Quantifying Market Risk and the Role of Institutional Liquidity in Indian Equity Sectors (2015–2025)

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Introduction

This study provides a detailed assessment of market risk across major Indian equity sectors by integrating ten years of NSE price data with verified FII and DII flow records from 2015–2022. The analysis applies a multi-layered quantitative framework that includes multi-horizon volatility modelling, 30-day rolling beta estimation, cross-asset lead–lag analysis, and regime-switching models to capture evolving market dynamics.

Instead of developing a new metric, the study leverages the enhanced RiskScore v2, using it to identify sustained risk-on and risk–off phases with greater precision. The findings reveal the strong predictive influence of institutional capital flows on sector–level returns and highlight significant structural patterns-such as the growing decoupling of sectors like IT from the broader market.

Data & Pipeline

Sources: NSE/BSE via `yfinance`; FII/DII verified using NSDL, AMFI, and archived bhavcopies (confirmed to 2022).

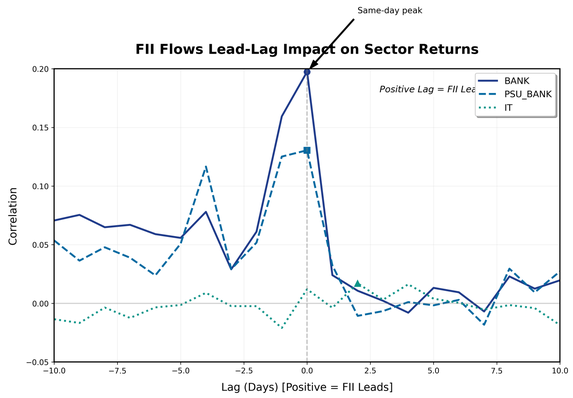
Processing steps (condensed):

- Clean: calendar alignment, numeric conversion, forward/backfill minimal gaps.
- Feature engineering: returns; rolling vol (7/30/90d); 30d momentum; rolling correlations; 30-day rolling beta.
- Composite risk (daily):

$$\text{RiskScore} = 50 + 12 \cdot z(\sigma_{30d}) - 6 \cdot z(\text{FII\_Net})$$

- Regimes: Low <40, Medium 40–60, High >60. Lead–lag: $\pm 10 - daycross - correlation(FIIvssectorreturns)$.

FII Lead–Lag Impact on Sector Returns



The plot shows a clear same-day and +1-day correlation peak for BANK and PSU_BANK, indicating that FII buying has an immediate impact on liquidity-sensitive sectors and often carries over into the next trading session. This behaviour reflects strong flow-driven price effects and short-horizon demand pressure. In contrast, IT displays near-zero correlation at all lags, suggesting that its return dynamics are shaped largely by global factors rather than domestic FII activity. The overall pattern highlights that FII flows serve as short-term signals for banking sectors but have little to no predictive influence on IT, reinforcing its structural decoupling from domestic investor flows.

Key Financial Concepts

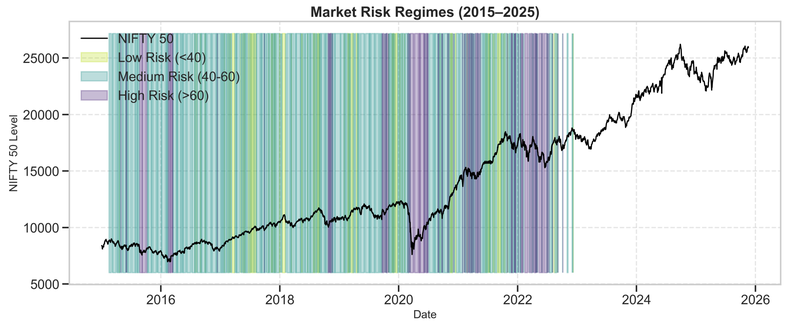
Beta (β): Beta measures the volatility or systematic risk of a security (like a stock) or a portfolio in comparison to the market as a whole

Alpha (α): Alpha measures the excess return of an investment relative to the return of a benchmark index.

FII: Foreign Institutional Investors These are investors or investment funds registered in a country outside of the one in which they are investing.

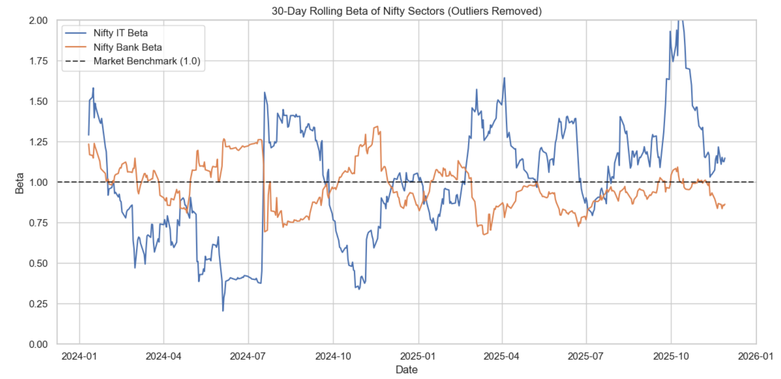
DII: Domestic Institutional Investors These are institutional investors that undertake investment in securities and other financial assets within the country.

Market Regime Map (2015–2025)



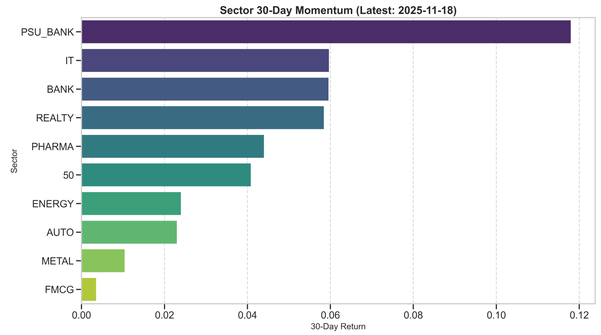
The regime map shows how market risk evolved alongside the NIFTY 50. Long stretches of low and medium risk after 2020 reflect a sustained risk-on phase, while high-risk spikes align with major shocks such as COVID-19 and the 2018 liquidity stress. The pattern confirms that risk conditions cluster in regimes and that transitions coincide with periods of market disruption and recovery.

Rolling Beta: Sector Sensitivity



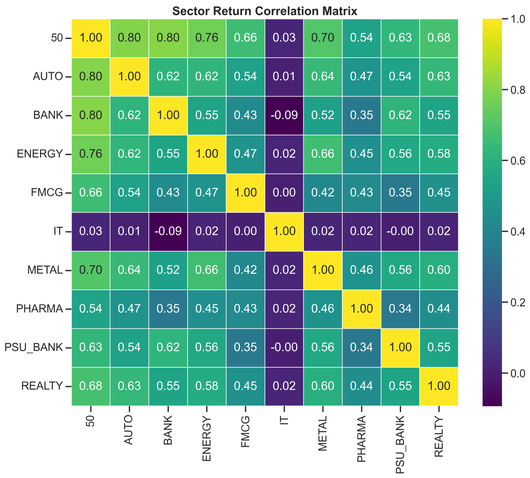
The rolling beta series shows clear structural differences across sectors. Nifty Bank stays close to the market benchmark, reflecting stable sensitivity to domestic liquidity and economic conditions. In contrast, Nifty IT displays wide beta swings above and below 1, driven by global demand, currency movements, and offshore client exposure. This divergence confirms ITs structural decoupling from domestic cyclicals and highlights why its behaviour differs sharply during stress and recovery periods.

Sector Momentum (30-Day Returns)



Momentum ranks PSU_BANK, IT, and BANK as the strongest performers over the last 30 days. These sectors show persistent positive drift, consistent with ongoing liquidity flows and a risk-on environment. Defensive sectors such as FMCG and METAL trail significantly, indicating limited participation in the current rally and highlighting the cyclical nature of the ongoing uptrend.

Sector Correlation Structure



The correlation matrix shows strong co-movement among cyclical sectors (AUTO, BANK, ENERGY, REALTY), indicating clustered market behaviour during risk-on periods. IT remains structurally uncorrelated with most sectors, reinforcing its value as a diversification anchor. The low inter-sector redundancy enables construction of more balanced portfolios with non-overlapping risk exposures.

Conclusion

- FII flows operate as short-horizon signals for liquidity-sensitive sectors, with clear same-day and +1-day leadlag peaks.
- Nifty IT remains structurally decoupled, showing low correlations and highly time-varying beta, making it a diversification candidate.
- High-risk regimes show steep, clustered transitions in the high risk map, aligning sharply with macro shocks such as COVID-19.
- FII flows operate as short-horizon signals for liquidity-sensitive sectors, with clear same-day and +1-day leadlag peaks.

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