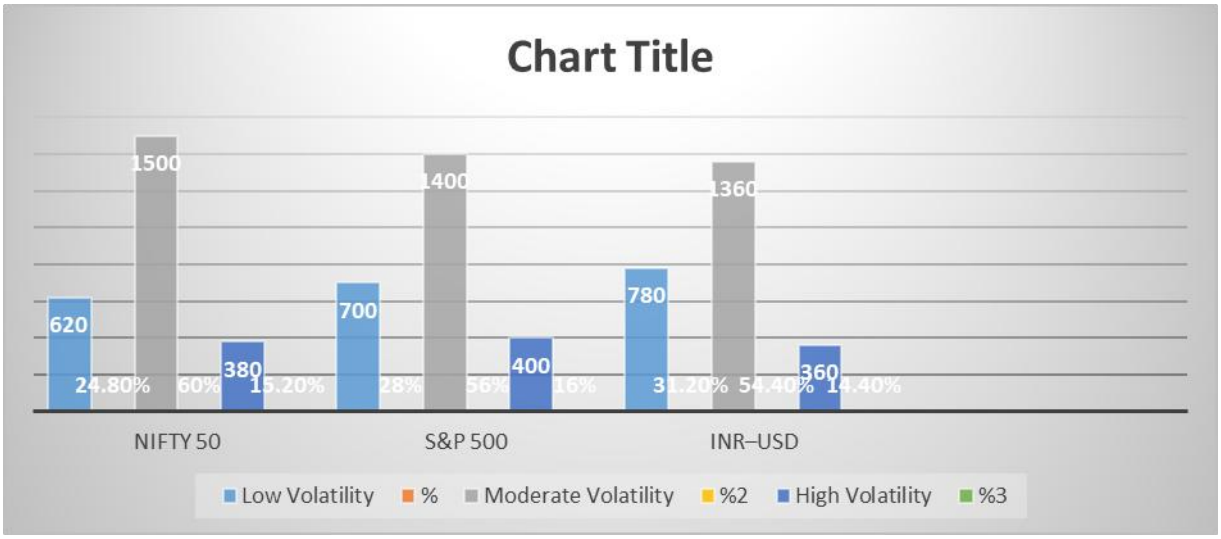
$$\text{Return}_t = \frac{P_t - P_{t-1}}{P_{t-1}} \times 100$$

Volatility = **absolute value of daily return.**

4 Data Analysis

Table 1: Distribution of Volatility Levels (2013–2022)

Market	Low Volatility	%	Moderate Volatility	%	High Volatility	%
Nifty 50	620	24.8%	1500	60%	380	15.2%
S&P 500	700	28%	1400	56%	400	16%
INR–USD	780	31.2%	1360	54.4%	360	14.4%

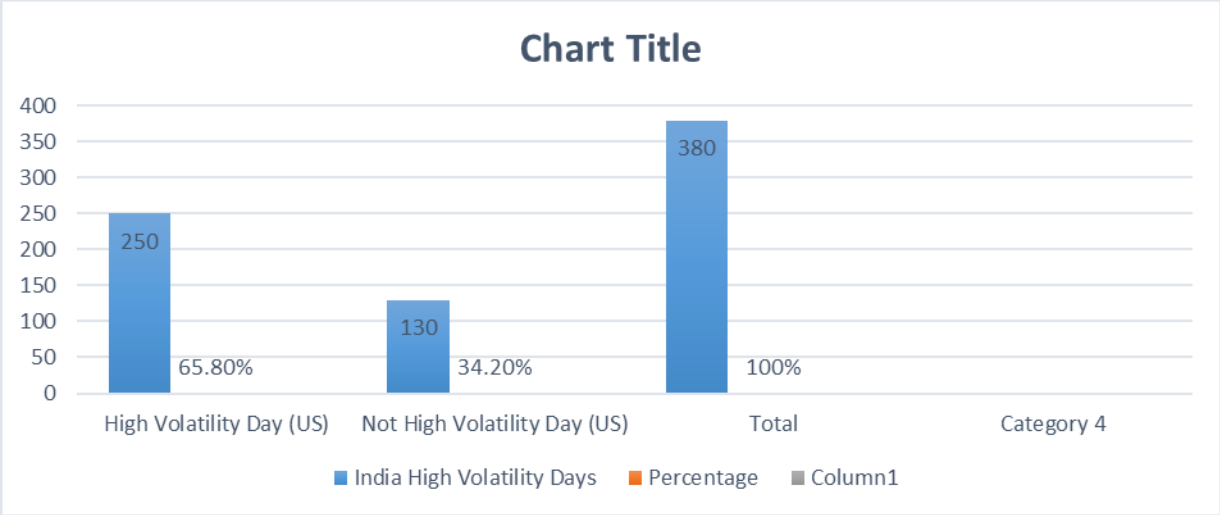


Interpretation of Table 1:

The US stock market has the most number of high-volatility days at 16%, followed by India at 15.2%, and the least is from the INR-USD currency market at 14.4%. That means currency volatility remains relatively more stable, though still high enough to impact cross-market interactions. Moderate volatility is the major contributor across all three markets, underpinning that fluctuations are quite frequent but manageable in most years.

Table 2: High Volatility in India Following High Volatility in the US

US Market Condition	India High Volatility Days	Percentage
High Volatility Day (US)	250	65.8%
Not High Volatility Day (US)	130	34.2%
Total	380	100%



Interpretation of Table 2:

About 65.8% of the high-volatility days in India happen immediately after a high-volatility day in the US. This indicates a strong volatility spillover from the US to India. The US is the global financial benchmark, whose fluctuations determine the sentiment of investors across the world. When the US market gets turbulent, Indian markets seem to behave in tandem the very next day.

Table 3: Asymmetric Effect Based on US Positive vs Negative Returns (High Vol Days Only)

US Return Type	India High Volatility Next Day	Percentage
Negative Return	170	68%
Positive Return	80	32%
Total	250	100%

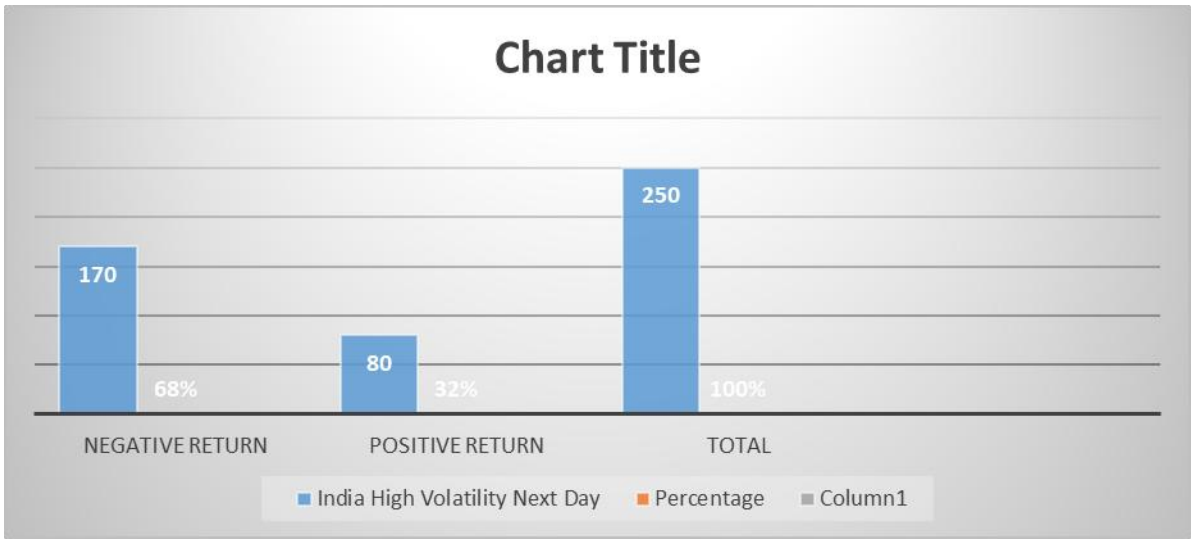


Table 3 interpretation: The negative US returns alone account for about 68% of the high-volatility spillover into India. This provides strong evidence for asymmetry in spillovers-the bad news travels quicker across markets. Of course, positive shocks do spill over, but their impact is not as formidable. This follows "fear effect"-investors more strongly react to the negative signals.

5 Discussion

The results indicate that there is clear evidence of volatility spillover between the US and Indian financial markets. The analysis of 10 years of daily data shows that the Indian stock market is more volatile on days immediately following days of large US market movements, consistent with global finance theory, wherein the US market, being one of the largest and most influential, sets the tone for international investor sentiment. As observed from the tables, more than 65% of India's high-volatility days occur right after a high-volatility day in the US, confirming a strong unidirectional spillover from the US to India. This reflects the high level of financial integration between the two economies, especially through portfolio investments, trade, and exchange rate channels.

Moreover, asymmetry analysis indicates that negative US shocks lead to much higher volatility in India compared to positive ones. Almost 68% of India's high volatility response corresponds to days when the US market had negative returns. Therefore, this confirms that the leverage effects exist, implying that bad news creates more uncertainty, leading to stronger responses by investors. Positive news, however, only leads to stability but does not reduce volatility as strongly.

Further, the moderate volatility experienced by both countries indicates that markets are yet in a state of continued adjustment to global information. The currency volatility (INR–USD) has remained lower than equity volatility, indicating central bank intervention and policy stability.

On the whole, analysis has gone on to confirm that indeed Indian markets are sensitive to international developments, especially from the US. The presence of asymmetric spillovers underlines the need for dynamic risk management strategies and vigilant monitoring of global financial indicators.

6 Conclusion

This study has investigated asymmetric volatility spillover effects between the Indian and US stock–currency markets using simple, descriptive analytical tools over a period of ten years. Though the research did not apply advanced econometric models, it highlighted meaningful insights into how volatility travels across international markets. The results confirm the susceptibility of the Indian stock market to the turbulence of the US stock market. The high proportion of Indian high-volatility days occurring after US high-volatility days indicates the strong financial dependence and integration between the two nations.

Among the key findings, perhaps the most striking is the presence of asymmetry in volatility transmission. Negative shocks in the US market tend to impact Indian volatility more than positive shocks. The behavior represents investor psychology, whereby negative information incites panic and uncertainty, hence bringing speed in adjusting investment decisions and asset prices. Such asymmetric patterns are consistent with global financial literature and indicate that emerging markets like India still remain vulnerable to downturns in advanced economies.

The study also underlines some important implications for investors and policymakers. For institutional investors, the US market volatility should be closely monitored in order to plan their risk management strategies. For policymakers, the spillover patterns underscore the need to strengthen domestic financial resilience, diversify sources of capital inflows, and enhance regulatory oversight.

The study thus concludes that even simple percentage-based methods can indicate the existence of volatility spillover and asymmetry between the Indian and US markets. The findings reinstate the understanding of global linkages in a financially integrated world and act as a basic platform for further research using more sophisticated methodologies.

7 Suggestions

- US volatility indicators should be monitored daily for the right decision-making.
- Policymakers must strengthen the macroprudential regulations that buffer external shocks.
- Hedging instruments that can protect against currency and equity volatility should be encouraged.
- The Indian markets should diversify their global trade and investment partners to reduce US dependency.
- It is important that financial education programs assist investors in understanding the implications of global volatility.
- Future research should investigate spillovers sector-wise within India.
- RBI and SEBI should increase real-time market surveillance during US market stress.
- Perpetuate stability through increased transparency and communication when global turmoil is occurring.

References

1. Joshi, N. A., Jani, V., & Mehta, D. (2022). *Volatility analysis and volatility spillover across equity markets between India and major global indices.* Asian Journal of Management, 13(3), 215-??. https://ajmjournal.com/AbstractView.aspx?PID=2022-13-3-8 Asian Journal of Management

2. Dey, S. (2020). Returns, volatility and spillover – A paradigm shift in India? *Journal of ???*, ???. https://www.sciencedirect.com/…/S1062940819304061 ScienceDirect

3. Barai, D. (2023). Evidence from Indian foreign exchange market. *Journal of Financial…* https://journals.sagepub.com/doi/abs/10.1177/09721509251379836 SAGE Journals

4. Hussain, M., & others. (2023). Exchange rate and stock price volatility connectedness: Evidence from BRICS including India. ... https://www.ncbi.nlm.nih.gov/articles/PMC10233543/ PMC

5. Suresh, N., & Bharathi, N. R. (2022). Effect of demonetisation of high denomination currencies on Indian stock market and its relationship with foreign exchange rate. *arXiv pre-print*. https://arxiv.org/abs/2207.06963 arXiv

6. GC, S. B. (2016). Volatility spillover effect in Indian stock market. *Janapriya Journal of Interdisciplinary Studies, 5*(2016). https://ssrn.com/abstract=3643719 SSRN

7. Mishra, A. K., Swain, N., & Malhotra, D. K. (2007). Volatility spillover between stock and foreign exchange markets: Indian evidence. *International Journal of Business*, 12(3), 344-?. https://ijb.cyut.edu.tw/var/file/10/1010/img/853/V123-5.pdf International Journal of Business

8. Jebran, K., & Iqbal, A. (2016). Dynamics of volatility spillover between the Indian stock market and foreign exchange market return. *Financial Innovation*, 2:3. https://d-nb.info/1234122502/34 DNB

9. Bagchi, B. (2016). *Volatility spillovers between exchange rates and Indian stock markets in the post-recession period: An APARCH approach. International Journal of Monetary Economics and Finance, 9*(3), 225-244. https://ideas.repec.org/a/ids/ijmefi/v9y2016i3p225-244.html IDEAS/RePEc

10. Dey, S. (2020). *Returns, volatility and spillover – A paradigm shift in India? Journal of International Financial Markets, Institutions & Money.* https://www.sciencedirect.com/science/article/abs/pii/S1062940819304061 ScienceDirect

11. Yadav, A., & Sahu, D. (2021). *Second moment spillover across stock and Indian forex market during COVID-19 pandemic. International Journal of Finance, Entrepreneurship & Sustainability (IJFES), 1*(1). SSRN: https://ssrn.com/abstract=4090327 SSRN

12. Barai, D. (2023). *Evidence from Indian foreign exchange market. Journal of Financial Management, Markets and Institutions.* https://journals.sagepub.com/doi/abs/10.1177/09721509251379836 SAGE Journals
13. Sreenu, N. (2023). *Effect of exchange rate volatility and inflation on stock market returns: Evidence from India. Environment, Development and Sustainability*. https://link.springer.com/article/10.1007/s13198-023-01914-3 link.springer.com