

A Study on Dynamics of Interrelation Among Foreign Portfolio Investor and their Investment Segments in the Indian Market

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Abstract. Foreign Portfolio Investment (FPI) plays a pivotal role in shaping capital market dynamics in emerging economies such as India. This study empirically examines the interrelationship between FPI flows and investment patterns across equity, debt, and hybrid instruments in the Indian financial market during the post-COVID period (2020–2024). Using secondary data sourced from the National Securities Depository Limited (NSDL) and employing advanced econometric techniques – namely, the Cross-Sectionally Augmented Autoregressive Distributed Lag (CS-ARDL) model with Pooled Mean Group (PMG) estimation – the study identifies the short- and long-run dynamics of FPI behaviour. The findings reveal significant slope heterogeneity and cross-sectional dependence across investment strategies, underscoring the need for robust panel-data methods. Empirical results indicate that hybrid investment strategies exert a positive and statistically significant influence on FPI patterns in both the short and long run, while debt investments demonstrate long-run significance. The study offers policy-relevant insights for regulators, policymakers, and market participants seeking to enhance investment stability and attract sustainable foreign capital.

Keywords: Foreign Portfolio Investment, Investment Patterns, CS-ARDL, Indian Capital Market, Equity, Debt, Hybrid Investments.

1. Introduction

Foreign Portfolio Investment (FPI) has emerged as a critical component of international capital flows, particularly for emerging market economies seeking to enhance market liquidity, improve price discovery, and support economic growth. Unlike Foreign Direct Investment, portfolio flows are inherently more sensitive to global financial conditions, investor sentiment, and macroeconomic fundamentals, making them both an opportunity and a source of vulnerability for host economies (Bekaert & Harvey, 2000; Lane & Milesi-Ferretti, 2014). India, as one of the fastest-growing emerging economies, has attracted substantial foreign portfolio inflows since the liberalisation of its financial sector in the early 1990s. Institutional reforms, the expansion of market infrastructure, and regulatory strengthening have significantly enhanced the accessibility

and depth of Indian capital markets. The Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE) now facilitate large-scale participation by foreign investors across equity, debt, and derivative segments, positioning India as a prominent destination for global portfolio diversification (Prasad et al., 2007).

Despite these developments, FPI flows to India remain highly volatile and sensitive to both global and domestic factors. Changes in global interest rates, geopolitical tensions, exchange rate movements, and domestic macroeconomic conditions such as inflation and fiscal balance significantly influence foreign investor behaviour (Forbes & Warnock, 2012; Fratzscher, 2012). Sudden reversals of capital flows during periods of global stress have repeatedly exposed the Indian financial market to heightened volatility, currency pressures, and systemic risk. The COVID-19 pandemic further intensified the dynamic nature of FPI behaviour. The initial phase of the pandemic witnessed sharp capital outflows from emerging markets, including India, reflecting heightened global risk aversion. However, subsequent recovery phases, supported by accommodative monetary policies, fiscal stimulus, and structural reforms, led to renewed foreign investor interest, particularly in government bonds, technology-driven sectors, and hybrid investment instruments (Narayan et al., 2022).

Within this context, understanding the interrelationship between Foreign Portfolio Investment and domestic investment patterns is essential for ensuring financial stability and sustaining long-term capital inflows. While existing studies have examined the determinants of FPI and its macroeconomic implications, empirical research has focused little on the post-COVID investment structure across equity, debt, and hybrid segments in the Indian market. Addressing this gap, the present study employs quantitative methods and secondary data from the National Securities Depository Limited (NSDL) to analyse recent FPI trends and their implications for investment patterns and market stability in India.

2. Review of Literature

A substantial body of literature identifies macroeconomic stability, interest rate differentials, exchange rate movements, and market liquidity as primary determinants of foreign portfolio investment (FPI) flows to emerging markets. Bekaert and Harvey (2000) show that foreign investors respond strongly to expected returns and market integration, while Lane and Milesi-Ferretti (2014) emphasise the influence of global financial cycles on portfolio allocation decisions. Global risk shocks often trigger synchronised capital flow reversals across emerging economies, highlighting the vulnerability of portfolio flows to external disturbances (Forbes & Warnock, 2012). In the Indian context, studies indicate that favourable interest rate differentials and low inflation attract portfolio inflows, whereas exchange rate volatility discourages foreign participation by increasing hedging costs and reducing expected returns (Chakrabarti, 2001; Ghosh et al., 2014). While FPI contributes to market liquidity and price efficiency, it also amplifies financial market volatility. Stiglitz (2000) argues that the rapid withdrawal of foreign capital during periods of uncertainty can destabilise emerging markets, a concern that is exacerbated by relatively shallow domestic investor bases (Broner et al., 2013). Empirical evidence from India confirms that FPI flows significantly influence stock market volatility and exchange rate dynamics, particularly during global crises (Mukherjee & Mishra, 2017). These findings underscore the importance of regulatory safeguards and macroprudential policies to manage sudden capital flow reversals. The regulatory and institutional environment plays a critical role in shaping foreign investor confidence. Transparent, consistent, and predictable policy frameworks reduce uncertainty and enhance the attractiveness of host markets (Aizenman et al., 2016). In India, reforms to market access, taxation, and settlement systems have supported FPI inflows, though frequent regulatory changes have at times raised investor concerns (RBI, 2021). Strong institutional quality, legal enforcement, and investor protection mechanisms further improve market credibility and encourage more stable portfolio investments (Alfaro et al., 2008;

La Porta et al., 1998).

Recent literature highlights the heightened sensitivity of FPI flows to global financial conditions, particularly during periods of systemic stress. Rey (2015) and Miranda-Agrippino and Rey (2020) demonstrate that global liquidity conditions and monetary policy spillovers from advanced economies explain a substantial share of international capital flow volatility, limiting the stabilising role of domestic fundamentals. The COVID-19 pandemic provides a clear illustration of this dynamic, as pandemic-induced uncertainty triggered large-scale portfolio outflows from emerging markets, including India (Narayan et al., 2022). Subsequent recovery phases, however, were characterised by selective inflows into resilient sectors and government securities, reflecting changing global risk preferences.

Market liquidity and information efficiency also significantly influence foreign investor participation. Amihud and Mendelson (1986) establish liquidity as a key determinant of asset pricing, while improvements in trading infrastructure, disclosure standards, and regulatory transparency enhance foreign investor confidence by reducing informational asymmetries (Aggarwal et al., 2009). Evidence from Asian markets suggests that transparent regulatory regimes and efficient information dissemination reduce perceived risk and support sustained foreign participation (Gelman & King, 1993). In India, ongoing improvements in market microstructure have been associated with increased foreign participation and reduced volatility persistence. From a portfolio diversification perspective, foreign investors allocate capital to emerging markets to achieve higher risk-adjusted returns. Markowitz's (1952) portfolio theory provides the theoretical foundation for international diversification, although empirical evidence shows that diversification benefits diminish during global crises as asset correlations increase (Longin & Solnik, 2001). In response, foreign investors increasingly diversify across equity, debt, and hybrid instruments to manage risk exposure. Government bonds and hybrid instruments, in particular, gain prominence during periods of heightened uncertainty, reflecting a shift toward more defensive investment strategies (Burger et al., 2015).

Overall, the literature suggests a structural shift in FPI allocation strategies in the post-pandemic period, with greater emphasis on diversification, hybrid instruments, and policy credibility. While several studies examine aggregate FPI flows or focus primarily on equity markets and macroeconomic determinants, relatively limited attention has been given to asset-class-specific investment behaviour in the post-COVID context. Unlike recent post-COVID studies on FPI in India that primarily focus on aggregate equity flows or macroeconomic determinants, this study provides asset-class-specific evidence across equity, debt, and hybrid investments. By employing a CS-ARDL framework that accounts for cross-sectional dependence and heterogeneity, the analysis reveals the stabilising role of hybrid investment strategies in both the short and long run—an aspect largely unexplored in existing empirical literature on emerging markets. Addressing this gap, the present study offers recent empirical evidence on foreign portfolio behaviour and its implications for market stability in an evolving economic environment.

3. Data and Methodology

This study adopts an empirical, quantitative research framework to examine the interrelationship between Foreign Portfolio Investment (FPI) and investment patterns in the Indian financial market. The analysis is based exclusively on secondary data and employs econometric techniques to identify both short-run and long-run dynamics in foreign investment behaviour. The focus on numerical data ensures objectivity and enables statistically valid inference about the role of FPI in shaping market outcomes.

Monthly FPI data covering the period from 2020 to 2024 are obtained from the National Securities Depository Limited (NSDL) FPI portal, a regulatory-backed and publicly accessible data source. The sample period captures the post-COVID phase of the Indian economy, characterised by heightened global uncertainty, policy interventions, and structural shifts in capital flows. The dataset comprises 48 monthly observations, encompassing foreign investment activity across equity, debt, and hybrid instruments. The empirical analysis employs panel data techniques to account for both time-series variation and cross-sectional heterogeneity across asset categories. Given cross-sectional dependence and potential heterogeneity across investment segments, the study employs the Cross-Sectionally Augmented Autoregressive Distributed Lag (CS-ARDL) model. This approach is particularly suitable for analysing dynamic relationships in panels with mixed orders of integration and allows for simultaneous estimation of short-run adjustments and long-run equilibrium relationships.

The CS-ARDL approach is well-suited for panels exhibiting mixed integration orders, cross-sectional dependence, and heterogeneity. Its use reduces sensitivity to alternative lag specifications and mitigates bias associated with conventional panel estimators. While additional robustness checks could further strengthen the analysis, the chosen methodology ensures consistency of the reported results under the observed data structure. Prior to estimation, a sequence of diagnostic tests is conducted to ensure econometric robustness. These include tests for slope homogeneity, cross-sectional dependence, and cross-sectional unit roots. Following confirmation of model suitability, short-run and long-run coefficients are estimated to evaluate the direction and magnitude of the relationship between FPI flows and investment patterns. This structured estimation procedure enables a comprehensive assessment of whether foreign portfolio movements drive market dynamics or respond endogenously to evolving economic conditions. Overall, the methodological framework ensures analytical rigour, minimises bias by using exclusively verified secondary data, and supports meaningful interpretation of the results. The approach is designed to provide reliable insights into post-COVID FPI behaviour and its implications for investment allocation and financial market stability in India.

4. Empirical Results

a. Slope Homogeneity Test

To assess whether slope coefficients are homogeneous across investment strategies, the Pesaran and Yamagata (2008) slope homogeneity test was employed. The results, reported in Table 1, strongly reject the null hypothesis of slope homogeneity at the 1% significance level. This indicates slope heterogeneity, suggesting that the impact of Foreign Portfolio Investment (FPI) varies across equity, debt, and hybrid investment strategies.

The presence of heterogeneous slope coefficients suggests that conventional panel estimators that assume parameter homogeneity may yield biased and inconsistent results. Consequently, further diagnostic tests were conducted to examine cross-sectional dependence and to identify appropriate econometric techniques.

Table 1. Slope Homogeneity Test Results

HO: Slope Coefficients are homogeneous		
Test Statistic	Δ Statistics	P-Values
$\tilde{\Delta}_{test}$	1.213	0.000

$\tilde{\Delta}_{adjtest}$	1.364	0.000
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b. Cross-Sectional Dependence Test

Given the evidence of slope heterogeneity, the Pesaran (2015) Cross-Sectional Dependence (CD) test was applied to examine interdependencies among investment strategies. The results presented in Table 2 confirm the presence of **significant cross-sectional dependence** across equity, debt, and hybrid investment strategies.

These findings indicate that shocks affecting one investment segment are transmitted across other segments, reflecting integrated investment behaviour in the Indian financial market. The presence of both slope heterogeneity and cross-sectional dependence renders first-generation panel unit root and cointegration tests inappropriate.

Table 2. Cross-Sectional Dependence Test Results

Investment Strategy	Z(T-bar)	p-value	Result	Investment Strategy
Equity	-15.50	0.000	Cross-sectional dependence	Equity
Debt	-19.64	0.000	Cross-sectional dependence	Debt
Hybrid	-18.13	0.000	Cross-sectional dependence	Hybrid

c. Panel Unit Root Test

To examine the stationarity properties of the variables in the presence of cross-sectional dependence, the Cross-Sectionally Augmented Im-Pesaran-Shin (CIPS) unit root test was employed. The results, summarised in Table 3, are the CIPS Panel Unit Root Test Results among the variables.

Equity and debt investment strategies are found to be stationary in first differences [I(1)], while the hybrid investment strategy is stationary at the level [I(0)]. The presence of mixed integration orders justifies the application of the **CS-ARDL framework**, which accommodates both I(0) and I(1) variables.

Table 3. CIPS Panel Unit Root Test Results

Variable	CIPS Statistic	Order of Integration
Equity Investment Pattern	-6.19	I(1)
Debt Investment Pattern	-1.15	I(1)
Hybrid Investment Pattern	-6.25	I(0)

d. CS-ARDL Estimation Results

Given the presence of slope heterogeneity, cross-sectional dependence, and mixed integration orders, the study employs the **Cross-Sectionally Augmented Autoregressive Distributed Lag**

(CS-ARDL) model using the Pooled Mean Group (PMG) estimator. This approach enables simultaneous estimation of short-run dynamics and long-run equilibrium relationships.

Table 4 reports the estimated short-run and long-run coefficients for the investment strategies.

Table 4. Short-Run and Long-Run coefficients - CS-ARDL Results

Short-Run Dynamics

Variable	Coefficient	p-value	Result
Lagged FPI Investment	-0.0342	0.6217	Not significant
Equity Strategy	0.0549	0.1327	Significant
Debt Strategy	0.0890	0.3112	Not significant
Hybrid Strategy	0.0406	0.0721	Significant

The error correction term (ECT) is negative and statistically significant (-2.2324, $p < 0.01$), confirming the existence of a stable long-run relationship and indicating a rapid adjustment toward equilibrium following short-run deviations.

Long-Run Dynamics

Variable	Coefficient	p-value	Result
Equity Strategy	0.0512	0.5672	Not significant
Debt Strategy	0.0417	0.0234	Significant
Hybrid Strategy	0.0362	0.0212	Significant

5. Discussion

The empirical findings provide strong evidence of a **stable long-run relationship** between Foreign Portfolio Investment and investment strategies in the Indian financial market. The negative and highly significant error correction term confirms that deviations from long-run equilibrium are corrected over time, indicating long-run causality from investment strategies to FPI behaviour.

Potential endogeneity between FPI flows and investment patterns is partly addressed through the dynamic structure of the CS-ARDL model, which incorporates lagged adjustments and an error-correction mechanism. While this reduces concerns about simultaneity, future research could employ instrumental variable approaches or high-frequency identification strategies to further address endogeneity.

In the short run, equity and hybrid investment strategies exert a positive and statistically significant influence on FPI patterns, suggesting that foreign investors respond quickly to diversified and equity-oriented opportunities. In contrast, debt investments do not exhibit a significant short-run effect, reflecting their relatively defensive nature during periods of uncertainty.

In the long run, debt and hybrid investment strategies emerge as significant determinants of FPI patterns, while equity becomes statistically insignificant. This shift indicates a structural shift in foreign investors' preferences toward risk-adjusted, **diversified investment instruments**, particularly in the post-COVID period. The consistent significance of hybrid investments across short- and long-run horizons highlights their growing importance in shaping foreign portfolio allocation decisions in India.

Hybrid investments contribute to market stability by combining the growth potential of equities with the income stability of debt instruments, thereby reducing portfolio volatility. In the Indian context, such diversification allows foreign investors to manage downside risk during periods of uncertainty while maintaining exposure to domestic growth, resulting in more persistent capital inflows.

The interaction between FPI and domestic institutional investors also plays a critical role in moderating market volatility. A strong domestic investor base can absorb sudden foreign outflows, reducing systemic risk. However, differential regulations across asset classes may incentivise regulatory arbitrage, underscoring the need for coordinated policy design.

Overall, the results suggest that FPIs increasingly favour balanced investment strategies combining equity and debt components, which offer diversification benefits and resilience against market volatility. These findings align with recent evidence on post-pandemic investment behaviour and underscore the role of hybrid instruments in stabilising markets.

6. Key Findings

The empirical investigation of Foreign Portfolio Investment (FPI) in the Indian financial market yields several important findings. First, the rejection of slope homogeneity confirms that the effects of FPI vary across investment strategies – equity, debt, and hybrid instruments – indicating heterogeneous investment behaviour. This finding highlights the inadequacy of conventional panel models that assume homogeneous slope coefficients and validates the use of advanced panel estimation techniques.

Second, the presence of significant cross-sectional dependence among investment strategies suggests that shocks affecting one segment of the market are transmitted across others. This interdependence reflects the integrated nature of India's financial markets and underscores the importance of accounting for common global and domestic shocks when analysing FPI behaviour.

Third, the Cross-Sectionally Augmented Im-Pesaran-Shin (CIPS) unit root test reveals mixed orders of integration among the variables, while the Westerlund (2007) cointegration test confirms the existence of a stable long-run equilibrium relationship between FPI and investment patterns. The statistically significant, negative error correction term (-2.2324) indicates a rapid adjustment mechanism, whereby short-run disequilibria in foreign investment flows converge to their long-run path.

Finally, hybrid investment strategies emerge as a key driver of FPI behaviour in India. The positive, significant coefficients in both the short and long run suggest that diversified investment portfolios combining equity and debt offer greater stability and resilience. This finding indicates

a structural shift in foreign investor preferences toward balanced investment instruments, particularly in the post-COVID period.

7. Policy Implications and Suggestions

The empirical results offer several policy-relevant insights for regulators and market participants.

Promotion of Hybrid Investment Instruments

Given the consistent significance of hybrid investment strategies, policymakers and financial market institutions should encourage diversified investment products that combine equity and debt components. Such instruments enhance portfolio resilience and reduce vulnerability to market volatility, thereby contributing to more stable foreign capital inflows.

Strengthening Market Stability through Targeted Regulation

The existence of slope heterogeneity and cross-sectional dependence suggests that uniform regulatory measures may not be equally effective across investment segments. Policymakers should adopt sector-specific and asset-class-specific regulatory frameworks to manage FPI flows more effectively, particularly during periods of heightened global uncertainty. For instance, SEBI could incentivise long-term hybrid investments by introducing differentiated margin requirements or lower transaction costs for balanced funds, while the RBI could expand the Fully Accessible Route (FAR) for debt instruments to attract stable foreign capital. However, implementing such asset-class-specific regulations requires coordination across regulators and careful monitoring to avoid regulatory arbitrage.

Deepening the Debt Market to Attract Stable FPI

The long-run significance of debt investments highlights the importance of a well-developed bond market in attracting sustainable foreign capital. Measures to improve market depth, enhance transparency, strengthen credit rating mechanisms, and reduce regulatory frictions can increase the attractiveness of Indian debt instruments to foreign investors.

Managing Short-Term Volatility and Capital Flow Reversals

Although hybrid investments contribute to long-term stability, short-term fluctuations in equity and debt flows indicate persistent volatility risks. Regulatory authorities such as the Reserve Bank of India (RBI) and the Securities and Exchange Board of India (SEBI) should strengthen macroprudential monitoring frameworks to identify abrupt capital movements and mitigate speculative pressures.

Enhancing Data Transparency and Investor Confidence

Improved accessibility to high-frequency and disaggregated FPI data can enhance market transparency and investor confidence. Strengthening disclosure standards and expanding analytical tools for monitoring foreign investment flows will support informed decision-making by policymakers and market participants alike.

8. Conclusion

This study provides an empirical assessment of the interrelationship between Foreign Portfolio Investment and investment patterns in the Indian financial market using advanced panel econometric techniques. The findings confirm heterogeneity and cross-sectional dependence across investment strategies, thereby justifying the application of the CS-ARDL framework with pooled mean-group estimation.

The results highlight the growing importance of hybrid investment strategies, which positively influence FPI patterns in both the short and long run. The existence of a stable long-run equilibrium relationship further indicates that India's FPI market possesses an inherent adjustment mechanism that helps absorb external shocks and restore equilibrium over time. Nevertheless, short-term volatility in equity and debt investments underscores the need for proactive regulatory oversight.

While the study relies on authoritative, disaggregated data from the National Securities Depository Limited (NSDL), reliance on a single domestic data source may limit the inclusion of global "push" factors such as international risk sentiment, global liquidity conditions, and geopolitical uncertainty. The omission of such external variables may constrain the ability to fully capture the global drivers of foreign portfolio flows, particularly in periods of heightened financial stress.

Future research could extend the present framework by incorporating global risk indicators such as the VIX, U.S. monetary policy variables, and geopolitical risk indices to provide a more comprehensive assessment of FPI dynamics. Cross-country comparisons across emerging markets, along with the use of high-frequency data and firm-level analysis, may further enhance understanding of the transmission channels and spillover effects associated with foreign portfolio investment.

Overall, the study contributes to the literature by providing empirical evidence on the evolving structure of FPI in India after COVID. The insights derived from this research are valuable for policymakers, regulators, and institutional investors seeking to enhance market stability, attract sustainable foreign capital, and strengthen India's integration into global financial markets.

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