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NEXUS BETWEEN STOCK MARKET DEVELOPMENT AND FOREIGN CAPITAL FLOWS: THE MODERATING ROLE OF LIQUIDITY

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Abstract. This paper examines the relationship between stock market development and foreign capital flows in nineteen emerging market economies, paying particular attention to the impact of market liquidity. In an era of heightened globalisation, emerging markets are becoming increasingly dependent on well-functioning stock markets to attract foreign capital. However, the mechanisms through which stock market development influences foreign capital inflows are not well understood. The present study aims to address this gap by explicitly incorporating liquidity as a key moderating factor in the nexus between stock market development and foreign capital flows. The present study employs secondary financial data spanning the period from 2005 to 2023 for a panel of selected emerging market economies. The analysis employs the General Method of Moments (GMM), Panel Autoregressive Distributed Lag (ARDL) and ECM modelling techniques. The results show that liquidity has a positive moderating effect on the relationship between stock market development and FDI, whereas illiquidity has the opposite effect. However, liquidity has no moderating effect on the relationship between stock market development and FPI. These results imply that policies that enhance liquidity in emerging markets are essential. Furthermore, a long-term relationship was found between liquidity and FDI, suggesting that improvements in stock market liquidity are likely to have a lasting impact on FDI.

Keywords: foreign capital flows, stock market development, liquidity, FDI, FPI, moderation, cointegration.

JEL Classification: G10, F30

1. Introduction & Background

Foreign capital flows play a crucial part in financing investment in emerging market economies. This enables countries to capitalise on growth opportunities that exceed their domestic savings, ultimately facilitating economic growth (Igan, Kutan & Mirzaei, 2016). Since the 1990s, the volume of foreign capital flowing into emerging markets has increased significantly, sparking interest among scholars and policymakers seeking to understand its impact on economies (Makoni, 2016). In developed countries, foreign capital flows tend to promote sustainable development. In contrast, in developing countries, capital flows often support investment-led growth (Saini & Singhania, 2018). Structural differences between advanced and emerging economies affect investor decisions (Cerutti, Claessens & Puy, 2019). Historically, investors from developed economies have been reluctant to invest in developing countries. This has prompted these countries to remove their restrictions and implement various policies to liberalise their capital accounts, in order to attract foreign capital inflows (Al-Smadi, 2018).

Over the past few decades, there has been extensive scholarly debate about the effect of capital account liberalisation and globalisation on the economic growth and development of host countries. A substantial body of literature has examined the connection between foreign capital inflows and economic growth in emerging market economies (see Duodu & Baidoo, 2022; Yazdani & Markari, 2021). While there is no

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consensus in the literature yet, the majority of studies suggest that foreign direct investment (FDI) and foreign portfolio investment (FPI) significantly contribute to economic growth in developing countries. Furthermore, the evidence to date is inconclusive regarding the impact of stock market development on foreign capital flows (see Samman & Jamil, 2018; Otchere, Soumaré, & Yourougou, 2016).

Stock markets operate most efficiently when they are liquid, as this ensures the availability of long-term funds (Ariwa et al., 2017). Liquid markets attract foreign investors (Bousnina, Gana & Dakhlaoui, 2024), while poorly functioning and illiquid markets discourage them (Oluwatosin, Taiwo & Yusuf, 2013). As investors gain greater confidence in a host country's financial markets, the liquidity of its capital markets improves (Marozva & Makoni, 2021). However, emerging markets are often characterised by imperfect and low-quality stock markets, which limit the availability of information and constrain investor activity. This ultimately impacts economic growth.

Most of the existing literature focuses on the direct relationship between stock market development and foreign capital flows (Makoni, 2021; Oyerinde, 2019), as well as the part played by institutional quality in this relationship (Hasan et al., 2024). The role of market microstructure in foreign capital flows has been investigated by few studies. Current literature emphasises the impact of liquidity on these flows (see, for example, Marozva & Makoni, 2021; Ochenge, Ngugi & Muriu, 2020). Yaacob et al. (2017) argue that foreign portfolio investment increases liquidity in domestic capital markets and improves market efficiency. As liquidity improves, markets deepen and broaden, enabling the financing of a wider range of investment opportunities. Unlike previous studies, this study aims to empirically investigate the relationship between foreign capital flows and stock market development by focusing on the moderating role of liquidity. The cointegrating and causal relationships between liquidity and foreign capital flows are inconclusive. This study will examine the impact of liquidity and capital market development on foreign capital flows in more detail.

The objectives of the study are threefold: firstly, to examine the long-run relationship between stock market development and foreign capital flows; secondly, to determine the effect of liquidity on foreign capital flows; and thirdly, to investigate whether liquidity moderates the relationship between stock market development and foreign capital flows. The present study makes a significant contribution to the extant literature by introducing the concept of liquidity moderation into the study of stock market development and the foreign capital flow nexus. This study provides further evidence from emerging market economies using cointegrating techniques.

2. Literature Review

This section discusses both theoretical and empirical literature relevant to the paper.

2.1 Theoretical Literature

Eclectic OLI paradigm

The eclectic paradigm theory of international production, also known as the OLI framework, is one of the most influential theories used to explain foreign direct investment (FDI). According to the eclectic paradigm, firms must fulfil three conditions in order to use FDI as a means of internationalising. In his earlier work, Dunning (1980) identified four major theoretical influences on the behaviour of firms in international production. According to the eclectic paradigm, a firm's decision to engage in FDI hinges on the fulfilment of three conditions simultaneously: ownership, location, and internalisation advantages (Dunning, 1980). Ownership advantages refer to assets that are specific to a firm, such as advanced technology, managerial skills, brand reputation and organisational capabilities. According to Dunning (1980), these advantages give firms a competitive edge over both domestic and foreign rivals.

The eclectic paradigm is relevant to both FDI research and this study because it emphasises the economic advantages of a host country's location, such as its market size, efficiency and liquidity, and its improved financial markets. Such efficient and liquid markets reduce transaction costs and boost investor confidence, thereby encouraging greater inflows of foreign capital. Foreign investors consider an improved financial infrastructure to be a locational advantage, as they anticipate that today's inefficiencies may translate into tomorrow's opportunities as asset values appreciate. Therefore, despite their shortcomings, emerging markets offer growth potential from a global investor's perspective.

This modified version of the theory can be used to understand FPI. In this case, however, the potential portfolio investor should have identified ownership, locational, and externalisation advantages. As FPI is an external transaction, it requires the use of external markets. The advantages of externalisation include reduced risk through diversification and capital mobility, as well as reduced information asymmetries. This allows them to exercise their preferred options and investment strategies (Dunning & Dilyard, 1999). Externalisation justifies placing capital in countries that are unfamiliar to investors. This is how FPI is pursued: international capital markets are used to take full advantage of ownership and location characteristics that are unique to investors (Makoni, 2016).

According to Goldstein et al. (2007), as the probability of an aggregate liquidity shock increases, investors become more aware that they may need to sell

their investments early. Therefore, FPI becomes a more attractive alternative to FDI because of its liquidity properties. However, foreign portfolio investors are less well-informed than direct investors and will be able to obtain higher prices, since buyers are less well-informed (Goldstein et al., 2007). Furthermore, foreign portfolio investors are aware of market liquidity, size, and trading costs. Therefore, they will prefer to invest in a larger, more efficient market with low trading costs (Haider et al., 2017).

2.2 Empirical Literature

A well-developed capital market encourages investment in the most profitable opportunities. Such markets are generally perceived as being more efficient and liquid (Mishra, 2011). Well-functioning stock markets ensure the timely and efficient release of information affecting the prices and profits of listed companies' shares. This boosts investor confidence and attracts more investment (Adjasi & Biekpe, 2006).

According to Oluwatosin et al. (2013), illiquid and expensive capital markets deter foreign investors due to their poor functioning. The high costs of illiquid capital markets also hinder domestic enterprises' efforts to raise capital. A liquid capital market attracts more foreign investment than a less liquid one. Push and pull factors play a crucial role in determining capital flows in emerging markets (Canela, Collazo & Santiso, 2006). They found that country-specific liquidity, as measured by the restricted monetary base (M1), significantly influenced portfolio equity flows in the BRIC (Brazil, Russia, India and China) emerging markets between 1995 and 2005. This suggests that foreign investors are attracted to liquid local markets. Marozva and Makoni (2021) found similar results, indicating that FPI inflows were susceptible to fluctuations in liquid financial markets. The authors examined the impact of economic and bond market liquidity on foreign portfolio investments. The study employed a panel data analysis of five emerging African market economies between 2000 and 2020 to test for a determining relationship. Amihud's illiquidity measure was used as a proxy for liquidity and FPI as a percentage of GDP was used as a proxy for FPI. Despite being conducted at different times and using different liquidity measures, the results of the two studies confirm that the relationship between FPI and liquidity is persistent in emerging markets.

By contrast, Ochenge et al. (2020) found that local liquidity had no significant influence on FPI. Their study used data from 2011 to 2018 to examine the relationship between aggregate foreign equity inflows and the aggregate liquidity of the Kenyan stock market. The study employed four measures of stock liquidity: Amihud's price measure; the Hui and Heubel price impact measure; Liu's measure; and the liquidity index. The results of their study suggest that increased foreign portfolio investment promotes liquidity in local stock markets. Driven by the relationship between capital flows and market returns, total net flows are positively correlated with return volatility in Thailand (Pavabutr & Yan, 2007). It has been found that foreign portfolio flows affect the equity market by improving market liquidity, as measured by volatility. Furthermore, the findings suggest that informed trading by certain foreign investors can enhance price efficiency and promote liquidity in emerging markets (Pavabutr & Yan, 2007).

Evidence from developed economies in the Americas, Europe and emerging Asia suggests that there is a positive interaction between international capital flows and local market liquidity (Vagias & Van Dijk, 2011). These results suggest that capital flows in both developed and emerging economies are linked to increased local market liquidity. They further elaborate that this effect is more substantial for countries with greater transparency and less developed markets (Vagias & Van Dijk, 2011). This is contrary to the view of other authors, such as Lusinyan (2002), who posit that well-developed markets are more transparent and liquid, attracting capital flows. Using data on foreign trade levels, Rhee and Wang (2009) examine the dynamic interaction between foreign equity flows and local stock market liquidity. More specifically, they examine the impact of foreign ownership on stock liquidity, using data from Indonesia between 2002 and 2007. Their regression analysis revealed that foreign ownership was associated with reduced liquidity in Indonesia.

3. Methodology

This paper employed a quantitative research design, using statistical procedures to test existing theories and examine relationships among variables. Panel data methodologies were used to analyse the connections between stock market development, foreign capital flows and liquidity in emerging market economies.

3.1. Data, Data Sources and Variables

The study used annual financial and economic data from January 1, 2005 to December 31, 2023. It focused on nineteen emerging market economies, which were selected based on the availability of data for the variables under investigation. Data on FDI and FPI represent flow variables, capturing the annual movement of foreign capital into emerging market economies. This data was collected from World Bank databases. Data on market efficiency and liquidity was obtained from the Reuters terminal.

The stock market index was used to calculate the liquidity and market efficiency variables. Stock market indices used: Brazil/Ibovespa (Brazil), Shanghai (China), IGPA (Chile), PX (Czechia), EGX30 (Egypt),

BUX (Hungary), BSE Sensex (India), JSX (Indonesia), FTSE Bursa (Malaysia), IPC (Mexico), PSEi (Philippines), WIGSAW30(Poland), QE(Qatar), MOEX (Russia), TASI (Saudi Arabia), JSE (South Africa), SET50 (Thailand), BIST100 (Turkey), ADX General (United Arab Emirates).

Summary of variables

Dependent variables: Foreign capital flows

Foreign capital flows are measured using FDI and FPI. FDI refers to capital inflows intended to secure a lasting managerial interest in a firm operating in an economy other than that of the investor, typically defined as the acquisition of 10% or more of the voting equity. In contrast, FPI involves the acquisition of financial assets such as stocks and bonds (less than 10 percent of voting shares) without active participation in the management of foreign enterprises (World Bank, 2025).

Independent variables: Stock market development

The development of the stock market is indicated by its capitalisation as a percentage of GDP, its turnover ratio, and the value of shares traded as a percentage of GDP. Stock market capitalisation indicates the size and depth of the equity market in relation to the economy, while the turnover ratio reflects the level of trading volume in relation to the size of the stock market. Value traded shows the level of market activity in relation to GDP.

Moderating variable: Liquidity

Liquidity is measured using the illiquidity measure proposed by Amihud (2002), which is calculated as the ratio of the absolute stock return to the dollar trading volume averaged over the observation period. This measure captures the price impact of trading activity: lower values indicate greater liquidity. Amihud's illiquidity measure is calculated as:

$$ILLIQ_{i,t} = \frac{1}{D_{i,t}} \sum_{t=1}^{D_t} \frac{\left|R_{i,d}\right|}{DVol_{i,d}}$$

Where $\left|R_{i,d}\right|$ and $DVol_{i,d}$ are annual returns and annual dollar trading volume for stock *i* on year *d*; $D_{i,t}$ is the number of days for which data is available for stock *i* in month *t*. All other things being equal, a higher trading volume results in a lower Amihud ILLIQ measure. Therefore, a negative relationship is expected between illiquidity and foreign capital flows.

Control variable: Market efficiency

Market efficiency is measured using the variance-ratio test developed by Lo and MacKinlay (1988), which evaluates weak-form efficiency by determining whether stock returns follow a random walk. Annualised stock returns are calculated using the monthly opening and closing prices of the main stock market indices. A variance ratio that significantly deviates from one indicates market inefficiency.

The equation of the variance ratio is defined as follows:

$$VR(q) = \frac{Var\left[R(k)\right]}{k.Var\left[R(1)\right]}$$

Where Var [R(k)] is the variance of the returns during the study period, and k, Var [R(1)] is the variance of returns of a single period. According to Adibe and Nyeche (2022), efficient markets facilitate information dissemination, improve price discovery and increase investor confidence, thereby strengthening the relationship between the stock market and foreign capital flows.

3.2 Model Specifications

To examine the relationship between stock market development and foreign capital flows, the study employed dynamic panel data estimation techniques. Specifically, the System Generalised Method of Moments (GMM) panel approach was used to evaluate the moderating effect of stock market development and liquidity on foreign capital flows. This method was selected primarily due to potential endogeneity issues among the variables included in the model (Roodman, 2009). Additionally, the System GMM approach is well suited to addressing heteroscedasticity and serial correlation issues. Since foreign capital flows exhibit persistence, they are likely to generate autocorrelation and cross-sectional heterogeneity. To test the interaction between stock market development and liquidity, the following equation was parameterised:

$$\begin{aligned} FCF_{it} &= FCF_{it-1} + \beta_1 SMD_{it} \times LIQ_{it} + \\ &+ \beta_2 MEF_{it} + \sum_{i=1}^{n} \beta_j X_{j,it} + \mu_1 + {}_{it} \end{aligned} \quad (1)$$

Here, subscript base, FCF, end base, sub, FCF_{it} is foreign capital flows as captured in this study, as FDI and FPI for country i at a time period t. SMD is stock market development. FCF_{it-1} is the first lag of the dependent variable. The term X_{it} refers to the vector of control variables, including GDP growth, inflation, institutional quality, real interest rates, exchange rates, trade openness, human capital, and infrastructure development. The unobserved, time-invariant country-specific effects are captured by μ_1 whilst it represents the error term.

The Autoregressive Distributed Lag (ARDL) bounds test, as developed by Pesaran and Shin (1998), is utilised for the purpose of analysing the long-run cointegration of variables. However, conventional ARDL modelling is appropriate for single-time-series studies when N = 1; when N > 1 and T > 1, the presence of multiple countries requires a panel ARDL framework. The panel ARDL framework allows the evaluation of the integrated nature of foreign capital flows and stock market development. A unique strength of this ARDL

approach is the potential to enable several variables to be combined in order two, to the extent that none are combined in order two, *I* (2) (Pesaran, Shin & Smith 1999). Furthermore, the ARDL model is well-suited to relatively small samples and can simultaneously estimate the long-run relationship and the short-run adjustment process (Pesaran et al., 1999). For the bounds test procedure, an optimal lag length should be selected to compute the F-statistic. When estimating the panel ARDL, the Hausman test (Hausman, 1978) is performed to determine whether MG or PMG is a more consistent and efficient estimator.

To explicitly encapsulate the long-run equilibrium relationships and the short-run adjustment dynamics, the ARDL system is reparametrized into an error correction form, yielding the following equations:

$$\Delta FCF= \varnothing_i \left(FCF_{i,\,t-1} - \gamma_{1i}SMD_{i,t} - \gamma_{2i}LIQ_{i,t} + \gamma_{3i}MEF_{i,t}\right) + \\ + \sum_{j=1}^{p-1}\delta_{ij}\Delta FCF_{i,\,t-j} + \sum_{j=0}^{q-1}\beta_{1i}\Delta SMD_{i,t-j} + \sum_{j=0}^{q-1}\beta_{2i}\Delta LIQ_{i,t-j} + \\ + \sum_{j=1}^{q-1}\beta_{3i}\Delta MEF_{i,\,t-j} + \mu_i + \varepsilon_{it} \quad (2)$$

$$\Delta SMD= \varnothing_i \left(SMD_{i,\,t-1} - \gamma_{1i}FCF_{i,t} - \gamma_{2i}LIQ_{i,t} + \gamma_{3i}MEF_{i,t}\right) + \\ + \sum_{j=1}^{p-1}\delta_{ij}\Delta SMD_{i,\,t-j} + \\ \sum_{j=0}^{q-1}\beta_{1i}\Delta FCF_{i,t-j} + \sum_{j=0}^{q-1}\beta_{2i}\Delta LIQ_{i,t-j} + \\ + \sum_{j=1}^{q-1}\beta_{3i}\Delta MEF_{i,\,t-j} + \mu_i + \varepsilon_{it}$$

$$\Delta FCF=\emptyset_i \left(FCF_{i,t-1}\text{-}\gamma_{1i}CMD_{i,t}\text{-}\gamma_{2i}LIQ_{i,t} + \gamma_{3i}MEF_{i,t}\right) + \\ \sum_{j=1}^{p-1}\delta_{ij}\Delta FCF_{i,t-j} + \sum_{j=0}^{q-1}\beta_{1i}\Delta CMD_{i,t-j} + \sum_{j=0}^{q-1}\beta_{2i}\Delta LIQ_{i,t-j} + \\ + \sum_{j=1}^{q-1}\beta_{3i}\Delta MEF_{i,t-j} + \mu_i + \varepsilon_{it} \quad (3)$$

Where:

FCF is foreign capital flows, SMD is stock market development, LIQ is liquidity, and MEF is market efficiency

The parameters γ represent the long-run coefficients, while δ, β, and ϕ capture short-run dynamics. The coefficient $\varnothing_i$ represents the speed of adjustment toward long-run equilibrium and is expected to be negative and statistically significant in the presence of cointegration. The error term ε_{it} captures idiosyncratic shocks, where the subscripts i and t denote the country and time period, respectively.

The optimal lag structure (p, q) is selected using the Akaike Information Criterion (AIC). In this model, lagged level variables are employed to examine the long-run relationship, while differenced terms are utilised to capture the short-run dynamics.

The investigation is informed by a well-established long-run relationship between foreign capital flows and stock market development. The short-run dynamics are investigated using a panel ECM (Pesaran et al., 1999). The ECM approach is advantageous because it explicitly accounts for cointegration while also allowing for short-run variation among the variables (Engle & Granger, 1987). In a panel ARDL approach to error correction, the error correction representation is directly estimated following confirmation of cointegration. The ECM specifications employed in this study are outlined as follows:

$$\Delta FCF_{it} = \alpha_{0,t} + \sum_{j=1}^{p-1}\delta_{ij}\Delta FCF_{i,\,t-j} + \\ + \sum_{j=0}^{q-1}\beta_{1i}\Delta SMD_{i,t-j+} \sum_{j=0}^{q-1}\beta_{2i}\Delta LIQ_{i,t-j} + \\ + \sum_{j=1}^{q-1}\beta_{3i}\Delta MEF_{i,\,t-j} + \alpha_i ECT_{it-1} + \omega_{it} \quad (4)$$

$$\Delta FCF_{it}=\alpha_{0,t} + \\ \sum_{j=1}^{p-1}\delta_{ij}\Delta FCF_{i,t-j} + \sum_{j=0}^{q-1}\beta_{1i}\Delta SMD_{i,t-j+} \sum_{j=0}^{q-1}\beta_{2i}\Delta LIQ_{i,t-j} + \\ + \sum_{j=1}^{q-1}\beta_{3i}\Delta MEF_{i,t-j} + \alpha_i ECT_{it-1} + \omega_{it}$$

$$\Delta SMD_{it} = \alpha_{0,t} + \sum_{j=1}^{p-1}\delta_{ij}\Delta SMD_{i,\,t-j} + \\ + \sum_{j=0}^{q-1}\beta_{1i}\Delta FCF_{i,t-j+} \sum_{j=0}^{q-1}\beta_{2i}\Delta LIQ_{i,t-j} + \sum_{j=1}^{q-1}\beta_{3i}\Delta MEF_{i,\,t-j} + \\ + \alpha_i ECT_{it-1} + \omega_{it} \quad (5)$$

4. Results and Discussions

The study utilised the principal component analysis (PCA) technique to construct a composite index from multiple correlated variables. The present study combined several related variables into a single composite index in order to capture the construct's multidimensionality while mitigating multicollinearity. The primary objective of PCA is to reduce dimensionality. The PCA results of the stock market development index can be found in the appendix.

Before applying the Panel ARDL model, diagnostic unit root tests are conducted on the panel to determine whether the series are stationary at their level or at their first difference. The Panel ARDL framework can be used after the inclusion of order-zero or order-one variables. The results of the unit root analysis, correlational analysis and descriptive statistics can be found in the appendix. This study uses the Pooled Mean Group (PMG) estimator. This enables the coefficients to be consistent with long-run variables and allows variation in short-run trends to be considered across countries.

Table 1 below illustrates the results for moderation using GMM.

Table 1 illustrates the impact of the relationship between stock market development and illiquidity on foreign capital flows. In an ideal scenario, a more liquid stock market would encourage additional listings and have a positive impact on the overall market (Haruna, Dibal & Isichei, 2023). However, the interaction term

Table 1
System GMM results for moderation

Variables	FDI	FPI
L.FDI	0.100	
	(0.0706)	
L.FPI		0.136
		(0.0775)
SMDINDEX_ILLIQ	-8346.7***	0.246*
	(1163.5)	(0.123)
VRT	-19.90**	-0.000143
	(6.881)	(0.00108)
INSTQUAL	20.41	-0.00145
	(33.42)	(0.00256)
TRAOP	0.501	0.000140
	(0.409)	(0.0000997)
EXCH	-0.826	0.0000485
	(1.024)	(0.0000717)
RINT	0.768	0.000331**
	(1.132)	(0.000103)
INFL	0.186	0.00000268
	(0.172)	(0.0000123)
INFRAINDEX	-63.96	-0.0518***
	(574.8)	(0.00870)
HUMINDEX	-51.17*	-0.00389
	(24.45)	(0.00833)
GDPG	-2.267*	0.000123
	(1.055)	(0.000143)
GFC	-38.20***	-0.00555***
	(6.321)	(0.00143)
COVID_19	2.151	0.00505***
	(8.587)	(0.00150)
N	301	245
Groups	19	19
Instruments	18	12
AR (1)	-2.02	-2.06
AR (2)	-1.70	-0.26
Sargan test	4.04	2.77
Hansen test	1.84	4.77

Source: authors' compilation using Stata

between stock market development and illiquidity is negatively associated with FDI. The interaction shows that stock market development and illiquidity have an adverse combined effect. Therefore, a well-developed stock market coupled with illiquidity repels FDI. In this case, therefore, illiquidity outweighs the positive effects of stock market development. As expected, the results by Soumare and Tchana Tchana (2015) indicate that stock market development has a positive impact on FDI. By contrast, Lee and Chou (2018) demonstrate that illiquidity has a negative impact on FDI in emerging markets.

This result is understandable in the context of emerging markets, where stock markets tend to be less liquid. The interaction term between stock market development and illiquidity is positively associated with FPI. This suggests that the effects of stock market development outweigh those of illiquidity. This result shows that FPIs still thrive in illiquid markets. Other studies confirm the positive correlation between the stock market and FPI (see Pavabutr & Yan, 2007; Vagias & Van Dijk, 2011).

Table 2 and 3 below illustrate the ARDL and ECM results of FDI and FPI.

The error correction term (ECT) in Table 2 indicates a coefficient of -0.626, implying an adjustment of approximately 62.6% back to equilibrium on an annual basis. Accordingly, it requires approximately 1.60 (1/0.626) years for changes in stock market development, liquidity, and market efficiency to fully affect FDI in the long run and thus return the market to equilibrium. The long-run equation yielded

a statistically significant coefficient of -122.2, indicating a negative long-run relationship between illiquidity and FDI. A decline in illiquidity (an increase in liquidity) is likely to result in an uptick in FDI. These results corroborate the findings of earlier empirical studies by Yousefinejad et al. (2018) and Abdul-Rahman et al. (2022), who concluded that heightened illiquidity, indicative of an information asymmetry issue, exerts a negative influence on FDI inflows.

Furthermore, the coefficient of -0.0354 indicates a negative and statistically significant long-run relationship between market efficiency and stock market development. This suggests that an enhancement in the efficiency of the stock market may result in a decline in its long-term growth, a phenomenon that was not previously anticipated. These results were not anticipated; however, analogous results were obtained by Rizvi et al. (2014) in Islamic stock markets.

Furthermore, the results suggest a strong positive short-term causal relationship between market efficiency and stock market development. Shaik and Maheswaran (2017) contend that efficient stock markets are essential for the development and maintenance of effective capital markets, since inefficient markets impede the promotion of viable investment projects. Therefore, countries should prioritise designing policies that improve the efficiency of the stock market. This will increase demand for capital market activities and, ultimately, lead to the stock market's greater development (Enisan & Olufisayo, 2009). As expected, a negative, significant long-run relationship was found between market efficiency and illiquidity. This means that an increase in market efficiency is associated with a decrease in illiquidity, i.e., an increase in liquidity. According to the market microstructure theory, markets tend to be more informationally efficient when they are more liquid. This notion is also supported by previous empirical studies (Gofran, Gregoriou, & Haar, 2022; Huang & Ho, 2020).

The ECT in Table 3 shows a coefficient of -0.668, indicating an adjustment of approximately 66.8% back to equilibrium each year. Accordingly, it requires approximately 1.50 (1/0.668) years for changes in stock market development, liquidity, and market efficiency to fully affect FPI in the long run and thus return to the equilibrium state. There is a positive, significant and bidirectional long-term relationship between stock market development and FPI. In the long term, an increase in stock market development leads to an increase in FPI, which is an expected result. This was confirmed by Qamruzzaman and Wei (2019), who found that improvements in the capital market lead to increased capital flows in the form of equity investment. This result is also supported by the findings of other studies, including those by Makoni and Marozva (2018) and Oyerinde (2019). This study also found

Table 2
PMG results for FDI

Variables	PMG D.FDI	PMG D.SMDINDEX	PMG D.ILLIQ	PMG D.VRT
Long-Run				
SMDINDEX	-0.103		-0.000315	0.0491
	(0.190)		(0.000319)	(0.0491)
ILLIQ	-122.2***	4.122		-10.14
	(29.11)	(2.226)		(9.056)
VRT	-0.339	-0.0354*	-0.000465*	
	(0.177)	(0.0171)	(0.000207)	
FDI		-0.00139	0.00000281	-0.00328
		(0.00139)	(0.0000157)	(0.00471)
ECT	-0.626***	-0.492***	-0.925***	-0.863***
	(0.0754)	(0.0664)	(0.0579)	(0.0632)
Short-Run				
D.SMDINDEX	1.644		-0.000265	-0.0553
	(1.787)		(0.00130)	(0.321)
D.ILLIQ	389.2	11.43		-21.36
	(257.4)	(7.755)		(18.67)
D.VRT	-0.785	0.0799*	0.000447	
	(0.862)	(0.0346)	(0.000296)	
D.FDI		-0.0282	-0.000191	0.0117
		(0.0266)	(0.000207)	(0.0288)
_cons	2.326***	-0.0172	0.00410***	0.475***
	(0.438)	(0.108)	(0.000361)	(0.0428)
N	321	302	321	321

Source: authors' compilation using Stata

that, in the long run, market efficiency is positively cointegrated with FPI. According to Siregar et al. (2024), under normal economic conditions, portfolio investors prefer stable, efficient markets to exploiting asymmetric information to achieve higher returns.

The positive long-term relationship between illiquidity and stock market development is supported by the findings of Bhattacharya, Bhattacharya and Basu (2019). They discovered that the illiquidity measure has a positive long-term impact on stock market development. The same study found that the market efficiency coefficient had a positive short-term impact on stock market development, which is consistent with the results of this study. Furthermore, the study revealed negative and positive causal relationships between market efficiency and stock market development in the short and long term, respectively. This suggests that market efficiency is a significant phenomenon in the stock market.

5. Conclusion and Policy Implications

The present study employed the GMM method to examine the interaction between stock market development and liquidity on foreign capital flows. The findings indicate that the relationship between the development of the stock market and liquidity is not consistent across all foreign capital flows. The interaction between the development of the stock market and liquidity has a negative effect on FDI, suggesting that while developed stock markets normally attract FDI, the presence of illiquidity outweighs this positive effect, deterring investors. This finding has important economic implications. Stock market development alone is insufficient to attract FDI unless it is accompanied by adequate market liquidity. Although a developed stock market usually suggests financial sophistication, efficient capital allocation and investment opportunities, a lack of liquidity increases transaction costs, restricts the ease with which investments can be entered into or exited, and makes asset valuation more uncertain. Consequently, foreign investors may view the investment environment as riskier, which reduces the attractiveness of the host economy, despite improvements in stock market development. Therefore, liquidity moderates the relationship between stock market development and FDI. The interaction between stock market development and illiquidity is positively associated with FPI. This implies that the effects of stock market development outweigh those of illiquidity. This result shows that FPI continues to thrive in illiquid markets, suggesting that liquidity does not play a moderating role in the relationship between stock market development and FPI. The paper also

Table 3
PMG results for FPI

	PMG	PMG	PMG	PMG
Variables	**D.FPI**	**D.SMDINDEX**	**D.ILLIQ**	**D.VRT**
Long-Run				
SMDINDEX	0.0109*		-0.000317	-0.0307
	(0.00528)		(0.000253)	(0.0561)
ILLIQ	0.586	25.07***		-5.688
	(0.881)	(4.906)		(9.661)
VRT	0.0104**	-0.114***	-0.000368	
	(0.00332)	(0.0302)	(0.000196)	
FPI		5.351**	0.0485	-5.866
		(1.732)	(0.0338)	(4.669)
ECT	-0.668***	-0.458***	-0.951***	-0.862***
	(0.0818)	(0.0659)	(0.0868)	(0.0653)
Short-Run				
D.SMDINDEX	0.108		0.000699	0.205
	(0.153)		(0.00161)	(0.208)
D.ILLIQ	-0.442	-6.946		-25.54
	(0.387)	(14.12)		(18.30)
D.VRT	-0.0215	0.0905*	0.000417	
	(0.100)	(0.0425)	(0.000323)	
D.FPI		-239.1	1.102	7555.6
		(291.6)	(1.468)	(7545.8)
_cons	0.0477	-0.0106	0.00419***	0.460***
	(0.0487)	(0.124)	(0.000454)	(0.0472)
N	321	321	321	321

Source: authors' compilation using Stata

examined the cointegrating relationships between stock market development, liquidity, and foreign capital flows using panel ARDL and ECM. The results suggest a long-term relationship between liquidity and FDI, indicating that improvements in stock market liquidity are likely to have a lasting impact on FDI. These results imply that policies to enhance liquidity in emerging markets are essential. Measures such as reducing transaction costs, adopting digital platforms and ensuring transparency in the regulatory framework can boost liquidity and efficiency, thereby attracting FDI and FPI inflows. Furthermore, given the volatility of short-term flows, regulators must carefully manage portfolio investments, implementing stronger market surveillance, macroprudential controls, and capital flow management mechanisms.

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Appendices

Appendix 1: PCA results for the stock market development index

Component	Eigenvalue	Difference	Proportion	Cumulative
SMCAP	1.68266	0.533208	0.5609	0.5609
SMTR	1.14945	0.981555	0.3831	0.9440
SMVT	0.167894	0.00	0.0560	1.0000

The stock market development index has a PC1 eigenvalue of 1.68266, which explains 56.09% of the total variance. The second component has an eigenvalue slightly above one (1.14945), which increases the cumulative variance explained to 94.40%. The remaining variance was contributed by PC3, but its eigenvalue was less than one (0.167894). However, since the index comprises just three closely related indicators (market capitalisation, turnover ratio and value traded), it is generally preferable to retain only the first principal component when constructing a single composite index. This captures the dominant common variation among stock market variables while preserving the interpretability of the composite index as a measure of stock market development.

Appendix: 2 Descriptive statistics

Variables	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Jarque-Bera
FDI	3,17	2,30	106,43	-40,26	8,88	6,28	69,72	64 907,60
FPI	0,13	0,00	9,50	-3,23	0,01	4,28	30,66	11 805,32
SMDINDEX	0,00	-0,30	9,86	-1,21	1,23	2,80	16,56	3 029,58
MEF	0,46	0,34	3,85	0,01	0,50	2,54	12,78	1 711,41
ILLIQ	0,00	0,00	0,02	0,00	0,00	1,38	5,92	227,21

Appendix 3: Correlational analysis

Variables	FDI	FPI	SMDINDEX	VRT	ILLIQ
FDI	1,00				
FPI	(0,03)	1,00			
SMDINDEX	(0,04)	(0,06)	1,00		
VRT	(0,06)	(0,01)	0,01	1,00	
ILLIQ	0,10*	0,12**	0,05	0,12**	1,00

Appendix 4: Unit Root results

Variable	Intercept	Intercept and Trend	None	Decision
Panel Unit Root Test using the LLC				
FDI	-6.6756***	-6.1059***	-5.5626***	I(0)
FPI	-3.9844***	-3.6291***	-7.0908***	I(0)
SMDINDEX	-5.4798***	-13.877***	-16.5002***	I(0)
VRT	-3.0734***	-1.7864***	-16.6437***	I(0)
ILLIQ	-4.9902	-5.8294***	-4.3659***	I(0)
Panel unit root tests using IPS				
FDI	-5.8121***	-4.9862***	-	I(0)
FPI	-3.7651***	-1.9628	-	I(0)
SMDINDEX	-2.6308***	-12.4064***	-	I(0)
VRT	-4.2859***	-6.1317***	-	I(0)
ILLIQ	-5.1798***	-3.8639***	-	I(0)
Panel unit root testing using ADF – Fisher Chi-square				
FDI	107.1452***	88.9692***	91.1197***	I(0)
FPI	73.9224***	55.9819**	115.5459***	I(0)
SMDINDEX	64.0449***	186.6791***	279.0081***	I(1)
VRT	77.2559**	103.6961***	261.3607***	I(0)
ILLIQ	88.5843***	73.8451***	53.9948**	I(1)
Panel unit root testing using PP – Fisher Chi-square				
FDI	133.6118***	138.3589***	93.0279***	I(0)
FPI	123.3766***	107.0572***	160.8358***	I(0)
SMDINDEX	90.3325***	317.2594***	430.2775***	I(1)
VRT	200.6607***	207.7399***	429.2821***	I(0)
ILLIQ	458.363***	200.7503***	102.2234***	I(1)