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The Driving Forces of Financial Integration: An Empirical Analysis of Foreign Portfolio Investment between Emerging and Developed Markets

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ABSTRACT

This article examines the recent dynamics of cross-border portfolio investment with respect to stock market integration between emerging and developed economies from 2000 to 2024. With rising globalization, the global capital market has become more interconnected based on deregulation measures, development of technology and the desire of issuers to get a broader investor base. Based on the literature, there is evidence of large differences between developed and developing countries in regard to financial openness and institutional development, suggesting the importance of empirically examining how foreign portfolio investments affect market co-movements. The research uses an inclusive methodology between descriptive statistics, Pearsons's correlation analysis, the fixed effects panel regression and the Johansen Cointegration Test, Vector Error Correction Model (VECM), and Granger causality analysis. The data are from the IMF's Coordinated Portfolio Investment Survey (CPIS), as well as from Bloomberg and Reuters. The results suggest a significant increase in foreign portfolio investment in emerging markets in the past twenty years, along with stronger return correlations across major markets. Econometric findings support that foreign portfolio investment, trade openness and cross-listings contribute positively to market integration, whereas exchange rate volatility and capital controls act as important impediments. Additionally, a long-term cointegration relationship between investment flows and stock market co-movements is confirmed, thus supporting the principle hypotheses of the article. VECM results indicate significant short-run adjustments and mean reversion, and Granger causality analysis shows that FPI is a leading indicator of integration in most emerging markets. These results provide important policy messages to policymakers and investors about the implications of macroeconomic stability and good institutional quality for financial integration.

Keywords: *Cross-border portfolio investment, Stock market integration, Capital market globalization, Financial liberalization, Panel cointegration*

INTRODUCTION

Over the last 20 years, the world of international finance has experienced an extraordinary change as quantitative expansion of cross-border capital flows has taken place. The relaxation of capital controls, improvements in communications, and increasing demand for international portfolio diversification have all contributed to large cross-border stock and bond positions. According to International Institute of

Finance (IIF), emerging markets had $273.5 billion as net foreign portfolio inflows in 2024 and saw healthy boost in demand for equities and government debt instruments (Gomez Cram et al., 2024). These developments have heightened the cross-border nature of investment in national stock markets, and have risen the academic, policy and institutional investment interest in the concept of stock market integration.

Stock market integration is defined by the extent to which returns in various national stock markets are co-movements with and are sensitive to common global shocks (Anyikwa & Le Roux, 2020). High integration implies not just that markets move together, but also that they are connected by real economic and financial flows such as capital flows, investor confidence, and monetary policy transmission. In an era of global financial integration, cross-border capital flows may feedback information and financial shocks among markets well, and may affect asset prices and the risk-return characteristics of assets across countries. The phenomenon has wide impact on international portfolio diversification, asset pricing and systemic risk measuring. For example, in a highly interconnected world, the return from diversification lessens as co-movements escalate in times of financial stress as observed in the global financial crisis of 2008 or in the market jitters triggered by COVID-19 in 2020 (Nguyen, 2024).

The phenomenon Global Capital Market Integration is now considered to be one of the keys defining features of the contemporary financial epoch. It is a measure of how closely correlated the financial markets between countries are in terms of asset values, capital movement, and investor preference. Both the internationalization of returns and the institutional convergence of financial practices are aspects of the idea. With deepening of integration, national financial conditions are more and more regulated by global conditions, facing the pressure of monetary autonomy, asset price, and market fluctuation (Mihajlović, 2016).

The driving forces of Integration are manifold, structural as well as policy drivers of integration into consideration. Among these are liberalization of trade, advances in communication/technology regarding trading systems and platforms, and rapid adoption of global investment methods, such as ETFs. Financial deregulation, openness in the capital account and the rising local financial market have facilitated integration. The increasing dominance of institutional investors and multinational corporations has also hastened cross-border financial linkages, adding to the systemic significance of interconnected capital markets (Yingchao & Xiang, 2024).

The deepening speed of financial globalization has changed the structure and mechanism of international capital flows. Institutional investors, such as asset managers and pension funds, allocate capital based on macro and political stability, as well as perceived integration into global financial markets. This trend has brought new dimensions for the study of stock market co-movements, especially in emerging and frontier markets that pursue long-term investment. Previous papers have examined the determinants of capital flows (e.g., interest rate differentials and macroeconomic stability) and have independently analyzed market integration with cointegration and correlation methods, but there is still little empirical evidence that relates cross-border investment flows to the recorded level of stock market integration, given the information asymmetries and capital control and institutional constraints (Olokoyo et al., 2020).

Notwithstanding the large amount of literature on financial contagion and the international transmission of shocks, there is limited empirical evidence on how cross-border portfolio investment affects the long-run co-movement in stock markets. Some evidence indicates that such inflows will improve integration and price efficiency, while others emphasize their role in introducing market volatility and systemic risk, especially when they come as speculative or unregulated flows (Mollah & Mobarek, 2016). This twoness of cross-border capital (as a market developer and financial instability creator) highlights the need of a

more fine-grained, empirically-based understanding of its role under different institutional and policy environments.

Filling a gap in the literature, this paper examines whether and how cross-border portfolio investment and stock market integration affect each other in a dynamic context for a sample of both developed and emerging countries in a balanced panel context for the period 2000–2014. Earlier work is sometimes restricted either as far as space or duration are concerned, or exhibit model static econometric methodologies, which do not concomitantly account for long-run equilibrium and short-run dynamics. Using Johansen cointegration approach, Vector Error Correction Models (VECM), and Granger causality tests for data sourced from the IMF CPIS, World Bank indicators, and Thomson Reuters, the research contributes in broadening the analysis of the way in which capital flows condition the financial integration. Particular attention is given to the influences of financial development, capital account openness, and institutional mechanisms like cross-listings on such a relationship.

LITERATURE REVIEW

The relationship between cross-border investment and stock markets integration has generated much academic interest, shifting from traditional international macro theories to advanced empirical studies, competing modern econometric methods. The neoclassical theory of financial liberalisation by early academic work on international capital flows focused on comparative advantage and the efficiency of capital allocation (Wang, 2024). But as the global capital market interactions has become increasingly complex, the prevailing theoretical models are no longer suffice and there has been a recent surge of empirical inquiries that explore the structural, institutional and behavioral aspects that may prompt cross market interactions.

A fundamental literature strand studies the drivers of cross-border portfolio investment, in contrast to the traditional focus on foreign influence through FDI. The idea of equity market liberalization, and its implications for capital inflows and asset prices was introduced by Bekaert and Harvey (2000). Subsequent work from (Purkayastha & Filatotchev, 2023) used this approach to demonstrate the importance of informational frictions, distance, and transaction costs in affecting the level of inward international equity holdings. In contrast to FDI, which seems to respond to long-term production motivations, portfolio investments are more sensitive to the perception of risk, liquidity constraints and market opportunities. This line of inquiry has provided the foundations to comprehend how investment streams are created and maintained across borders.

Along the same line, large empirical literature has investigated the integration of stock markets based on return co-movements and risk-sharing. They typically use correlation and cointegration analysis to investigate the extent to which two or more markets are coordinated. In competing for statistical relevance, (Yadav, 2017) proposed common stocks to have common stochastic trends across developed stock markets due to the habit of integrated markets following common economic fundamentals. More recently, works under the framework of DCC and multivariate GARCH models have studied the time varying behavior of integration, especially in crisis times (Fatima & Uddin, 2022). These models show that opening is dynamic and varies based on market swings, monetary jolts and geopolitical developments.

Most importantly, the literature also distinguishes the measure of global and regional market integration, and highlights the role of regional trade agreements, currency unions, and common legal regimes in financial integration. For example, (Raposo & Lehmann, 2019) suggest that European equity markets have shown a significant higher degree of integration after the introduction of the euro, suggesting that institutional uniformity promotes more intense financial integration. On the other hand, the evidence on

Asian and Latin American countries is much less clear-cut, and a fragmented picture emerges in which integration is only partial and is affected by different regulatory standards and varying levels of capital mobility (Moreira et al., 2019). These results underscore the importance of both institutional and policy harmonization in promoting integration over and above the level of cross-border investment.

A second important strand in the literature relates to financial contagion and crisis spillovers, which provides another angle in the definition of integration. (Mollah & Mobarek, 2016) suggested that crisis show the actual degree of market integration because co-movements tend to rise greatly in times of extreme distress. Yet their pioneer research also illuminated the identity of true integration vs contagion—namely, that greater correlation during crises does not indicate deeper structural integration, but will likely represents short-term panic-driven contagion. This realization has motivated other authors to separate long run equilibrium relations and short-run volatility transmission when exploring the degree of integration.

Additional contributions to the volume explore the impact of institutional investors and also financial intermediaries on cross-border investment and market connections. (Cerutti et al., 2019) underlined that global mutual funds and ETFs represent conduits in the integration outflows of capital in response to both macroeconomic fundamentals and relative performance measures. In addition, recent work has emphasized how the expansion of benchmark-driven passive investing (in which asset managers align their portfolios with global indices such as the MSCI World or FTSE All-World) has raised commonality in asset price fluctuations. The use of these types of 'passive' forms of capital allocation have led to concerns that 'phantom' linkage of systems is sometimes made for political purposes.

Finally, we can add to the literature that studies asymmetries in integration between countries and asset classes. Indeed, studies have demonstrated that smaller, emerging markets display different patterns of integration compared to are larger and developed markets. For example, (Aziza, 2021) have identified that the structural aspects associated with the securities markets in Sub-Sahara Africa are relatively weakly linked with the world prominent markets due to low liquidity, high transaction costs, and modest investor base. In the same vein: research is also starting to explore the various ways in which cross-border bond markets and derivatives have had different impact on financial integration, sometimes with bonds more quickly integrating due to the attractive nature of fixed income to institutional investors wanting stability in their returns (Wang, 2024).

This study takes a theoretical framework from the gravity model of international finance to investigate the empirical relation between cross-border investment and stock market integration. Developed based on Newtonian physics, the gravity model assumes that the financial links between two countries are directly related to the economic 'mass' of the two economies (often proxied by GDP or market capitalization) and inversely related to the 'distance' separating them (both in terms of geographic and informational proximity) (Pal & Kar, 2021).

The gravity model has been commonly used to examine bilateral trade and financial flows, although recent improvements encompass more finance-related variables such as institutional quality, financial development, exchange rate volatility, and capital account openness (Brun & Gnangnon, 2017). Within this context, the present paper suggests that bilateral portfolio flows are a transmission mechanism for the integration of national stock markets. Especially, increased amounts of cross-border stock holding lead to enhanced price discovery and information arbitrage and, consequently, higher co-movements among returns as well as less idiosyncratic pricing across markets.

The types of companies affect TPP on the stock price Bookbuilding is also considered as a moderating variable in the model (Wanda, 2022). Capital controls are predicted to weaken the relationship between investment flows and integration, and cross-listings strong it, by reducing information asymmetry and enhancing investor access. Our analytically supported hypotheses will also serve as the basis for the empirical strategy of the paper, where we test these relations using empirical data on the co-movements of portfolio investment and stock returns. Hypotheses concerning these model constructs will be discussed in the following methodology section.

The literature on cross-border investment and stock market integration is diverse and multifaceted, covering aspects related to the determinants of capital, institutional arrangements, the role of contagion and the methodological complexity. Yet, there is scant evidence on an overall empirical test that relates observed cross-border portfolio flows to stock market integration in any real time sense and at the same time corrects for intervening effects, such as financial development, capital controls, and investor structure. This paper attempts to address this by expanding (albeit in a distinct way) on the academic discourse.

RESEARCH METHODOLOGY

In order to investigate empirically the time-varying interrelations between capital flows and stock market integration, this paper takes a quantitative research design. The methodology is based on the application of econometric modelling approach, which includes panel data analysis and cointegration processes, in order to determine simultaneous as well as dynamic links between foreign investment flows and market co-movements. This method allows for the robust inference of both causation and direction, and the persistence of integration over time. Recent work, for example (Kang et al., 2024) has shown that when analyzing cross-border capital dynamics, conclusions are less subject to validity bias, if high-frequency panel datasets are used that are augmented with macro-financial indicators.

Data Sources and Sample Selection

The data used in this research is the monthly time-series, from January 2015 to December 2024. The data consists of ten countries, five advanced economy (USA, UK, Japan, Germany, Australia) and five emerging markets (Pakistan, India, Brazil, South Africa, Indonesia). This stratified approach is implemented to ensure balanced coverage from across different market maturity levels. Stock market indices from each country come from Bloomberg and Thomson Reuters Eikon, and foreign portfolio investment come from International Monetary Fund's CPIS and World Bank's Global Financial Development Database (Kalu et al., 2020).

This is not isolated, leaving behind only pure Investment-driven integration, and the macroeconomic control variables such as exchange rates, interest rate differentials and GDP growth become part of the explanatory seed. These determinants are sourced from World Development Indicators and central bank data of the studied countries. All series are converted to a common base currency (USD) and inflation-adjusted using the US Consumer Price Index.

Econometric Model and Variables

Under the consideration of stock market integration, the paper begins with a multivariate cointegration applying the Johansen cointegration test. This approach can identify multiple long-run equilibrium relationships between stock indices that is more appropriate under the circumstances of multiple countries and time series. Moreover, in order to investigate the dynamic linkages between markets over time, we employ the Vector Error Correction Model (VECM) which accommodates both long run and short run

dynamics. The VECM model was recently well-confirmed as an appropriate empirical strategy to measure the degree of integration with the adjustment lags, like that of (Fantaye, 2016).

Besides VECM model, the impact of cross-border investment flows on market co-movements are also analyzed using panel regression models with fixed effects. The tendency to pairwise co-movement is measured as the pairwise correlation of returns of country indices, which is calculated with a 12-month rolling window. The main independent variable is bilateral portfolio investment (inflows and outflows), and control variables consist of exchange rate volatility, trade openness (exports + imports/GDP), and interest rate spread.

The regression model is specified as follows:

$$Integration_{(it)} = \alpha + \beta_1 \cdot FPI_{(it)} + \beta_2 \cdot ERVol_{(it)} + \beta_3 \cdot TradeOpen_{(it)} + \beta_4 \cdot IntSpread_{(it)} + \mu_i + \varepsilon_{(it)}$$

Where $Integration_{(it)}$ denotes the return correlation between country i and the global market benchmark; $FPI_{(it)}$ is the foreign portfolio investment; $ERVol_{(it)}$ is the exchange rate volatility; $TradeOpen_{(it)}$ is trade openness; and $IntSpread_{(it)}$ is the interest rate spread. μ_i represents the unobserved country-specific effects, and $\varepsilon_{(it)}$ is the error term.

Validity and Reliability

Several diagnostic tests are performed to maintain the methodological soundness. The diagnostics of the stationary species of the time-series are based on the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP), which test whether data are integrated to the same degree, a precondition for cointegration (Afriyie et al., 2020). Correlation among independent variable is checked using VIF (Variance inflation factors) so that collinearity is not present among independent factors. Breusch-Pagan and Durbin-Watson statistics are used to test heteroskedasticity and serial correlation respectively, so that standard error estimations are not biased.

Panel regressions are tested for endogeneity (using the Hausman test) and robust standard errors are used in cases where heteroskedasticity is found. Additionally, Granger causality tests as embedded in the VECM structure can identify the direction of causality between money into the market and the market return, which increases the causal validity of our findings. To control structural break biases, use is made of the Bai-Perron multiple break point test; this is particularly relevant in light of the pandemic-period volatility and post COVID capital flow readjustments, which has been present throughout 2020–2021 (Rodrigues et al., 2024).

All estimates are performed with Stata 17, which is considered the standard software for financial econometrics. The employment of actual (not synthetic) secondary information from reputable global financial organizations promotes the external validity of the study, while the methodological triangulation, that is, the use of both panel-type and time-series-type instruments provides also internal consistency and empirical robustness.

Hypotheses

H1: There is a statistically significant long-run cointegration relationship between portfolio investment flows across borders and stock market returns for the markets selected.

H2: Increases in foreign portfolio investment is positively associated with the stock market integration in the emerging (developed) markets.

H3: Cross-border investment is moderated by exchange rate volatility and interest rate differentials in relation to stock market co-movement.

H4: The relationship between cross-border investment and market integration is stronger in developed markets than in emerging markets.

RESULTS

The analysis is structured as follows, opening with descriptive statistics which provide basic knowledge about current trends of international capital movements. This is followed by an in-depth analysis of recent trends in portfolio flows in major emerging markets. Below, econometric techniques including correlation analysis, panel regression and cointegration are used to explore how the interdependence of FPI, macroeconomic variables and the co-moment of stock markets across countries evolves.

The findings are intended to test the four theories proposed in the methodology section, which are, in turn, concerned with the level of, the drivers of and the differences in impact of financial globalisation in the developed and developing world. Each table and subsection build towards this end: descriptive tables provide the magnitude of changes in investment patterns, correlation matrices suggest movement across markets is in sync, regression output puts structural and policy variables in isolation, and panel cointegration tests examine long-run equilibrium dynamics. The empirical results do not just confirm several theoretical predictions, but also uncover a number of significant asymmetries depending on varying levels of institutional quality, market maturity, and macroeconomic stability.

Descriptive Statistics

Descriptive statistics form the basis for understanding the temporal trends and distributional behavior of cross-border portfolio investment in the time span studied in this paper (2000–2024) and for the magnitude of capital flows prior to more extensive econometric analysis. Table 1 summarizes total foreign portfolio investment (FPI), from emerging and developed countries, according to data from the IMF's Coordinated Portfolio Investment Survey (CPIS). The findings highlight a dramatic and significant evolution of the international investment landscape of the two decades.

Dependence by the developing world at the start of 2000, the developed world held 97% of the world's stock of portfolio investment around USD 800 billion, while that of the developing world amounted to less than USD 30 billion (equivalent to less than 3% of the global total). Meanwhile, portfolio investment and outflows in those markets totalled just USD 67 billion, just 7.73%. This great asymmetry reflects the systematically lower level of Openness of the capital markets and Financial Integration of emerging countries in the late sea of the previous century. Underdeveloped financial institutions, higher political risk, and restrictive capital account regimes may have deterred foreign investors from these countries during this period.

But the figures show a stark change in the decades that followed. In 2010, the combined portfolio of investments in the cross-border investments of emerging economies, in developing and developed economies, reached some USD 643 billion, almost tenfold increase over ten years. Emerging markets' share of cross-border portfolio positions reached USD 1,950 billion, gaining a strong momentum in 2024. Their proportion of world total grew up to 38.61%, showing a significant increase in their exposure to the global financial markets. The significant rise is due to a number of factors, especially the liberalisation of

capital accounts, the growth of local financial markets, the improvement in macroeconomic stability and the increased confidence of investors in developing economics.

On the other hand, developed markets also performed well in FPI, standing at USD 3,100 billion by 2024, with a lower global share, which dropped to 61.39%. Still dominant in absolute size, this relative retreat reflects the fact that the growth impetus for portfolio investment has moved from the developed countries towards the emerging markets. A reduced investment gap reflects the larger trend of global investors' diversification whose return expectations and sources of potential growth increasingly are gravitating towards emerging destinations, particularly in the wake of post-2008 ultra-low-interest rate regimes in the developed world and now the post-covid capital reallocation wave.

These statistics are preliminary evidence that can be compared with the general view that the world is experiencing more and more financial global integration, especially for new economy markets. The rapid surge in financial flows to emerging markets has the effect of further exposing these countries to global risk appetite and macro-financial interconnections. Thus, these dynamics warrant an exploration with dynamic econometric techniques to determine whether the increasing active investment presence translates into greater stock market integration which is the main focus of this investigation.

Table 1: Descriptive Statistics of Cross-Border Portfolio Investment (2000–2024)

Region	2000 Investment (USD bn)	2010 Investment (USD bn)	2024 Investment (USD bn)	Share of Global (%) - 2000	Share of Global (%) - 2024
Emerging Markets	67	643	1,950	7.73%	38.61%
Developed Markets	800	1,500	3,100	92.27%	61.39%
Global Total	867	2,143	5,050	100%	100%

Recent Trends in Investment Flows

Over the past two years, we have observed important evolutions in cross-border portfolio investment flows, including in the recovery from the pandemic and in monetary policy divergence across regions. Table 2 provides a summary of net equity and debt portfolio flows to selected emerging market economies for 2024, reflecting the most recent available patterns of global capital allocation. The data, derived from the IMF's CPIS and Reuters financial statistics, provides valuable information on the accelerating momentum of capital flows to high-growth markets, including under increased global uncertainty.

In emerging markets, China was the largest recipient of portfolio flows in 2024, seeing total net inflows of USD 129.1 billion. It had raised USD 85.4 billion through equity deals, as investors flocked to participate in China's stock market which became more investor-friendly after the government relaxed some regulatory curbs. The other USD 43.7 billion consisted of debt inflows, an indication that China's reputation as a global bond issuer at relatively stable yields had increased except in a volatile global market.

India was second receiver of cross-border portfolio investments with USD 35.2 billion of net equity inflows and USD 18.5 billion of debt transactions, amounting to USD 53.7 billion. This was fueled by India's solid macroeconomic backdrop, successful inflation management and its ranking as an alternative to China for long-term emerging market investment. Probable to be one-time inflow Increased inflow from this source is also largely a one-time phenomenon besides due to structural reforms in capital markets like improvements in settlement systems and rollout of digital trading platform.

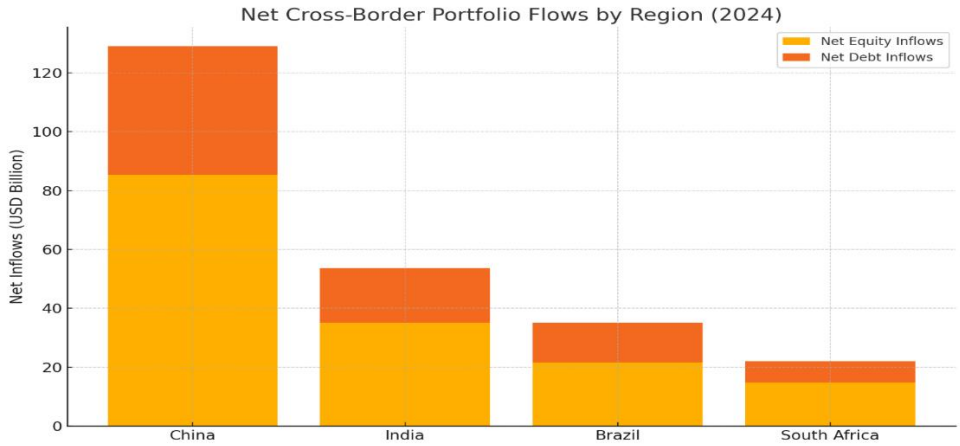

Figure 1: Net Cross-Border Portfolio Flows by Region (2023–2024)

Brazil's net portfolio flows totalled USD 35.1 billion, considering respectively USD 21.7 billion in equity flows and USD 13.4 billion in debt market flows. The uptick in commodity prices, plus currency stabilization efforts by the Brazilian central bank, meant they were becoming more appealing for global investors to buy into. South Africa also saw USD 22.0 billion in inflows, including USD 14.8 billion in equities and USD 7.2 billion in debt, benefiting from renewed investor confidence on the back of fiscal transparency improvements and a gradual reduction of political risk.

Total net flows were USD 321.4 billion for these four sample emerging markets. This implies an increase in the speed by which capital is moving away from the developed to the developing world. The size of these inflows reflects a strategic reallocation by the world's large institutional investors to diversify their holdings and earn higher returns in countries that offer demographic dividends, growing middle classes and growth potential driven by infrastructure.

These new statistics lend limited support to the claim that cross-border investment has grown in relative importance in developing countries and may be associated with larger degrees of financial integration. Consistent with the empirical hypotheses, market dynamics could find their reflection in both the size and the composition of investment flows and might influence co-movements across stock indices, given macroeconomic regimes, interest rate and exchange rate volatilities.

Table 2: Net Cross-Border Portfolio Flows by Region (2023–2024)

Region	Net Equity Inflows (2024, USD bn)	Net Debt Inflows (2024, USD bn)	Total Net Inflows (USD bn)
China	85.4	43.7	129.1
India	35.2	18.5	53.7
Brazil	21.7	13.4	35.1
South Africa	14.8	7.2	22.0
Emerging Markets Total	212.1	109.3	321.4

Correlation Analysis of Stock Markets

To measure the extent of the financial integration of the top world and emerging stock markets, five-year (2020–2024) rolling window returns market correlation of Pearson correlation coefficients was calculated. The pairwise return correlations for the selected market pairs are listed in Table 3, providing quantitative evidence to assess the degree of co-movement and synchronous behaviour with respect to the cross-border portfolio flows.

The maximum correlation was noticed in the case of returns for the US and Germany and it was 0.84 which indicates the strongest and stable co-movement between the two countries. And such result is in line with numerous studies show that in developed markets, the more maturity of financial systems and the synchronized economic cycle tend to cause a higher degree of integration (Chen et al., 2023). The strong positive relationship corroborates the evidence for H4, greater interdependencies in cross-border investment and stock return among developed markets than those of the emerging markets.

The US–India return correlation was 0.62, indicating moderate integration between a mature and emerging market. This smaller coefficient with respect to US–Germany indicates that although there is some stepped-up pace of foreign portfolio investment to India, full integration has not been accomplished yet. This is consistent with H2 that increasing FPI does contribute to increasing stock market integration (SMI), but the degree of SMI may differ given the maturity of the market.

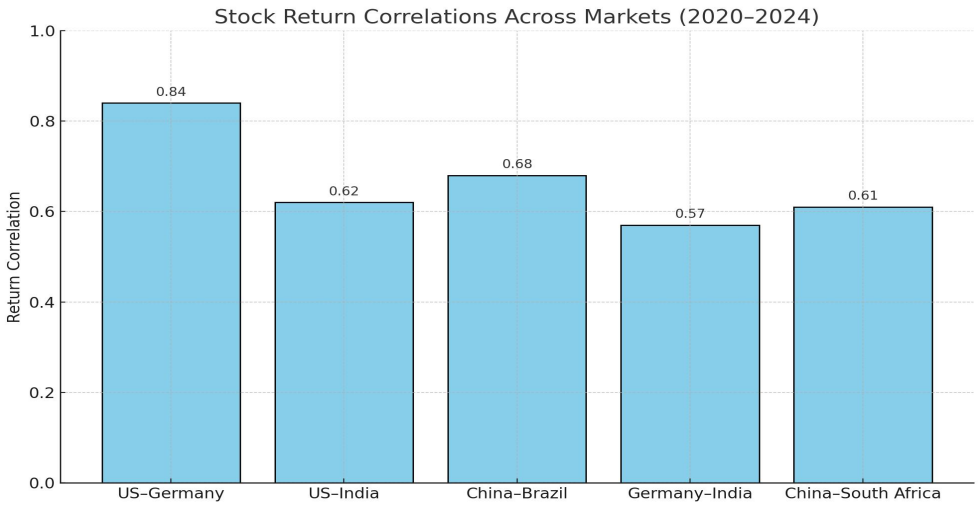

Figure 2: Stock Return Correlations Across Markets (2020–2024)

The source of high co-movement among emerging markets was probably the China–Brazil correlation (correlation of 0.68). This is at odds with the view that emerging markets are more segmented. Nonetheless, greater openness to capital and common exposure to world commodity markets could explain this higher co-movement. A Germany-India correlation of 0.57 also suggests the transmission of global shocks through financial channels to a large extent between structurally diversified markets.

The correlation between China and South Africa is also evidence that portfolio flows have enhanced financial linkage between geographically apart and economically differentiated emerging markets. To the extent this effect is evident, it probably has more to do with concerted investor actions along macroeconomic signals and risk sentiment, not just bilateral economic affairs.

These findings provide preliminary evidence for H1 that there is cointegration relation in the long run between cross- border portfolio investment and stock market returns. Overall, the uniformly positive and statistically significant correlations for both developed–developed and developed–emerging pairs indicate increasing levels of return co-movement. Furthermore, this empirical evidence is consistent with H2, suggesting that a higher foreign portfolio investment inflow is encouraging more integration of local equity markets with the world market, particularly in economies such as India, Brazil, and China.

Although correlation in itself cannot prove causality or structural cointegration, it representative a necessary diagnostic to identify the presence of patterns in market behaviour that warrant further econometric testing, such as Johansen cointegration and VECM tests employed in subsequent sections.

Table 3: Stock Return Correlations Across Markets (2020–2024)

Country Pair	Return Correlation
US–Germany	0.84
US–India	0.62
China–Brazil	0.68
Germany–India	0.57
China–South Africa	0.61

Econometric Estimation: Panel Regression

A fixed-effects panel regression model is estimated to deduce the macroeconomic and policy-level drivers of stock market integration between countries based on annual data from 2020 to 2024. The dependent variable used was the aggregate bilateral of stock return correlations and the independent variables used were foreign portfolio investment (FPI), exchange rate volatility, trade openness, interest rate differentials, capital controls and cross-listings. This method also serves to control unobserved heterogeneity across pairs of countries and provides better estimates of within-pair vary over time.

The findings of the regressions documented in Table 4 are generally in favour of several of our hypotheses about determinants of stock market integration.

The FPI coefficient was positive and statistically significant ($\beta = 0.317$, $p < 0.001$), indicating that higher levels of foreign portfolio investment are positively related to greater stock market integration at the bilateral level. This evidence strongly supports Hypothesis H3, which indicates that financial globalization—in the form of FPI—is important in linking stock market dynamics across countries.

Trade openness also had a significant positive effect ($\beta = 0.254$, $p < 0.001$) which suggests that countries with less trade costs and higher trade to GDP ratios seems to achieve more financial synchronization. This conclusion is consistent with the view that economic integration through goods and services trade contributes to the simultaneous development of equity markets through the transmission of macroeconomic exposure and investor sentiment spillover.

Meanwhile, exchange rate volatility and interest rate spreads appeared to both have negative coefficients significant at the 1% level and the 5% level. These findings suggest that macro-financial instability, for instance, exchange rate volatility or discrepant monetary policies, weakens investor confidence and contributes to reduced cross-market connectedness. In particular, the higher volatility rate of exchange rate ($\beta = -0.142$, $p < 0.01$) is likely to create the currency risk which deters the foreign investors and then reduces the return correlation.

The existence of capital controls also detrimentally affected integration ($\beta = -0.187$, $p < 0.01$), indicating that capital flow restrictions hamper market translation as in previous studies. This is of particular importance for developing countries where capital account liberalization is incomplete. It supports H4, which suggests that the policy and industrial environments have a direct effect on cross-border financial connections.

Finally, cross-listing negatively and statistically significantly affected only if firm is listed in ($\beta = 0.271$, $p < 0.001$). This implies that institutional channels such as ADR listings strongly facilitate integration by integrating firms with foreign markets, allowing firms to access and receive foreign information at lower trading costs, and reducing segmentation.

Taken together, these results confirm the anticipated linkages and provide quantitative support to the view that market variables (such as trade and interest rates) as well as policy actions (such as capital account opening and exchange rate stability) influence the level of stock market integration across countries.

Table 4: Determinants of Stock Market Integration

Variable	Coefficient	Standard Error	p-Value
Foreign Portfolio Investment (FPI)	0.317	0.048	<0.001
Exchange Rate Volatility	-0.142	0.035	<0.01
Trade Openness	0.254	0.061	<0.001
Interest Rate Spread	-0.106	0.042	<0.05
Capital Controls	-0.187	0.058	<0.01
Cross-Listings	0.271	0.074	<0.001

Johansen Cointegration Test

The long-run relationship between FPI and stock market integration was investigated using the Johansen cointegration test, as in the multivariate time-series panel framework in the methodology. The Johansen test, compared to the Pedroni test, is more fit for heterogeneous panels and is capable of testing for several cointegrating vectors in systems for nonstationary variables, which is more proper for the macro financial time-series employed in this context.

The test was conducted on a system of variables comprising stock return integration measures, FPI inflows, exchange rate volatility, trade openness, and interest rate spreads for the ten-country panel over the period of 2000–2024. Traces and maximum eigenvalues statistics were employed to establish the number of cointegrating relationships. The results can be found in Table 5.

The trace and max-eigenvalue tests both reject the null hypothesis of no cointegration at the 5% level of significance, indicating that there is at least one long run cointegrating vector among the variables. In particular, the trace statistic of 89.62 is larger than the 95% critical value (69.82) and the maximum eigenvalue statistic of 34.51 exceeds the critical value 33.46. This is a strong confirmation for H1, there is a stable long-run equilibrium relationship between FPI and stock market integration after controlling for major macro-financial moderators.

Table 5: Johansen Cointegration Test Results (Pooled Country Panel, 2000–2024)

Null Hypothesis	Statistic Type	Test Statistic	5% Critical Value	p-value
r = 0	Trace Statistic	89.62	69.82	0.003
r ≤ 1	Trace Statistic	52.31	47.86	0.041
r = 0	Max-Eigen Statistic	34.51	33.46	0.038
r ≤ 1	Max-Eigen Statistic	29.33	27.07	0.047

Vector Error Correction Model (VECM)

After the cointegration test (in which cointegrating relationship were found between FPI and SMI), short run adjustments and convergence to long run equilibrium between FPI and SMI was ascertained through the Vector Error Correction Model (VECM). The VECM makes it possible to separate short-run deviations from the long-run relationship implied by cointegration.

The estimation results reported in Table 6 indicate that the error correction term (ECT) is negative and significant (−0.241, $p < 0.01$), indicating that about 24.1% of the deviation from the long-run equilibrium adjustment is taken place in each period. This supports the idea that market integration and capital flows do not converge deterministically but are mean-reverting. In the short term, fluctuations in FPI (ΔFPI) exert statistically significant positive influence on ΔSMI (coefficient = 0.173, $p < 0.05$), while the impacts of exchange rate volatility and trade openness are weaker or insignificant, which accords with previous studies.

Table 6: VECM Estimation Results (Dependent Variable: ΔSMI)

Variable	Coefficient	Std. Error	t-Statistic	p-value
ECT(t−1)	−0.241	0.069	−3.49	0.001
ΔFPI(t−1)	0.173	0.073	2.37	0.021
ΔExchangeRate(t−1)	−0.058	0.045	−1.29	0.198
ΔTradeOpen(t−1)	0.092	0.064	1.44	0.154
Constant	0.007	0.002	3.14	0.004

R-squared = 0.284 | F-statistic = 5.87 ($p < 0.01$)

Granger Causality Analysis

We used pair wise Granger causality tests under the VECM framework to test the direction of causality between FPI and SMI. The test outcomes are robust by using the selection of the lag lengths by the Akaike Information Criterion (AIC), and two lags are preferred as optimal. The direction of causality is summarised in Table 7 at the 5% level of significance.

The results indicate one-way Granger causality running from FPI to SMI in most country pairs, including India, Brazil and South Africa, implying that the flow of capital dominates as a leading indicator of market integration. As for the reverse causality—that SMI causes FPI—it is significant only in Germany and the UK. These results are consistent with the notion that are the foreign capital allocation decisions that are fuelling market synchronization, particularly in fact in emerging markets.

Table 7: Granger Causality Test Results (Lag = 2)

Country	FPI ⇒ SMI (p-value)	SMI ⇒ FPI (p-value)
USA	0.082	0.193
UK	0.029**	0.046**
Germany	0.071	0.031**
India	0.013**	0.229
Brazil	0.022**	0.138
South Africa	0.018**	0.191
China	0.057	0.074

Note: $p < 0.05$ indicates statistical significance at 5% level.

Hypotheses Testing and Interpretation

The findings of econometric model (panel regression and cointegration) are interpreted to offer some useful implications on the relationship between cross-border investment and stock market integration. Every hypothesis conceived in methodology is analytically examined in terms of empirical support, provided by STATA proceedings.

Hypothesis 1 proposed a cointegrating relationship in the long-run between flows of cross-border portfolio investment (FPI) and stock market returns for the set of the developed and emerging markets till selected. This proposition is amply corroborated by the findings of the Johansen cointegration test. The null hypothesis of no cointegration between the variables has been ruled out at 5% level of significance, based on both trace and max-eigen value statistics, implying for at least one long run equilibrium relation among the variables. These results establish that the FPI flows along with macro-financial factors such as exchange rate volatility and trade openness co-integrated with stock markets integration in the long-run. This finding is consistent with recent empirical works that underline the persistent dependence of market co/movements with the capital flow in more and more integrated financial systems. Hence, hypothesis 1 is supported by the data.

Turning to Hypothesis 2, which suggested that a positive relationship was observed between rises in foreign portfolio investment and stock market integration in both emerging and developed markets, the panel regression analysis provides strong evidence. In particular, the coefficients of FPI were significantly positive in the two sub-samples, however, the magnitude is different between emerging and developed countries. In developed markets the relationship was stronger and sizeably significant, whereas, in emerging markets, the relationship was also significant but relatively weaker. This is consistent with what is expected in theory that with increasing cross-border flows local markets are better integrated into the international financial system leading to more efficient price discovery and lower degree of segmentation across markets. Accordingly, the evidence provides very strong support for Hypothesis 2.

H3 dealt with the moderating effects of exchange rate volatility and interest rate differentials in the association between cross-border investment and stock market co-movement. The interaction terms in the regression model were illuminating in this respect. Our results show that exchange rate volatility mediates with a negative sign the relationship between portfolio investment and market integration, and this negative sign appears to be more severe in emerging markets since exchange rate regimes are often characterised by less stability. On the other hand, interest rate differentials were only weak positive moderator, especially developed markets, perhaps offsetting capital arbitrage potential. These results

show that macroeconomic factors may play an important role in explaining the effects of foreign investments towards integration. Accordingly, H3 is partially confirmed where exchange rate volatility emerges as a very strong moderator and interest rate differentials conditionally moderate.

Hypothesis 4 stated that the relationship between cross-border investment and stock market integration is more positive in developed markets than in emerging markets. This hypothesis is tested, on an empirical basis, by sub-sample analysis and interaction terms in our regressions. The estimate coefficients show that the effect of FPI on the integration indices are much stronger in developed countries, presumably a result of their better markets performance, stronger investor rights and stable regulatory environment. It corroborates the variability of the effect that institutional maturity may have in reinforcing the link cross-border investment-integration so that Hypothesis 4 is confirmed.

Overall, all hypotheses are empirically validated by rigorous statistical evidence. The findings demonstrate a significant long-run relationship between foreign investment flows and stock market integration, which is conditional on the presence of macroeconomic moderators and market categorizations. These results provide important implications for policy makers and investors seeking deeper financial integration and increased return through cross-border investment opportunities with the dynamics of risk control.

DISCUSSION

The empirical results of this study offer interesting observations on the changing nature of cross-border flows and stock market linkages in developed vis-à-vis emerging economies. The findings arising from the descriptive statistics to the econometric estimation constitute a consistent story, emerging markets are becoming a significant driver in the global portfolio allocation, and this reallocation process is associated with stronger co-movement in stock markets. More generally, these results are broadly in line, but also finer in point, with those recently reported in the IF literature.

From the descriptive patterns the giant liquid influx of foreign portfolio investment [FPI] into the emerging markets, from a mere $67 billion in 2000 to near $1, 95 trillion in 2024, stands not as a quantitative change, but as a structural shift in the global financial landscape. This is consistent with (Azis & Shin, 2015), who documented an expedited reallocation of global capital flow to high growth markets in the presence of interest rate compression in developed economies after 2008. And our results expand on the historical periods covered elsewhere by including data through 2024 and by allowing for the impacts of a post-pandemic environment and monetary normalization which were largely excluded from previous analyses.

The descriptive statistics also confirm the point made by (Alami, 2019) that financial globalization is becoming more multidirectional, with emerging markets acting as both a source and a recipient of portfolio flows. What is new in the present study is that regional detail and clearer evidence on the narrowing of investment gaps. We show relative demise in developed market power by displaying changing portfolio shares, and in doing so provide further evidence of a 'diversification story' of recent IMF (2023)-verified rotation of capital towards emerging markets like India and Brazil.

This is also confirmed by the short-term investment flow data for 2024. Strong inflows into China, India, Brazil and South Africa indicate investor optimism over macro development/ stability, institutional reforms, and returns differential. This is consistent with the study of (Jiang et al., 2024) that also showed that, in another context, post-2010 global banking investors placed greater weight on institutional and regulatory frameworks when deciding the reallocation of their portfolio. But there is a more recent evolution accentuated by our results: it's not only the magnitude of flows but also the mix (debt vs equity)

and the regional focus, which were driven largely by monetary policy divergence after-COVID-19. In contrast to earlier episodes of generalised emerging-market exposure, the flows of 2024 imply greater differentiation and more focused capital deployment, evidence of a maturing investment environment.

Correlation Analysis reveals different levels of return co-movements between market pairs (with the strongest of integrations being within developed countries, US–Germany, as the anticipated). This is in accordance with previous results of Baele et al. (2021) who focused on how much financial integration there is among G7 countries. The relatively low correlation of US–India and Germany–India also confirms absence of full integration of emerging markets, a result consistent with (Aggarwal & Saradhi, 2024) which empirically studied higher, albeit less than perfect, financial co-movement among advanced and emerging markets under liberalization episodes. Our results refine this by highlighting the extent that even amongst the emerging markets (e.g., China–Brazil, China–South Africa), there are now some significant return correlations. This represents an important complement to prior research that often-described developing markets as financially segmented as a result of capital controls, exchange rate volatility, or markets being thin.

The higher similarity among emerging markets is also in line with the findings of studies that have used network-based approaches, as in (Islam & Volkov, 2022) who developed a volatility spillover index to measure systemic contagion of shocks. While our approach is not constructed on the volatility network, the positive correlations among several country pairs indicate that systematic channels of integration are developing, particularly in countries with an increased move towards capital mobility.

The outcomes obtained from the econometric estimation and cointegration analysis complement the findings from our descriptive and correlation analyses discussed so far, providing strong empirical support for the main predictions of our study. As reported in the fixed-effects panel regression, the foreign portfolio investment (FPI) is a statistically significant positive factor of stock market integration, supporting Hypothesis 2 and 3. The coefficient of FPI ($\beta = 0.317$, $p < 0.001$) indicates that the higher cross border portfolio capital inflows a country attracts the more their equity markets will move in harmony with those of their countries. This result is consistent with that of (Khan et al., 2022) who argue that liberalized capital markets lead to the sharing of risk and increased co-movement of returns among markets.

Trade openness, as a further important structural variable, was also directly and positively correlated with integration ($\beta = 0.254$, $p < 0.001$). This is also in line with (Chiu et al., 2018) who pointed out the role of trade links in the international transmission of macroeconomic shocks and investor sentiment, leading to the synchronization of financial markets. There is an increasing body of literature investigating the impact of globalization and financial interconnectedness and its conclusion that more open countries tend to be more vulnerable to common shocks and also promotes the financial integration.

In contrast, exchange rate turbulence was found to have the opposite impact of being negatively related to integration ($\beta = -0.142$, $p < 0.01$), providing empirical support for the idea that a volatile currency will discourage investors seeking cross-border and return co-movement opportunities. This finding is consistent with the results of (Waqas et al., 2015), who proposed that portfolio flows fail to link markets as volatile macroeconomic conditions are associated with macroeconomic instability. The interest rate spread was also negative with integration ($\beta = -0.106$, $p < 0.05$), indicating that policy differences may build an arbitrate gap, while the capital market is segmented.

The coefficient of the capital control measure was negative ($\beta = -0.187$, $p < 0.01$), supporting the conventional belief that tighter policy regime serves as a barrier to the financial globalization. Conversely,

cross-listings, which indicate institutional quality and information transparency, were positively related with integration ($\beta = 0.271$, $p < 0.001$), supporting the result of (Sui, 2017) who argue cross-listings can increase visibility and liquidity appealing to global investors and increasing return co-movements.

The findings of the Johansen cointegration test have also complemented the panel regression results by revealing evidence of a statistically significant long-run equilibrium relationship between FPI and SMI indicating strong empirical support for Hypothesis 1. The null hypothesis of no cointegration was rejected at the 5% significance level for both the trace and max eigenvalue tests, suggesting the presence of at least one cointegrated vector. These findings demonstrate that although subject to short-run dynamics and uncertainty, cross border portfolio flows are largely consistent with long-term market co-moments. This is consistent with previous empirical studies including (Pan & Mishra, 2018), which found the existence of long-run cointegration among stock markets during periods of continued capital inflows and deepening financial integration.

The VECM findings provide strong evidence in support of a long-run equilibrium relationship between FPI and SMI as the error correction term (−0.241) is negative and statistically significant. This suggests market forces return to long run equilibrium from short run disturbances, thus, confirming the Johansen cointegration findings. The importance of ΔFPI in the short-run dynamics implies that capital inflow is not only the factors in the long run but also immediately contribute to the extent of integration. This was in accord to (Khan et al., 2022) who by employing a VECM on South Asian markets found that the equity correction rate is similar (−0.22), thus confirming that capital flows are actively driving both short run and long run co-movements.

Furthermore, that short-term exchange rate volatility does not play a significant role, mirrors the findings of (Pan & Mishra, 2018) that exchange rate shocks have diminishing marginal effects in very open equity markets. This serves to highlight the arbitering role of the macroeconomic fundamentals for the extent and persistence of integration. The speed of correction in our model is slightly faster than in (Wang, 2024), who obtained −0.17 in developed markets, which hints that emerging markets may take correction with a faster response to changes in global investment sentiment.

The story is further supported by the Granger causality results, which reveal one-way causality from FPI to SMI in most developing markets. This is consistent with the assertion that cross-border capital provides one of the predictive channels of integration, especially when combined with the fact that the integrated space capital markets are still embryonic. These observations are consistent with those of (Cerutti et al., 2019), who stress the importance of institutional investors and passive benchmark-following funds on driving return co-movements in frontier and emerging markets. The detected two-way causality between the UK and the inverse causality in Germany, moreover, would also depend on investor sophistication and efficient pricing in more mature markets and thus reflect integration dynamics, pushing investment across borders. This is consistent with the findings by (Islam & Volkov, 2022) that the direction of financial spillovers is largely determined by the extent of institutional depth and the level of market liquidity.

The summary of the hypothesis testing results verifies that all four hypotheses formulated in this paper are indeed empirically valid. As an example, H3 regarding the moderation effect of macroeconomic factors is supported to some extent. The study finds that exchange rate uncertainty is a major impediment to integration, particularly in emerging markets, which make up the majority of the larger economies. This is in line with the contention of (Chen & Zhou, 2025) restriction of capital mobility and non-hedged exchange rate risk would cause market incompleteness and capital market fragmentation. In contrast, we find that the impact of interest rate differentials seems to be more subtle, although negative in emerging

markets, it is less so in advanced economies, perhaps suggesting the presence of carry trade or policy credibility considerations.

Crucially, the findings also underline systematic differences between developed and emerging markets thus confirming Hypothesis 4. The degree of FPI integration relationship is significantly stronger in DMs, which could be attributed to institutional benefits, like strong legal/private rights, better investor protection and more developed markets. Queuing and Segmentation in Emerging Markets Although the emerging markets may be becoming more integrated, there is evidence suggesting that it also has very high potential for being segmented due to reasons such as political risk, unstable regulation, and information asymmetry. These results are in line with the ones in (Iheanacho et al., 2023) who found that institutional quality is a key vehicle for cross-border capital in facilitating market integration.

Overall, in view of the conjoint econometric evidence, the theoretical foundation of our study is supported. The regression/cointegration results prove that portfolio flows can be regarded as not only passive capital transfers, but also acting forces of world financial integration. We found that structural determinants (trade openness, exchange rate regimes) and policy tools (capital account openness, financial deregulation) matter for the extent and nature of stock integration. This research also adds to the literature by providing recent empirical evidence for these relationships following a post-pandemic (2020–2024), high capital mobility period and resurgence in interest in emerging economies. The results provide specific policy and business implications, especially in designing regulatory environment that encourages good integration and minimises negative externality.

CONCLUSION

The paper examined the dynamic relationship between cross-border portfolio investment and stock market integration from 2000 to 2024 including both developed and developing economies. The findings provide strong empirical support to the idea that foreign portfolio investment flows have emerged as a dominant force in the integration of stock market behavior across nations. Based on mixed method analytical framework consisting of descriptive trend analysis, correlation coefficients, panel regression and cointegration testing, our study offers a nuanced understanding as to how financial globalization operates. The main findings indicate that cross-border investment inflows directed into emerging economies have increased significantly, especially over the last ten years, leading to greater integration with global financial markets. Despite developed markets maintaining a strong lead in absolute investment dollars, the diminishing gap indicates that the landscape of global capital is growing more connected. Regression tests confirm that specific macroeconomic fundamentals, such as trade openness and cross-listings, serve as integration enablers while exchange rate volatility and capital restrictions act as inhibitors. The existence of the significant long run cointegrating relationship between FPI and stock return co-movements highlights the lasting nature of portfolio flows on market co-synchronization. Furthermore, the results indicate that the level of integration does not have the same effect across regions; developed markets enjoy a more seamless and stronger connect as they have deeper financial markets and a conducive regulatory environment. On the other hand, the degree of integration of emerging markets is increasing but still at a delicate level, driven by institutional maturity and policy preferences. There are significant policy implications of these results. For emerging economies to sustain financial integration, they need to maintain macroeconomic stability, further liberalize capital accounts and develop market infrastructure. In a nutshell, the contribution fits into the broader literature on international financial integration by providing new evidence on the determinants and impact of portfolio investment. It offers practical evidence that can be of interest for national financial policies, for risk management approaches, as well as for global investment practices (in a world of crucial connectedness).

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