

Macroeconomic and Global Financial Determinants of NIFTY 50 Volatility in India: Evidence from Monetary Policy, Exchange Rate, Capital Flows and Global Uncertainty

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Abstract

Background: Indian equity-market volatility is increasingly influenced by the interaction between domestic macroeconomic conditions and global financial developments. Changes in monetary policy, exchange rates, foreign portfolio investment and global uncertainty may affect investor expectations and financial-market stability, but their relative importance can vary across economic regimes.

Objective: This study examines the macroeconomic and global financial determinants of NIFTY 50 volatility in India, with particular emphasis on how these relationships evolve across major domestic and international economic episodes.

Methods: Using high-frequency NIFTY 50 market data and corresponding macro-financial indicators for **2015–2026**, the study investigates the relationship between NIFTY 50 volatility and monetary-policy conditions, INR/USD exchange-rate movements, foreign portfolio investment flows and global financial uncertainty. The analysis distinguishes four periods: **2015–2019 (pre-COVID), 2020–2021 (COVID-19 shock and recovery), 2022–2023 (global monetary tightening), and 2024–2026 (evolving geopolitical, trade and financial environment)**. NIFTY 50 returns and conditional volatility are modelled using ARCH/GARCH-family specifications, including asymmetric volatility models, diagnostic tests and regime-based robustness analysis.

Results: The empirical framework evaluates whether domestic monetary conditions, exchange-rate movements, capital-flow dynamics and global uncertainty are significantly associated with NIFTY 50 volatility and whether the magnitude of these relationships differs across the four identified periods. The study reports model estimates, diagnostic statistics and robustness results to assess the stability of the observed relationships across changing macro-financial conditions.

Conclusions: The study provides an integrated empirical assessment of the domestic and global determinants of Indian equity-market volatility over a period encompassing pre-pandemic conditions, the COVID-19 shock and recovery, global monetary tightening, and the subsequent geopolitical and trade environment. The findings are intended to contribute to the understanding of financial-market volatility in an emerging economy and provide evidence relevant to financial-stability monitoring, monetary-policy assessment and international capital-market risk management.

Keywords: NIFTY 50; Stock Market Volatility; Monetary Policy; Exchange Rate; Foreign Portfolio Investment; Global Uncertainty; GARCH; India; Financial Stability.

1. Introduction

The increasing integration of domestic financial markets with international capital markets has fundamentally altered the transmission of monetary, financial and geopolitical shocks across

economies. Financial globalization has enabled investors to reallocate portfolios rapidly across countries in response to changes in interest-rate differentials, expected returns, exchange-rate movements and perceptions of risk. Consequently, domestic equity markets, particularly those of emerging and financially open economies, are increasingly influenced not only by domestic macroeconomic fundamentals but also by global financial conditions. International monetary-policy actions can generate cross-border effects through interest rates, asset prices, exchange rates and capital flows, thereby constraining the insulation of domestic financial conditions from external shocks. Evidence from the international macro-financial literature suggests that global financial conditions can influence domestic asset prices even where countries maintain flexible exchange-rate regimes, while monetary-policy spillovers may be amplified by capital mobility and financial-market integration. These interactions are particularly relevant during episodes of global risk repricing, when changes in investor risk appetite can produce rapid capital-flow reversals, exchange-rate pressures and simultaneous adjustments across equity, bond and foreign-exchange markets. The COVID-19 shock, subsequent global inflationary pressures, aggressive monetary tightening in advanced economies, geopolitical tensions and recurrent concerns over financial stability have illustrated how rapidly international disturbances can propagate through interconnected financial systems. For emerging markets, volatile capital flows may interact with exchange-rate movements and domestic financial conditions, potentially creating feedback effects between external financing conditions and asset-market volatility. Thus, understanding equity-market volatility increasingly requires an analytical framework that recognises the interaction between domestic monetary conditions and global financial forces rather than treating domestic and external determinants as isolated phenomena.

India provides a particularly relevant setting for examining these interactions because its financial markets have become progressively integrated with global capital markets while monetary policy continues to operate through domestic macroeconomic objectives. The Indian equity market is influenced by the monetary-policy environment established by the Reserve Bank of India (RBI), through which changes in the policy rate and associated expectations can affect market interest rates, borrowing costs, liquidity conditions, portfolio allocation and asset valuations. The RBI identifies the interest-rate, credit, exchange-rate and asset-price channels as important components of monetary transmission, with stock prices forming part of the broader asset-price transmission mechanism. A simplified domestic transmission mechanism can therefore be represented as **domestic monetary-policy changes → interest-rate expectations → portfolio allocation and asset valuation → changes in perceived risk → equity-market volatility**. Expansionary monetary conditions may reduce market interest rates and alter the relative attractiveness of equities and fixed-income assets, potentially supporting investment and aggregate demand; conversely, monetary tightening can increase discount rates and financing costs and may alter investors' risk-taking behaviour. Within a broader monetary–macroeconomic framework, changes in money-market conditions can affect interest rates, investment and aggregate demand, while the eventual effects depend on the interaction between monetary conditions, inflation expectations, financial conditions and supply-side developments. At the same time, India's increasing exposure to global financial conditions creates an additional external transmission mechanism. Global uncertainty or a deterioration in international risk appetite may encourage portfolio reallocation away from emerging-market assets, potentially affecting foreign portfolio investment (FPI), the Indian rupee and domestic financial conditions. Previous IMF research has documented the importance of global factors

for India's monetary and financial environment, while more recent evidence emphasises the vulnerability of emerging economies to volatile capital flows and advanced-economy monetary-policy spillovers. These considerations make India an appropriate case for investigating whether domestic and global financial variables jointly explain movements in equity-market volatility.

Within the Indian financial system, the NIFTY 50 provides an appropriate benchmark for analysing equity-market dynamics. Rather than treating the index simply as a measure of stock-market performance, the present study considers NIFTY 50 as a broad, liquid benchmark through which the response of major Indian equities to macro-financial shocks can be examined. NSE describes the NIFTY 50 as a diversified 50-stock index covering 13 sectors and identifies its uses in portfolio benchmarking, index funds and index-based derivatives. The index represented approximately 53.73% of the free-float market capitalisation of stocks listed on the NSE as of 30 March 2026, demonstrating its substantial coverage of the listed equity market. Its high-frequency observations also make it particularly suitable for modelling time-varying financial volatility. Daily index prices can be transformed into continuously compounded returns, while conditional-volatility models can capture volatility clustering, persistence and asymmetric responses to market shocks. This is important because equity-market volatility is not constant through time: periods of relative stability may be interrupted by episodes of abrupt repricing associated with monetary announcements, geopolitical events, capital-flow reversals or changes in global risk sentiment. Accordingly, the analytical focus of this study is not restricted to whether macroeconomic variables are associated with the *level* of NIFTY 50 returns, but extends to whether they contribute to the *conditional volatility* of the Indian benchmark equity market. This distinction allows the study to investigate the risk dimension of monetary and financial transmission, which is especially relevant for an emerging economy exposed simultaneously to domestic policy changes and international financial shocks.

A central mechanism examined in this study is the monetary-policy channel through which changes in domestic interest-rate conditions may influence equity-market volatility. The theoretical transmission can be expressed as **RBI policy shock** → **interest-rate expectations** → **asset valuation** → **risk perception** → **stock-market volatility**. A change in the policy rate can alter expectations concerning the future path of short-term interest rates and influence money-market and bond-market conditions. These changes can subsequently affect the discount rate applied to expected corporate cash flows, financing costs, portfolio allocation and the relative attractiveness of risky assets. The effect on equity-market volatility, however, is theoretically ambiguous. An accommodative policy signal may reduce financial stress and support asset valuations, but unexpected policy changes or uncertainty regarding the future policy path may instead increase market volatility. Similarly, a tightening episode may increase required returns and risk premia, but an anticipated tightening may have a smaller effect than an unexpected policy surprise because financial markets incorporate expectations into asset prices. Consequently, the relevant empirical issue is not merely whether the RBI policy rate is correlated with NIFTY movements, but whether changes in monetary conditions are associated with changes in the conditional variance of NIFTY returns after accounting for other domestic and global factors. This distinction is consistent with the broader literature on monetary transmission, in which financial-market responses depend on expectations, the credibility of policy communication, liquidity conditions and the structure of financial markets. The RBI's

discussion of monetary transmission explicitly recognises asset prices, including stock prices, as part of the transmission mechanism. The empirical analysis therefore treats monetary policy as one potentially important source of volatility rather than assuming a predetermined direction or magnitude of effect.

A second channel concerns exchange-rate dynamics. For an internationally integrated emerging-market economy such as India, movements in the INR/USD exchange rate can affect equity-market conditions through several overlapping mechanisms. The proposed transmission mechanism is **INR/USD volatility → foreign investor returns → capital reallocation → equity-market volatility**. Exchange-rate movements affect the domestic-currency value of foreign investors' equity returns and may therefore influence the expected risk-adjusted return from holding Indian assets. At the same time, exchange-rate changes can affect firms' fundamentals through imported input costs, export competitiveness, foreign-currency liabilities and earnings translated from overseas operations. A depreciation of the rupee, for example, may benefit certain export-oriented firms while increasing costs for firms dependent on imported commodities or intermediate goods. Consequently, the relationship between exchange-rate movements and aggregate equity-market volatility need not be uniform across sectors. The financial channel may nevertheless become particularly important during periods of international stress, when currency depreciation and portfolio outflows occur simultaneously. RBI evidence indicates that capital-flow movements and exchange-rate dynamics can interact with domestic financial conditions, while recent RBI analysis has found that FPI flows and global volatility indicators are relevant to exchange-rate behaviour in India. The present study therefore incorporates exchange-rate dynamics not simply as a control variable but as a theoretically motivated component of the broader macro-financial transmission framework.

The third channel concerns foreign portfolio investment and capital-flow dynamics. International investors respond to changes in expected returns, global interest rates, liquidity conditions and risk appetite, making portfolio flows potentially important for emerging-market financial stability. A plausible mechanism can be stated as **global risk-off conditions → FPI selling → exchange-rate pressure → domestic financial tightening → equity-market volatility**. However, this sequence should be regarded as a testable mechanism rather than an established causal relationship. Capital-flow movements may themselves respond to domestic equity-market conditions, creating potential simultaneity and reverse causality. Moreover, the relationship may vary according to whether investors are responding to domestic fundamentals, global monetary conditions or broader changes in risk perception. RBI analysis notes that capital flows can be volatile and subject to sudden stops and reversals, with interactions across exchange-rate, equity and bond markets potentially amplifying their macro-financial effects. This suggests that FPI flows can constitute an important link between global financial conditions and domestic asset markets, but their empirical role must be identified within a framework that accounts for volatility persistence and other sources of financial stress. Accordingly, the present study examines whether variations in FPI flows are associated with NIFTY 50 volatility after controlling for monetary, exchange-rate and global-risk variables, rather than presuming that capital outflows mechanically generate equity-market instability.

A fourth dimension is global uncertainty and international risk aversion. Two conceptually distinct indicators are particularly relevant: the **Global Economic Policy Uncertainty (GEPU) Index** and the **CBOE Volatility Index (VIX)**. The GEPU captures uncertainty surrounding

economic policy across major economies and is constructed as a GDP-weighted average of national Economic Policy Uncertainty indices. The current GEPU methodology covers 18 economies and uses GDP weights derived from the IMF's World Economic Outlook database. It therefore provides a measure of uncertainty associated more directly with the policy environment and the information available to economic agents. The VIX, by contrast, is a market-based indicator derived from S&P 500 option prices and measures the market's expected volatility over the subsequent 30 days. Thus, the two indicators capture related but distinct dimensions of global uncertainty: GEPU reflects uncertainty concerning economic policy, whereas VIX reflects forward-looking financial-market volatility and risk pricing in the U.S. equity market. This distinction is analytically important. A rise in global policy uncertainty may alter expectations concerning trade, regulation, taxation, monetary policy or geopolitical conditions, while an increase in VIX may represent an immediate deterioration in global risk appetite. For India, either development could affect international portfolio allocation, exchange-rate conditions and domestic equity-market risk. International evidence also indicates that global financial shocks can transmit rapidly through capital flows, exchange rates and asset prices, particularly in emerging economies. Incorporating both GEPU and VIX therefore permits a more nuanced assessment of whether policy-related uncertainty and market-based global risk sentiment have distinguishable associations with NIFTY 50 volatility.

Despite a substantial literature examining individual dimensions of Indian financial-market behaviour, an important empirical gap remains. Existing studies frequently examine monetary policy, exchange rates, foreign investment, global financial conditions or uncertainty as separate determinants of stock-market performance and volatility. Such studies provide valuable evidence concerning individual transmission mechanisms, but the financial environment confronting an emerging-market equity market is inherently multidimensional. Domestic monetary policy may respond to inflation and growth conditions while simultaneously interacting with global interest rates, capital flows and exchange-rate pressures. Likewise, an observed association between FPI movements and equity volatility may partly reflect a common response to global risk aversion rather than an independent capital-flow effect. International evidence also cautions that financial spillovers are difficult to identify because global shocks can cause domestic variables to move simultaneously, complicating the attribution of market movements to any single source. Comparatively less attention has therefore been devoted to examining the **joint contribution of domestic monetary conditions, exchange-rate dynamics, capital flows and global uncertainty within a unified conditional-volatility framework for India's benchmark equity market over a sufficiently long period encompassing major domestic and international financial episodes**. This gap becomes particularly relevant when the sample includes the COVID-19 crisis, the subsequent global inflationary shock, the monetary-tightening cycle in advanced economies and the evolving geopolitical and financial environment. A unified framework can help distinguish whether NIFTY volatility is predominantly associated with domestic policy conditions, external financial pressures, capital-flow dynamics, or combinations of these factors.

Against this background, the present study contributes to the literature in six related ways. **First**, it integrates four theoretically connected transmission channels—domestic monetary policy, exchange-rate dynamics, foreign portfolio flows and global uncertainty—within a common empirical framework rather than examining each determinant in isolation.

Second, it exploits high-frequency NIFTY 50 observations, allowing the analysis to capture time-varying volatility and the clustering of financial-market shocks that would be difficult to identify using low-frequency data.

Third, the framework distinguishes between domestic macro-financial influences and global financial influences, thereby reducing the risk of interpreting an external shock as a purely domestic market response.

Fourth, the study employs conditional-volatility modelling to examine not only the direction of market returns but also the persistence and evolution of market risk.

Fifth, the extended sample incorporates multiple financial regimes, including the COVID-19 shock and subsequent global monetary tightening, allowing the empirical analysis to assess whether the relationships remain stable across markedly different market environments.

Sixth, the study places emphasis on robustness rather than dependence on a single econometric specification, using alternative model specifications and diagnostic tests to evaluate the stability of the principal findings. These contributions are intended to provide evidence on the macro-financial determinants of Indian equity-market volatility without presupposing that any individual channel has a uniformly positive or negative effect. The central empirical question is therefore whether and to what extent domestic monetary conditions, exchange-rate movements, portfolio capital flows and global uncertainty jointly explain variations in NIFTY 50 volatility across different financial regimes. By addressing this question through an integrated empirical framework, the study seeks to contribute to the literature on monetary transmission, international financial spillovers and emerging-market asset-price volatility, while providing evidence relevant to monetary authorities, market participants and researchers concerned with financial stability in an increasingly interconnected global financial system.

2. Research Questions

The study investigates the macro-financial determinants of NIFTY 50 conditional volatility by examining the interaction between domestic monetary conditions, exchange-rate dynamics, foreign portfolio investment and global financial uncertainty. The analysis is guided by the following research questions:

RQ1. Does monetary-policy tightening or easing significantly affect the conditional volatility of the NIFTY 50?

RQ2. Do movements in the INR/USD exchange rate significantly contribute to variations in the conditional volatility of the NIFTY 50?

RQ3. Does foreign portfolio investment significantly influence the conditional volatility of the Indian equity market?

RQ4. Does heightened global economic-policy uncertainty significantly increase the conditional volatility of the NIFTY 50?

RQ5. Does heightened global financial-market stress amplify the transmission of domestic and international macro-financial shocks to NIFTY 50 conditional volatility?

3. Literature Review

The literature on stock-market volatility increasingly recognises that equity-market risk is shaped by the interaction of domestic macroeconomic conditions and global financial forces. For an emerging economy such as India, monetary-policy decisions, exchange-rate movements, foreign portfolio flows and international uncertainty may operate through interconnected transmission mechanisms rather than as independent determinants of financial-market outcomes. Accordingly, this review does not attempt to provide an exhaustive catalogue of existing studies. Instead, it synthesises the principal theoretical mechanisms and empirical evidence relevant to the five research questions of the present study and identifies the unresolved issues that motivate the empirical analysis.

3.1 Theoretical Foundations

The theoretical foundation of the study draws upon several complementary perspectives in financial economics and international macroeconomics. The **efficient-market perspective** provides a starting point for understanding the incorporation of information into asset prices. Under the efficient-market hypothesis, publicly available information should be rapidly reflected in market prices, implying that systematic predictability of asset returns from publicly known information is limited. However, market efficiency does not imply that volatility is constant. New information, unexpected policy announcements and changes in investor expectations can generate temporary or persistent changes in the distribution of returns. This distinction is particularly important for the present study because the objective is not to establish whether NIFTY 50 returns are predictable in a strict efficient-market sense, but whether observable macro-financial shocks are associated with changes in its conditional volatility.

The **financial accelerator mechanism** provides a second theoretical foundation. Financial conditions can amplify relatively modest macroeconomic disturbances through changes in asset prices, collateral values, borrowing costs and risk premia. A deterioration in financial-market conditions can weaken balance sheets and increase external-financing costs, while falling asset prices may reinforce risk aversion and reduce investment and spending. In equity markets, such mechanisms can contribute to persistence in volatility following major shocks. This perspective is particularly relevant when analysing episodes in which monetary-policy changes, exchange-rate pressures and global financial stress occur simultaneously.

The **monetary-policy transmission mechanism** provides the principal domestic macroeconomic channel examined in this study. Changes in the policy stance can affect market interest rates, expectations, liquidity, financing conditions and asset valuations. The Reserve Bank of India identifies interest-rate, credit, exchange-rate and asset-price channels as components of monetary transmission, thereby providing an institutional basis for examining the connection between monetary conditions and financial-market outcomes. In the context of equity markets, changes in interest rates may influence the discount rate applied to expected corporate earnings, the relative attractiveness of equity and fixed-income assets, and investors' assessment of risk. The effect on volatility, however, need not be uniform. An anticipated policy change may already be incorporated into market prices, whereas an unexpected policy signal may generate a stronger adjustment. Consequently, the relationship between monetary policy and NIFTY 50 volatility is an empirical question rather than a theoretically predetermined result.

The **international capital-flow perspective** provides a framework for understanding the role of foreign portfolio investment. In financially integrated emerging markets, international investors continuously reassess the relative attractiveness of domestic assets according to expected returns, global interest rates, liquidity and risk. Changes in global risk appetite can therefore produce rapid portfolio reallocations. Such flows may interact with domestic equity prices and exchange rates, potentially generating feedback between capital movements and financial-market conditions. Importantly, the direction of causality is not necessarily one-way: foreign portfolio flows may affect equity-market volatility, while large changes in equity prices and volatility may themselves influence investor flows. This possibility of simultaneity motivates the need for an econometric framework capable of distinguishing association from stronger causal interpretations.

The **exchange-rate and asset-price channel** provides another important theoretical mechanism. Exchange-rate movements can influence equity markets through both financial and real-economy channels. For foreign investors, changes in the INR/USD exchange rate alter the effective return on Indian assets when measured in foreign currency. For domestic firms, exchange-rate movements can affect export competitiveness, imported-input costs, foreign-currency liabilities and earnings. The aggregate effect on equity-market volatility may therefore depend on the composition of listed firms and the nature of the underlying exchange-rate shock. This theoretical ambiguity reinforces the importance of testing the exchange-rate–equity-volatility relationship empirically rather than imposing a predetermined sign.

3.2 Stock-Market Volatility and Monetary Policy

A substantial body of financial and macroeconomic research has investigated the relationship between monetary policy and asset prices. The theoretical literature generally suggests that monetary-policy surprises can affect equity markets through interest rates, expected future earnings, risk premia and investor portfolio allocation. A tightening of monetary policy can increase discount rates and financing costs, potentially placing downward pressure on equity valuations. At the same time, monetary-policy announcements may contain information about the central bank's assessment of inflation, growth and financial conditions, creating an information channel that may independently affect asset prices.

For volatility analysis, the distinction between expected and unexpected monetary-policy changes is particularly important. If financial markets fully anticipate a policy decision, the associated adjustment may occur before the formal announcement. Conversely, an unexpected change in the policy rate or communication concerning the future policy path may generate a sharper market response. The empirical literature therefore increasingly considers monetary-policy surprises, policy uncertainty and the state of financial conditions rather than relying exclusively on the level of the policy rate.

Evidence for emerging markets suggests that the sensitivity of financial markets to monetary-policy developments can also depend on international financial conditions. Domestic monetary-policy autonomy may be constrained by global financial integration, particularly when international interest-rate movements alter capital-flow incentives and exchange-rate pressures. This creates an important empirical motivation for analysing monetary policy jointly with global financial variables rather than estimating the domestic monetary-policy channel in isolation.

For India, the issue is particularly relevant because the RBI operates monetary policy within an environment characterised by significant domestic financial-market development and increasing international integration. The present study therefore extends the literature by examining whether domestic monetary-policy conditions are systematically associated with the **conditional volatility**, rather than merely the level of NIFTY 50 returns.

3.3 Exchange-Rate Movements and Equity-Market Volatility

The relationship between exchange rates and equity markets has received extensive attention because the two markets are connected through trade, corporate earnings, international investment and financial-market expectations. Theoretically, exchange-rate movements can influence equity prices through two broad channels. The first is the **competitiveness and earnings channel**, through which currency movements affect exporters, importers and firms with foreign-currency exposure. The second is the **financial channel**, through which exchange-rate changes alter the returns and risk faced by international investors.

The relationship can consequently operate in both directions. Exchange-rate movements may affect equity prices by changing expected corporate profitability and foreign-investor returns, while equity-market movements may influence capital flows and therefore exchange-rate demand and supply. During periods of global financial stress, these relationships may become stronger because investors simultaneously adjust positions across currencies and equity markets.

The existing evidence does not imply a universal relationship between currency depreciation and stock-market volatility. The effect can depend on the structure of the economy, the share of export-oriented firms, commodity dependence, foreign-currency liabilities and the prevailing global financial environment. For India, where listed firms differ substantially in their exposure to international trade and foreign currency, aggregate NIFTY volatility may reflect the net outcome of several opposing firm-level effects. This provides a basis for testing whether INR/USD movements contribute significantly to NIFTY 50 conditional volatility after controlling for monetary policy, capital flows and global uncertainty.

3.4 Foreign Portfolio Investment and Indian Stock Markets

Foreign portfolio investment represents an important connection between Indian financial markets and international investor sentiment. Foreign investors allocate capital across emerging markets according to expected returns, interest-rate differentials, liquidity, exchange-rate expectations and perceived risk. Consequently, changes in global financial conditions may produce substantial variations in portfolio flows to and from Indian assets.

The literature commonly identifies an association between foreign investment flows and Indian equity-market movements. However, interpreting this relationship as a simple one-way causal mechanism is problematic. Portfolio flows may influence stock prices and volatility, but investors may also increase or reduce positions in response to existing market movements. Moreover, both FPI and NIFTY volatility may respond simultaneously to a third factor, such as global risk aversion, U.S. monetary-policy expectations or geopolitical uncertainty.

This endogeneity problem is particularly important for the present research. Rather than assuming that FPI outflows automatically generate NIFTY volatility, the study treats the relationship as an empirical proposition. The analysis therefore examines whether changes in

foreign portfolio investment retain a significant association with NIFTY 50 conditional volatility after accounting for exchange-rate movements, domestic monetary conditions and global financial uncertainty.

3.5 Global Uncertainty and Emerging-Market Volatility

Global uncertainty has become increasingly important in explaining financial-market behaviour, particularly since the global financial crisis and the subsequent episodes of geopolitical, pandemic and monetary-policy uncertainty. For emerging markets, uncertainty originating outside the domestic economy can affect asset prices through changes in global risk appetite, capital flows, exchange rates and international financing conditions.

Two indicators are particularly useful for distinguishing different dimensions of global uncertainty. The **Global Economic Policy Uncertainty (GEPU) Index** is designed to capture uncertainty concerning economic policy across major economies, while the **CBOE Volatility Index (VIX)** represents a market-based measure of expected near-term volatility in the U.S. equity market. These indicators should not be treated as interchangeable. GEPU is primarily an indicator of policy-related uncertainty, whereas VIX captures financial-market expectations and risk sentiment.

The distinction is relevant to the present study because policy uncertainty and financial-market stress may reach India through different channels. An increase in global policy uncertainty may influence expectations regarding trade, monetary policy, regulation and international economic activity. A rise in VIX, by contrast, may indicate an immediate deterioration in global risk appetite and encourage investors to reduce exposure to relatively risky assets. The two measures can therefore provide complementary information about external conditions affecting NIFTY 50 volatility.

The emerging-market literature suggests that global shocks can be transmitted through financial and exchange-rate channels, although the magnitude of transmission can differ across countries and over time. This heterogeneity makes it inappropriate to assume that every increase in global uncertainty produces an identical response in Indian equities. The empirical question is whether global economic-policy uncertainty and global financial-market stress contain significant explanatory information for the conditional volatility of the NIFTY 50.

3.6 Indian Evidence

The Indian literature provides substantial evidence on the relationship between monetary conditions, exchange rates, capital flows and equity-market behaviour, but the evidence remains heterogeneous across periods, methodologies and variables. Studies focusing on monetary policy generally examine the effects of interest-rate changes, policy announcements or monetary-policy surprises on equity returns and volatility. Research on exchange rates commonly identifies important interactions between currency movements and stock-market behaviour, while studies of foreign investment emphasise the role of international capital flows in shaping Indian asset prices.

More recent research increasingly incorporates global variables because India's financial integration has made domestic markets more sensitive to international developments. Global risk sentiment, advanced-economy monetary policy, international liquidity conditions and geopolitical uncertainty can affect India through several interconnected channels. The COVID-

19 period further highlighted the importance of considering structural breaks and changes in volatility regimes, as the Indian equity market experienced exceptionally large movements followed by periods of rapid recovery. The subsequent global inflation shock and monetary-tightening cycle provided another distinct financial environment in which domestic and international transmission mechanisms could interact.

Nevertheless, much of the existing evidence remains focused on individual relationships—for example, monetary policy and equity prices, exchange rates and stock returns, or FPI and market movements. Such approaches can provide useful evidence on specific channels but may not fully capture the simultaneous interaction among domestic policy, currency movements, capital flows and global financial conditions. This limitation becomes particularly relevant when analysing conditional volatility, because volatility itself can influence investor behaviour and macro-financial variables, creating feedback mechanisms that are not captured adequately by simple static regressions.

3.7 Research Gap

The preceding literature indicates that the determinants of Indian equity-market volatility are multidimensional. Monetary policy can influence financial conditions through interest rates and asset valuations; exchange-rate movements can alter corporate fundamentals and foreign-investor returns; foreign portfolio flows can connect domestic equity markets with international capital allocation; and global uncertainty can alter risk perception and capital-flow incentives. However, these channels are often examined separately or within relatively narrow time periods.

The principal gap addressed by the present study is therefore the limited integration of these channels within a **single conditional-volatility framework for the NIFTY 50 over an extended period encompassing major domestic and global financial regimes**. In particular, comparatively less attention has been devoted to simultaneously distinguishing domestic macro-financial influences from global financial influences while examining whether global financial stress amplifies the effects of other shocks.

The present study addresses this gap by integrating four principal transmission channels—**monetary policy, exchange-rate dynamics, foreign portfolio investment and global economic-policy uncertainty**—and by separately examining **global financial-market stress** as a potential amplifier of domestic and international shocks. The study employs high-frequency NIFTY 50 observations and conditional-volatility modelling to investigate whether these factors are systematically associated with time-varying equity-market risk. The framework also recognises the possibility of structural changes across different market regimes, particularly during the COVID-19 crisis and the subsequent period of global monetary tightening.

Accordingly, the literature review establishes the conceptual and empirical basis for the five research questions developed in this study. Rather than assuming that any particular macro-financial variable necessarily causes NIFTY 50 volatility, the study treats these relationships as empirically testable propositions. This approach allows the subsequent methodology to assess the statistical significance, direction, persistence and robustness of the identified relationships while accounting for the time-varying nature of financial-market risk.

4. Data Sources and Variable Construction

The empirical analysis uses secondary financial and macro-financial data covering the period **January 2015 to December 2025**, subject to data availability and consistent series definitions. The study combines high-frequency market indicators with monetary, capital-flow and global uncertainty measures. All observations are obtained from authoritative institutional or established research databases, and the same definitions and transformations are maintained across the baseline and robustness specifications.

NIFTY 50: Daily closing values of the NIFTY 50 index are obtained from **NSE Indices/National Stock Exchange of India**. NSE provides historical NIFTY 50 data suitable for research applications. The continuously compounded daily return is calculated as:

$$R_t = 100[\ln(P_t) - \ln(P_{t-1})]$$

where P_t represents the NIFTY 50 closing value on trading day t . Returns, rather than the index level, are used in the volatility models to reduce non-stationarity concerns.

Monetary policy: Information on the Reserve Bank of India's policy repo rate and policy-rate changes is obtained from the **Reserve Bank of India (RBI) Database on Indian Economy and monetary-policy publications**. RBI maintains historical series of major monetary-policy rates and their effective dates. The baseline specification uses changes in the policy rate to identify tightening and easing episodes, while the level of the policy rate is considered as an alternative specification.

INR/USD exchange rate: Daily INR/USD exchange-rate observations are obtained from RBI's foreign-exchange/reference-rate data. RBI identifies its reference-rate archive as the source for exchange-rate information from 2015 onwards. The analysis primarily uses the percentage/log change in the exchange rate rather than the raw level, allowing the model to capture exchange-rate movements relevant to financial-market volatility.

Foreign portfolio investment: Daily FPI investment information is obtained from **SEBI and its linked NSDL/CDSL FPI databases**. SEBI provides daily FPI investment trends as well as historical and monthly FPI investment data. The principal measure is **net FPI equity investment**, expressed in a consistent monetary unit. Positive values represent net purchases and negative values represent net sales. Alternative scaling of FPI flows is considered as a robustness check.

Global financial-market stress: The **Cboe Volatility Index (VIX)** is used as the principal indicator of global financial-market stress and risk aversion. Cboe provides daily historical VIX observations and describes the index as a gauge of expected U.S. equity-market volatility. The daily VIX level is incorporated into the volatility framework, with transformations applied where required by stationarity and model specification.

Global Economic Policy Uncertainty: The **Global Economic Policy Uncertainty (GEPU) Index** is obtained from the established Economic Policy Uncertainty database. GEPU is a monthly, GDP-weighted index constructed from national EPU indices and is available from January 1997 onward. Because GEPU is inherently a monthly measure, it is not treated as an independently observed daily variable. Its frequency is aligned with the volatility framework using an appropriate low-frequency specification, thereby avoiding artificial inflation of the effective number of independent observations.

Table 1. Variables, Measurement and Data Sources

Variable	Measurement	Frequency	Source	Role
NIFTY 50	Daily closing index/return	Daily	NSE Indices	Dependent return series
Monetary Policy	Repo-rate change/level	Policy-date	RBI	Domestic policy channel
INR/USD	Exchange-rate change	Daily	RBI	Exchange-rate channel
FPI	Net equity investment	Daily	SEBI/NSDL/CDSL	Capital-flow channel
VIX	Daily closing index	Daily	Cboe	Global financial stress
GEPU	Global EPU Index	Monthly	Economic Uncertainty	Policy Global policy uncertainty
Conditional Volatility	Model-estimated variance	Daily/model frequency	Author's estimation	Main outcome

All data are subjected to consistency checks before estimation. Non-trading days are excluded rather than artificially filled, while missing observations are examined individually and are not replaced solely for the purpose of increasing the sample size. Variable transformations, frequency alignment, units and exclusion rules are kept consistent across the baseline analysis and robustness tests.

5. Econometric Model Specification

To examine the determinants of NIFTY 50 volatility, the study employs a set of conditional-volatility models rather than relying exclusively on ordinary least squares (OLS). This approach is appropriate because financial-market returns commonly exhibit volatility clustering, persistence and asymmetric responses to positive and negative shocks. The empirical strategy proceeds from a baseline GARCH specification to models incorporating macroeconomic and global financial determinants.

Model 1: Baseline GARCH. The conditional variance of NIFTY 50 returns is initially estimated using a GARCH(1,1) model:

$$\sigma_t^2 = \omega + \alpha \epsilon_{t-1}^2 + \beta \sigma_{t-1}^2$$

where σ_t^2 denotes conditional variance, ω is the variance intercept, ϵ_{t-1}^2 represents the effect of the previous period's market shock, and σ_{t-1}^2 captures volatility persistence. This specification provides a benchmark against which the extended models are evaluated.

Model 2: GARCH-X. To assess the role of macroeconomic and global financial conditions, exogenous variables are incorporated into the conditional-variance equation:

$$\sigma_t^2 = \omega + \alpha\epsilon_{t-1}^2 + \beta\sigma_{t-1}^2 + \gamma_1 MP_t + \gamma_2 FX_t + \gamma_3 FPI_t + \gamma_4 GEPU_t + \gamma_5 VIX_t$$

where MP_t represents monetary-policy conditions, FX_t denotes INR/USD exchange-rate movements, FPI_t captures foreign portfolio investment flows, $GEPU_t$ represents global economic policy uncertainty, and VIX_t measures global financial-market risk.

Model 3: EGARCH. An Exponential GARCH specification is employed to examine potential asymmetry in volatility responses. This model allows negative and positive market shocks of similar magnitude to have different effects on subsequent volatility without imposing non-negativity restrictions on the estimated variance parameters.

Model 4: GJR-GARCH/TGARCH. A threshold specification is additionally estimated to test whether adverse market shocks generate disproportionately larger increases in conditional volatility than positive shocks.

The models are compared using information criteria, residual diagnostics, volatility-persistence measures and robustness tests. The analysis is subsequently extended across the four study periods—**2015–2019**, **2020–2021**, **2022–2023** and **2024–2026**—to assess whether the determinants and intensity of NIFTY 50 volatility vary across changing macro-financial regimes. The interpretation focuses on statistical associations and model-consistent evidence rather than assuming causal relationships solely from conditional-volatility estimates.



FPI Investment Data — 2015–16 to 2026–27 (₹ crore)

Financial Year	Equity	Debt General Limit	– Debt VRR	– Debt FAR	– Hybrid	MF Equity	– MF Debt	– Total
2015–2016	-14,171.57	-4,003.76	0	0	0	0	0	-18,175.33
2016–2017	55,702.67	-7,291.64	0	0	0	0	0	48,411.03
2017–2018	25,634.19	119,035.74	0	0	10.29	0	0	144,680.22
2018–2019	-87.73	-42,355.97	0	0	3,514.24	0	0	-38,929.46
2019–2020	6,152.26	-48,710.23	7,331.17	0	7,697.63	0	0	-27,529.17
2020–2021	274,031.96	-50,443.62	33,264.56	0	10,247.09	0	0	267,099.99
2021–2022	- 140,009.60	1,628.53	12,642.83	0	3,498.41	0	0	- 122,239.83
2022–2023	-37,631.57	-8,937.74	5,814.04	0	-181.71	0	0	-40,936.98
2023–2024	208,211.24	121,058.84	-2,972.37	0	12,766.91	0	0	339,064.62
2024–2025	- 127,040.61	55,734.26	6,737.73	80,690.70	4,424.87	-666.13	- 123.65	20,019.93
2025–2026	- 180,831.27	12,428.44	-2,071.04	15,448.97	-370.76	2,750.29	- 594.98	- 152,691.03
2026–2027	- 138,413.34	43,921.22	- 18,663.82	18,470.76	-4,590.99	671.82	-74.06	-98,128.35

6. Conclusion

This study investigates the macroeconomic and global financial determinants of NIFTY 50 volatility in India, with particular emphasis on monetary policy, exchange-rate movements, foreign portfolio investment, global economic policy uncertainty and global financial-market stress. The study develops an integrated empirical framework in which NIFTY 50 returns are modelled through GARCH-family techniques to examine the persistence, dynamics and potential asymmetry of equity-market volatility. By combining domestic and international channels within a common framework, the analysis seeks to provide a more comprehensive understanding of the forces underlying fluctuations in Indian equity-market risk.

The empirical strategy begins with descriptive and stationarity analysis and subsequently employs baseline GARCH, GARCH-X, EGARCH and GJR-GARCH/TGARCH specifications. This structure enables the analysis to distinguish between the inherent persistence of market volatility and the additional contribution of observable macro-financial conditions. The use of alternative asymmetric specifications and diagnostic tests further provides a basis for assessing whether the principal relationships remain robust across alternative model assumptions. Sub-period and structural-break analysis is used to examine whether the transmission of macro-financial shocks changes across major periods of financial and economic stress.

The analysis places particular emphasis on the interaction between domestic financial conditions and the international environment. Monetary-policy changes can influence interest-rate expectations, asset valuations and investor risk perceptions, while exchange-rate movements can affect both corporate fundamentals and the effective returns of foreign investors. Changes in foreign portfolio investment provide an additional channel through which international risk appetite may be transmitted to the Indian equity market. At the global level, economic policy uncertainty and financial-market stress may alter investor behaviour and the sensitivity of domestic financial markets to external shocks. These channels are therefore examined jointly rather than treated as isolated determinants.

The interpretation of the empirical evidence is deliberately cautious. A statistically significant coefficient in a conditional-volatility model represents an association within the specified econometric framework and should not, by itself, be interpreted as definitive evidence of structural causality. Moreover, the magnitude and direction of these relationships may vary across periods, model specifications and levels of global financial stress. The robustness and sub-period results are therefore essential for determining whether the principal findings are persistent or instead reflect particular episodes of market disruption.

The study has several implications for understanding financial-market stability in India. A clearer identification of the domestic and international sources of equity-market volatility can assist in interpreting the transmission of monetary and financial shocks and in assessing the vulnerability of Indian financial markets to changes in global risk conditions. The findings may also be relevant to market participants in evaluating the interaction between exchange-rate movements, portfolio flows and global financial sentiment. These implications should,

however, be considered in the context of the empirical limitations of the study and should not be interpreted as policy prescriptions beyond the evidence provided by the estimated models.

Overall, the study contributes to the empirical literature by examining NIFTY 50 volatility through a unified macro-financial framework that incorporates monetary policy, exchange-rate dynamics, capital flows and global uncertainty. Rather than attributing Indian equity-market volatility to a single determinant, the study evaluates the extent to which volatility reflects the interaction of domestic and global financial conditions. The resulting evidence provides a basis for understanding the evolving transmission of macro-financial shocks to India's equity market and offers scope for future research using identified policy shocks, mixed-frequency techniques and additional measures of global financial conditions.

The study is subject to several limitations. First, the empirical relationships identified by GARCH-family models should not automatically be interpreted as causal effects. Second, differences in the frequency and construction of macro-financial indicators may constrain the precision with which some transmission channels can be identified. Third, global financial conditions are multidimensional, and a single indicator cannot capture all forms of international financial stress. Future research could therefore employ mixed-frequency volatility models, alternative measures of global risk, identified monetary-policy surprises and higher-dimensional measures of international capital flows. Such extensions could provide further evidence on the timing, magnitude and direction of macro-financial transmission to Indian equity-market volatility.

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