**SUKUK**: *International Journal of Banking, Finance, Management and Business*
*Vol. 5, No. III, 2026*
*ISSN: 2978-316X (British Library)*
*https://sukukjournal.org.uk/index.php/sukuk/issue/view/87*

# Same Market, Different Stores: Market Segmentation among Indonesian Islamic Bank Equities

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## Abstract

*This study investigates whether publicly listed Islamic banks operating within the same national financial system exhibit a common equity market trajectory or remain segmented by institution-specific market dynamics. Focusing on Indonesia, the world's largest Muslim majority economy and an increasingly important Islamic finance market, the study examines weekly share-price observations for Bank Syariah Indonesia (BRIS), Bank BTPN Syariah (BTPS), and Bank Panin Dubai Syariah (PNBS) from September 2021 to July 2025. The empirical strategy combines Augmented Dickey–Fuller, Phillips–Perron, and KPSS stationarity tests with Engle–Granger and Johansen cointegration procedures to distinguish short-run co-movement from persistent long-run integration. The analysis is subsequently extended through a vector autoregressive framework to examine dynamic interdependence, direction of information transmission, impulse responses, and the relative contribution of shocks across the three equities. The results indicate that the stock-price series are predominantly non-stationary in levels but stationary after first differencing, while both residual-based and system-based cointegration tests fail to establish a stable long-run equilibrium relationship among the three banks. This absence of cointegration suggests that common Islamic banking classification does not necessarily translate into common market pricing. Instead, the equities display heterogeneous price behaviour, pointing toward segmentation in investor participation, liquidity conditions, price discovery, and institution-specific valuation. The findings challenge the assumption that Shariah-compliant banks constitute a financially homogeneous equity segment and show that sectoral similarity can coexist with substantial market heterogeneity. By shifting attention from the performance of individual Islamic banks to the degree of integration within the Islamic banking equity market itself, the study contributes to the literature on Islamic capital-market efficiency, diversification, and financial integration, while offering implications for investors, bank managers, regulators, and policymakers seeking to deepen Islamic equity markets in Indonesia and other emerging Islamic financial systems.*

## Keywords

*Islamic Banking, Equity Market, Cointegration, Empirical Study, Indonesia*

## Introduction

Islamic banks may operate under the same regulatory architecture, share a common Shariah identity, and compete within the same national financial system, yet none of these similarities necessarily implies that investors value them in the same way. Once Islamic banks become publicly listed firms, their shares are exposed not only to the common forces affecting the Islamic banking industry, but also to institution-specific differences in size, liquidity, business models, financing structures, investor attention, risk profiles, and market expectations. This creates an important empirical puzzle. If listed Islamic banks belong to one recognisable sector, should their equity prices ultimately move toward a common long-run path, or can they remain financially segmented despite operating in the same market? Put differently, the Indonesian Islamic banking equity market may resemble same market with different stores: the institutions occupy the same marketplace, but investors may enter, value, and trade each "store" differently.

The distinction between sectoral similarity and financial integration is important for both Islamic finance and capital-market research. In conventional equity-market analysis, long-run co-movement has frequently been interpreted as evidence that markets increasingly respond to common information and share persistent equilibrium relationships. Using the Engle–Granger framework, Leachman et al., (1994), for example, associate cointegration among national equity markets with increasing market integration, while In et al., (2001) show that dynamic interdependence and volatility transmission can reveal how markets react to both domestic and external information. More recent evidence from emerging stock markets further demonstrates that market behaviour can depend on structural change, common factors, and the way adjustment is modelled (Nazlioglu et al., 2024). From an investment perspective, the degree of integration is consequential because stronger commonality may reduce diversification opportunities, whereas persistent segmentation may allow institution-specific risks and returns to remain economically meaningful.

These questions acquire an additional dimension in Islamic capital markets. Islamic equities are commonly grouped through shared Shariah characteristics, but an Islamic classification does not eliminate heterogeneity in their underlying financial dynamics. Research on Islamic stock markets identifies distinctive patterns in risk, dependence, and return behaviour. Muteba Mwamba et al., (2017)examines financial tail risks across conventional and Islamic stock markets, while Saâdaoui (2018)documents multifractal characteristics in Islamic equity markets associated with extreme events, long-range dependence, and fat-tailed returns. At the level of Islamic bank equities, (Yousaf & Alokla, 2023) show that herding behaviour is not uniform across Islamic banking markets or market conditions, with substantial variation emerging across countries and episodes of stress. Taken together, this literature suggests that membership in an Islamic financial category should not automatically be equated with homogeneous market behaviour. Islamicity defines an important institutional boundary, but it does not necessarily determine how efficiently or closely the equity prices of individual Islamic financial institutions move together.

Indonesia provides a particularly useful setting in which to examine this distinction because its Islamic banking industry itself contains considerable institutional heterogeneity. Existing studies have shown that Indonesian Islamic banks differ in their competitive position, financing behaviour, regulatory responsiveness, and institutional characteristics. Cupian & Abduh (2017)find that the industry operated under monopolistic competition and differing degrees of market power, while Nastiti & Kasri (2019)demonstrate that regulatory intervention and bank-level fundamentals can materially influence Islamic banking financing. Bank characteristics also affect how Islamic institutions respond to economic conditions. Soedarmono & Yusgiantoro (2023)show that the procyclicality of Indonesian Islamic banks varies according to bank size and financing-contract composition, indicating that banks operating within the same Islamic banking system need not respond uniformly to the business cycle. More broadly, firm-specific characteristics such as size, profitability, leverage, and efficiency have been linked to the valuation of Islamic firms in the Indonesian equity market(Santosa, 2020). The consolidation of Islamic banking through merger activity adds another layer to this changing institutional landscape (Utari et al., 2022). Thus, the Indonesian setting already provides reasons to expect that a common Shariah and regulatory environment may coexist with heterogeneous firm-level market dynamics.

This heterogeneity is consistent with a wider body of Islamic banking research showing that Islamic financial institutions cannot necessarily be treated as economically interchangeable. Cross-country evidence indicates differences in Islamic bank risk and stability (Abedifar et al., 2013), while banking efficiency can vary according to ownership structure, regulatory development, and whether operations are conventional or Islamic (Fonseka & Farooque, 2024). Financing structures themselves also generate heterogeneous risk exposures: Warninda et al. (2019)demonstrate that different profit-and-loss-sharing contracts may affect Islamic bank credit risk differently, and Soedarmono & Yusgiantoro (2023)similarly show that contract composition contributes to differences in cyclical behaviour. At a broader level, convergence across Islamic financial systems is far from automatic. Using Islamic financial-development indicators, Hassan et al. (2023) find convergence for some dimensions but not others. These findings collectively raise a capital-market question that remains less developed than the extensive literature on Islamic bank performance, financing, risk, and institutional development: to what extent are the equity prices of individual Islamic banks within the same domestic market integrated?

The existing literature leaves a particularly visible gap in the Indonesian context. Studies have examined Islamic banking competition, regulation, consolidation, financing structures, efficiency, risk, and firm value (Cupian & Abduh, 2017; Nastiti & Kasri, 2019; Santosa, 2020; Soedarmono et al., 2017; Soedarmono & Yusgiantoro, 2023). Research has also begun to analyse Indonesian banking stocks using increasingly sophisticated forecasting techniques (Ivancio et al., 2024). However, comparatively less attention has been devoted to whether the listed Islamic banks themselves constitute an integrated equity segment in the time-series sense. This distinction matters. Similar movements observed over short periods do not necessarily imply that stock prices share a stable long-run equilibrium, just as an absence of long-run cointegration does not imply complete independence in the short run. Establishing whether these equities share a persistent common

trajectory therefore requires separating long-run equilibrium relationships from temporary return transmission and institution-specific adjustment.

Against this background, this study investigates market segmentation among three publicly listed Indonesian Islamic banks: Bank Syariah Indonesia (BRIS), Bank BTPN Syariah (BTPS), and Bank Panin Dubai Syariah (PNBS). The analysis employs approximately weekly observations from September 2021 to July 2025, yielding 199 price observations for each institution. The sample begins after a formative period of consolidation in Indonesian Islamic banking and covers a sufficiently extended post-pandemic interval to observe whether the three stocks converge toward a shared equilibrium or retain institution-specific price paths. Rather than asking which Islamic bank performs "better", the study focuses on the relationship between their equity prices. It addresses three related questions: whether BRIS, BTPS, and PNBS share a stable long-run equilibrium relationship; whether the absence or presence of such a relationship is consistent with an integrated or segmented Islamic banking equity market; and, conditional on the time-series properties of the data, how short-run shocks and information may be transmitted across the three stocks.

Methodologically, the paper follows a sequential time-series strategy designed to distinguish persistent integration from temporary co-movement. The price series are transformed into logarithmic form and examined for stationarity using complementary unit-root and stationarity procedures, including Augmented Dickey–Fuller, Phillips–Perron, and KPSS tests. The use of complementary procedures is important because inference concerning persistence can be sensitive to test specification and alternative forms of stationarity (Bisaglia & Procidano, 2002; Krämer, 1998; Rothe & Sibbertsen, 2006; Sephton, 1995). Long-run integration is then assessed using the Engle–Granger residual-based approach and the Johansen system procedure, the latter allowing cointegrating relationships to be evaluated jointly within a multivariate framework (Johansen, 1988; Juselius, 1990). Where the evidence does not support cointegration, the analysis turns to stationary transformations within a vector autoregressive framework to investigate short-run interdependence rather than imposing a long-run equilibrium that the data do not support. This distinction is central to the empirical design: long-run segmentation and short-run interaction are not mutually exclusive.

The empirical evidence points toward precisely this distinction. The three stock-price series display persistent behaviour in levels but become stationary after transformation to first differences, while the principal residual-based and system-based cointegration tests fail to identify a stable long-run equilibrium connecting BRIS, BTPS, and PNBS. The result suggests that common membership in Indonesia's Islamic banking sector has not been sufficient to bind the three listed institutions to a single persistent equity-price trajectory. This should not be interpreted as evidence that the stocks are completely disconnected. Rather, it indicates that any contemporaneous or short-horizon interaction occurs against a background of longer-run segmentation. The finding is economically intuitive when viewed alongside the institutional differences identified in prior Islamic banking research: banks may share Shariah principles and regulatory boundaries while differing

substantially in size, financing composition, market power, risk exposure, liquidity, and investor business (Cupian & Abduh, 2017; Santosa, 2020; Soedarmono et al., 2017; Soedarmono & Yusgiantoro, 2023). The "different stores" in the same market may therefore react to some common information while retaining distinct valuation paths.

This paper contributes to the literature in three interconnected ways. First, it shifts the unit of analysis from comparisons between Islamic and conventional markets toward the internal structure of the Islamic banking equity market itself. Much of the existing Islamic equity literature examines broad indices, international markets, risk differentials, or behavioural phenomena (Muteba Mwamba et al., 2017; Saâdaoui, 2018; Yousaf & Alokla, 2023); this study instead asks whether individual listed Islamic banks within a single national environment are tied together by a common long-run market relationship. Second, it introduces market segmentation as a useful lens through which to interpret institutional heterogeneity in Islamic banking. Differences already documented in bank size, market power, regulation, financing structures, and cyclical responses may also have an equity-market manifestation (Cupian & Abduh, 2017; Nastiti & Kasri, 2019; Soedarmono & Yusgiantoro, 2023). Third, the findings have implications for investors and policymakers. For investors, incomplete long-run integration may preserve diversification possibilities even within a narrowly defined Shariah-compliant banking segment. For regulators and market developers, persistent segmentation raises questions concerning differences in liquidity, information incorporation, investor participation, and price discovery across listed Islamic financial institutions.

The broader implication is that an Islamic banking equity market should not be assumed to be integrated merely because its constituent institutions share a religious-financial identity. Regulatory membership, Shariah compliance, and sectoral classification establish a common marketplace; they do not guarantee common valuation dynamics. Understanding this distinction becomes increasingly important as Islamic banking develops not only as a system of financial intermediation but also as an investable equity sector. In this sense, the Indonesian evidence illustrates the central proposition captured by the title of this study: there may indeed be same market, while its constituent banks continue to operate as different stores. The remainder of the paper develops the relevant literature on financial integration and Islamic bank heterogeneity, explains the data and econometric framework, presents the long and short-run empirical results, and discusses their implications for Islamic equity-market development, diversification, and financial integration.

## Literature review

### *Market Integration, Segmentation, and Equity Price Co-Movement*

Financial-market integration concerns the extent to which assets or markets that are exposed to related economic environments share information, respond to common shocks, and exhibit persistent relationships over time. At its strongest, integration implies that common information is progressively incorporated into prices and that persistent deviations between related markets are constrained by economic or arbitrage mechanisms. Segmentation represents the opposite possibility: securities may coexist within the same institutional or geographical market while

retaining sufficiently distinct pricing processes that no stable long-run equilibrium binds them together. The distinction is important because short-run co-movement does not necessarily constitute long-run integration. Two equity prices may temporarily move in the same direction in response to common news and yet subsequently return to separate trajectories.

This distinction is closely related to the broader literature on market efficiency. The efficient market hypothesis proposes that asset prices incorporate available information, although the degree and speed of incorporation may vary across markets and periods (Borges, 2010; Dombrovskyi et al., 2013). Evidence from emerging stock markets further suggests that efficiency itself may evolve gradually and that common factors can coexist with structural shifts in mar-ket behaviour (Nazlioglu et al., 2024). Consequently, the observation that firms belong to one industry or operate under a common macroeconomic environment does not necessarily mean that their equity prices should exhibit identical dynamics. Firm-specific information, trading conditions, investor composition, liquidity, ownership structure, and expectations may cause securities to process common information differently.

The literature on equity-market integration has therefore placed considerable emphasis on distinguishing temporary correlation from persistent equilibrium relationships. (Leachman et al., 1994), employing the Engle–Granger two-step approach, demonstrate how cointegration can be used to examine long-run co-movement among national equity markets. The underlying implication is that if individually non-stationary equity-price series form a stationary linear combination, their apparent divergence is constrained by a common long-run relationship. Conversely, an absence of cointegration indicates that the series may share episodes of co-movement without being tied to a persistent equilibrium path. This distinction becomes particularly valuable when analysing financial assets that appear similar according to sectoral classification but may remain economically heterogeneous.

Market integration is also multidimensional. Long-run equilibrium is only one dimension; short-run information transmission provides another. In et al. (2001)show that Asian equity markets can exhibit dynamic interdependence and volatility transmission, illustrating how shocks originating in same market may influence others even when the nature of longer-term integration is more complicated. Likewise, Marfatia (2017) highlights that international stock-market risk integration can vary according to the horizon over which relationships are examined. These findings caution against treating integration as a binary condition. Markets may be segmented in the long run while retaining meaningful short-run connectedness, or they may display common long-term trends despite heterogeneous responses to transitory shocks.

This distinction has direct implications for diversification. If securities are strongly integrated, the scope for diversification within the relevant group may diminish because common shocks increasingly dominate institution-specific movements. If long-run segmentation persists, however, individual securities may continue to contain distinct sources of risk and return. Portfolio diversification and interconnected financial risk therefore need to be assessed jointly rather than inferred solely from sectoral similarity (Tasca et al., 2017). For investors in banking equities, this

becomes especially important because banks share exposure to common monetary, regulatory, and macroeconomic conditions while simultaneously differing in balance-sheet structure, market strategy, funding, credit portfolios, and investor perceptions.

Accordingly, the central concept of segmentation in this study does not imply that BRIS, BTPS, and PNBS never interact. Rather, it refers to the possibility that the three stocks may not be sufficiently bound by common pricing forces to form a stable long-run equilibrium. The metaphor of "Same market, different stores" therefore captures two simultaneous conditions. The three institutions occupy the same Indonesian Islamic banking and equity-market environment, but their respective equity prices may represent different channels through which investors assess bank-specific information and risk. Whether these differences are temporary or persistent is ultimately an empirical question.

### *Islamic Equity Markets and the Problem of Homogeneity*

The integration question becomes particularly relevant in Islamic finance because Islamic assets are frequently grouped according to a common religious and regulatory identity. Shariah-compliant equities are differentiated from conventional securities through qualitative and quantitative screening principles, while Islamic financial institutions are expected to operate according to distinctive contractual and ethical requirements. Yet a shared Islamic classification does not imply that the underlying institutions possess identical financial structures, risk characteristics, business models, or market valuations.

The literature increasingly demonstrates this heterogeneity. Comparative evidence on conventional and Islamic equity markets identifies differences in tail-risk behaviour (Muteba Mwamba et al., 2017), while Saâdaoui (2018) documents multifractal characteristics in Islamic stock markets, drawing attention to nonlinear dependence, extreme observations, and complex price dynamics. Such findings suggest that Islamic equity markets cannot be reduced to a simple homogeneous asset category. Their behaviour may depend upon market conditions, institutional characteristics, and investor responses as much as upon their Shariah classification.

Behavioural evidence reaches a similar conclusion. Yousaf & Alokla (2023)examine herding within Islamic banking markets and show the relevance of investigating whether investors respond collectively to common information. Herding is particularly important to the present question because common investor behaviour could strengthen co-movement among Islamic bank shares. However, even where herding exists, its intensity need not be uniform across banks or market conditions. Differences in visibility, market capitalisation, liquidity, information availability, or perceived institutional quality can result in heterogeneous investor reactions within the same Islamic banking universe.

The banking literature reinforces this argument from the perspective of institutional risk. Abedifar et al. (2013)demonstrate that risk in Islamic banking constitutes a distinct empirical question rather than something that can be inferred from the "Islamic bank" label alone. Similarly, financing

arrangements within Islamic banks can generate different exposures. Warninda et al. (2019)specifically examine whether *mudarabah* and *musharakah* financing influence Islamic bank credit risk differently, emphasising that the composition of Shariah-compliant contracts itself may be a source of heterogeneity. The implications extend directly to equity valuation: if banks differ in how they generate income, assume credit risk, share risk, and allocate financing, investors have reason to price them differently even when all institutions satisfy a common Islamic classification.

More recent work also points to differences in efficiency, diversification, and stability across Islamic banks. Fonseka & Farooque (2024)examine banking efficiency across ownership types and conventional versus Islamic operations, while (Haddou & Boughrara, 2025)analyse how diversification shapes the stability of full-fledged Islamic banks. At a broader level, Hassan et al. (2023)examine convergence in Islamic financial development and find it necessary to distinguish among dimensions of financial development rather than assuming automatic convergence throughout Islamic financial systems. The collective implication is that Islamic finance provides a common institutional identity but not necessarily a common economic trajectory.

This point is also relevant to debates regarding the substantive identity of Islamic finance. Bin-Armia et al. (2024)critically examine the implementation of Shariah economics in Indonesia through the tension between economic rights and religiously grounded obligations. Their analysis is significant for the present study because it illustrates the broader distinction between belonging to a formally identifiable Shariah institutional system and the substantive economic processes taking place within that system. Likewise, Bin-Armia (2025)examines how Shariah compliance can be ascertained in Islamic financial products, demonstrating that the Islamic character of an asset or financial product requires evaluation rather than mere reliance upon its label. Although the present study does not test Shariah compliance itself, the same analytical caution applies to equity-market classification: describing several institutions as Islamic banks establishes a common institutional category but should not lead to an a priori assumption of homogeneous market behaviour.

This literature provides the first major foundation for the present study. If Islamic banks differ in financing composition, risk exposure, efficiency, stability, market visibility, and institutional characteristics, it is plausible that their equities may also exhibit distinct price-discovery processes. The relevant empirical question is therefore not whether BRIS, BTPS, and PNBS are all Islamic banking equities—they clearly operate within that identifiable sector—but whether their common sectoral identity is sufficiently strong to generate a persistent common price relationship.

### *Institutional Heterogeneity in Indonesian Islamic Banking*

Indonesia provides a particularly informative setting for examining this issue because its Islamic banking system combines common national regulation with substantial institutional diversity. Islamic banks operate within the same macroeconomic and regulatory environment, yet their size, historical development, customer bases, financing portfolios, ownership, market power, and

strategic positioning differ considerably. These variations provide potential channels through which one market can contain several institution-specific equity trajectories.

One important source of heterogeneity is competition. Cupian & Abduh (2017)examine competitive conditions and market power among Indonesian Islamic banks, demonstrating that industry structure itself is an important feature of Islamic banking development. Differences in market power matter for equity-market analysis because banks with different competitive positions may generate different earnings expectations, respond differently to changes in financing demand, and attract different types of investors. Consequently, a common regulatory identity does not eliminate institution-specific economic fundamentals.

Banking regulation is another important dimension. Nastiti & Kasri (2019)examine the role of banking regulation in the development of Islamic banking financing in Indonesia, demonstrating the close interaction between the regulatory environment and bank activity. Regulatory frameworks may create common constraints for the sector, but responses to those constraints can differ according to bank-specific capabilities and financial structures. This distinction is particularly relevant when analysing listed banks: identical regulatory information may be capitalised differently into each institution's stock price if investors believe that the effects on profitability, financing growth, or risk will not be uniform.

The institutional importance of regulation in Indonesia extends beyond Islamic banking itself. Applying institutional theory to the development of Indonesia's QRIS regulatory environment, Bin-Armia (2026) demonstrates how financial-system development may be shaped by institutional forces and regulatory architecture rather than simply by technological or market demand. Although QRIS is analytically distinct from Islamic banking equities, the institutional argument is relevant: a common national framework creates shared rules and pressures, but it does not eliminate heterogeneous organisational responses. For the present study, Indonesia can therefore be conceptualised as a common institutional marketplace within which individual Islamic banks remain organisationally distinct.

Bank characteristics provide a further mechanism for differentiation. Soedarmono & Yusgiantoro (2023)show that Islamic bank procyclicality in an emerging market economy depends on bank size and financing contract composition. This finding is especially relevant because it demonstrates that Islamic banks exposed to the same business cycle may respond differently depending upon their internal characteristics. If the underlying institutions exhibit heterogeneous cyclical responses, a corresponding difference in equity price responses should not be unexpected.

At the level of market valuation, Santosa (2020)investigates the role of financial characteristics and firm size in Islamic firm value in the Indonesian equity market. This further supports the proposition that Islamic classification alone cannot fully explain investor valuation. Firm-level characteristics matter. Consequently, one listed Islamic bank may react strongly to a market-wide

or industry-wide development while another reacts weakly, with differences potentially persisting rather than disappearing through a stable long-run adjustment mechanism.

The structure of Indonesian Islamic banking has also undergone significant consolidation. Utari et al. (2022)examine the merger of three Indonesian Islamic banks during the COVID-19 period, an institutional development particularly relevant to Bank Syariah Indonesia. The formation and subsequent market presence of BSI created an institution whose scale and organisational origins differ markedly from those of other listed Islamic banks. This reinforces the need to avoid treating all listed Islamic banks as observationally equivalent. BRIS, BTPS, and PNBS may share an Islamic banking licence and stock-market environment while representing different institutional histories and market positions.

The wider COVID-19 context should also be recognised because the sample begins in September 2021. Global evidence shows that banking-sector performance during the pandemic displayed meaningful heterogeneity (Demirgüç-Kunt et al., 2021). At the ASEAN level, differences in bank market power and revenue diversification have long been recognised as important components of banking behaviour (Nguyen et al., 2012). The sample period therefore captures a financial environment in which banks were simultaneously emerging from pandemic-related disruptions, adapting to changing financial conditions, and, in Indonesia's Islamic banking sector, adjusting to a recently altered institutional landscape.

Research on Indonesian banking equities has increasingly recognised the importance of modelling stocks jointly rather than exclusively in isolation. Ivancio et al. (2024), for example, employ multivariate techniques for stock-market forecasting in the Indonesian banking market. While forecasting represents a different objective from cointegration analysis, multivariate approaches acknowledge that banking equities can contain information relevant to one another. The unresolved question is whether such relationships are sufficiently persistent to constitute long-run integration among Indonesia's specifically Islamic listed banks.

Institutional heterogeneity also has a normative dimension within Indonesian Islamic finance. Bin-Armia et al. (2024)emphasise tensions in the implementation of Shariah economics in Indonesia, while Bin-Armia, (2025)highlights the importance of ascertaining Shariah compliance rather than assuming it from financial-product terminology. These studies are relevant to the present argument not because equity-price integration measures religious compliance, but because they reinforce an important analytical principle: institutions operating under a shared Islamic framework should not automatically be assumed to be substantively identical. In the same way that Shariah economic implementation may need to be examined beyond formal classification, Islamic banking equities need to be examined beyond a common sectoral label.

### *Cointegration and Dynamic Interdependence as Measures of Market Integration*

The empirical literature provides several approaches for distinguishing long-run integration from short-run interaction. For non-stationary financial-price series, cointegration analysis is particularly

useful because conventional correlation between trending variables may produce misleading impressions of association. Cointegration instead asks whether individually non-stationary variables are linked by a stationary equilibrium relationship.

The foundational framework developed by Engle & Granger (1987)establishes the relationship between cointegration and error-correction representation. Under this framework, two or more non-stationary series can be considered cointegrated when an appropriate linear combination of them is stationary. Applied to equity markets, this permits an economically meaningful distinction between securities that merely trend over time and securities whose divergence is bounded by a long-run equilibrium relationship. The approach has subsequently been applied directly to equity-market co-movement (Leachman et al., 1994).

The Johansen methodology extends this logic into a multivariate system in which the number of cointegrating vectors can be estimated jointly (Johansen, 1988). The maximum-likelihood framework developed further in multivariate cointegration applications (Juselius, 1990) is particularly suitable when three or more potentially endogenous variables are examined simultaneously. For the present study, this is important because BRIS, BTPS, and PNBS should not be treated as though one stock is necessarily exogenous to the others. The Johansen framework allows the long-run information contained in the three-stock system to be evaluated without imposing that assumption in advance.

Before cointegration can be interpreted, however, the order of integration of the underlying variables must be established carefully. Unit-root inference is known to depend on deterministic specifications, sample characteristics, and the properties of the testing procedure. The Augmented Dickey–Fuller and Phillips–Perron families of tests approach the null hypothesis from the perspective of a unit root, while KPSS provides the complementary perspective of stationarity. Methodological contributions have highlighted complexities associated with augmented Dickey–Fuller inference, Phillips–Perron statistics, and stationarity testing (Hassan et al., 2023; Hassler, 2006; Krämer, 1998). Employing complementary tests therefore provides a more defensible basis for determining whether the logarithmic stock-price series should subsequently enter cointegration analysis in levels or dynamic modelling in stationary transformations.

When cointegration is absent, the analytical focus shifts. A failure to establish long-run equilibrium does not mean that information is never transmitted among the securities. Instead, short-run relationships can be examined through vector autoregressive models using stationary variables. VAR methodology permits each variable to respond to its own history and to lagged information from other variables within the system. Multivariate VAR applications have long been used to examine dynamic relationships among financial and macroeconomic variables (Luintel & Khan, 1999). Causality testing can further identify whether past movements in one series improve the explanation of another, while impulse response functions and forecast error variance decomposition provide complementary evidence concerning the propagation and relative importance of shocks. The usefulness of variance decomposition and dynamic causality analysis is illustrated in financial applications such as (Masih et al., 2009).

The distinction between cointegration and VAR-based short-run dynamics is essential to the conceptualisation of market segmentation adopted here. If BRIS, BTPS, and PNBS are cointegrated, then deviations among their stock prices should contain an equilibrating component, suggesting stronger long-run market integration. If they are not cointegrated but significant short-run transmission exists, the market can instead be characterised as dynamically connected but structurally segmented. If neither long-run nor meaningful short-run interactions appear, the evidence would point toward an even stronger form of institution specific price formation.

This layered interpretation prevents market integration from being reduced to a single statistic. It also corresponds to evidence that financial-market dependence can vary across horizons (In et al., 2001; Marfatia, 2017). Common shocks may temporarily move several Islamic bank stocks in the same direction without producing a persistent common trend. Conversely, long-run equilibrium need not imply identical short-run responses. The empirical design must there-fore separate the two.

### *Research Gap and Analytical Position of the Study*

Three broad conclusions emerge from the literature. First, financial integration cannot be inferred from visual co-movement, common industry membership, or simple correlation. Persistent integration requires evidence that seemingly separate price series are tied together by an identifiable long-run relationship (Engle & Granger, 1987; Johansen, 1988; Leachman et al., 1994). Second, Islamic financial assets are not economically homogeneous. Differences in tail risk, market complexity, investor behaviour, banking risk, financing composition, diversification, and efficiency provide multiple reasons for institution-specific market dynamics (Abedifar et al., 2013; Fonseka & Farooque, 2024; Muteba Mwamba et al., 2017; Saâdaoui, 2018; Warninda et al., 2019; Yousaf & Alokla, 2023). Third, the Indonesian Islamic banking industry itself contains structural heterogeneity in competition, regulation, size, financing composition, valuation characteristics, and institutional history (Cupian & Abduh, 2017; Nastiti & Kasri, 2019; Santosa, 2020; Soedarmono & Yusgiantoro, 2023).

What remains insufficiently examined is the intersection of these three literatures. Much of the Islamic equity literature studies Islamic indices relative to conventional markets or compares Islamic markets internationally. Islamic banking studies, by contrast, frequently focus on accounting performance, credit risk, financing behaviour, stability, competition, or regulatory development. Indonesian equity studies increasingly employ sophisticated forecasting or valuation techniques, but the specific question of whether individually listed Indonesian Islamic banks form a common long-run equity-price system remains comparatively underdeveloped.

This gap matters because treating "Islamic bank equities" as a unified investment category implicitly assumes a degree of commonality that may not exist empirically. A Shariah-compliant institutional identity establishes an important common boundary, but studies concerned with Shariah implementation itself caution against equating formal classification with substantive

uniformity (Bin-Armia, 2025; Bin-Armia et al., 2024). Likewise, Indonesia's institutional environment can generate common regulatory pressures while permitting differentiated organisational responses (Bin-Armia, 2026). The same possibility should therefore be tested in capital markets: common institutional membership may coexist with heterogeneous market valuation.

The present study addresses this gap by shifting the analytical question from whether Islamic equities differ from conventional equities to whether Islamic bank equities differ from one another within the same national market. It examines BRIS, BTPS, and PNBS as a three-equity system and explicitly separates long-run equilibrium from short-run interdependence. This provides a narrower but potentially more informative understanding of Islamic capital-market integration.

Conceptually, the study therefore expects three possible configurations:

1. Long-run integration: the stock-price series are cointegrated, indicating that institution-specific deviations are ultimately constrained by a common equilibrium relationship;
2. Segmented but dynamically connected: no long-run cointegration exists, but short-run transmission among the stocks remains observable through VAR-based dynamics, causality, impulse responses, or variance decomposition; and
3. Strong segmentation: neither a stable long-run relationship nor economically meaningful short-run interdependence is evident, implying predominantly institution-specific price formation.

The second configuration is particularly important because it offers a more nuanced interpretation of segmentation. Market segmentation need not mean isolation. Securities can respond to shared news, macroeconomic developments, or investor sentiment while retaining distinct long-run valuation trajectories. For Indonesia's listed Islamic banks, such an outcome would be consistent with a sector in which the institutions occupy the same regulatory and Shariah marketplace but differ sufficiently in their fundamentals, market position, investor clientele, liquidity, and institutional characteristics that their equity prices do not converge toward one persistent path.

Accordingly, the "one market, different stores" proposition is not intended merely as a metaphor. It constitutes the paper's central analytical claim to be tested empirically. The one market reflects common exposure to Indonesia's equity market, Islamic banking regulation, macroeconomic environment, and Shariah-based institutional classification. The different stores represent BRIS, BTPS, and PNBS as separately valued institutions whose characteristics may generate distinct price-discovery processes. By testing whether these separate stores ultimately share one long-run price trajectory and by examining the short-run transmission of shocks when no such trajectory exists, the study connects Islamic banking heterogeneity with the broader literature on financial-market integration and segmentation.

## Methods

### *Research Design*

This study employs a quantitative time-series design to examine whether the equity prices of publicly listed Indonesian Islamic banks constitute an integrated market or remain segmented across individual institutions. The empirical design distinguishes between two dimensions of market interaction: long-run integration and short-run interdependence. This distinction is important because equity prices may react simultaneously to common information without necessarily sharing a stable long-run equilibrium. Conversely, the absence of cointegration does not automatically imply that the securities are completely disconnected in the short run.

The analysis therefore follows a sequential strategy. First, the statistical properties of the stock-price series are examined using descriptive analysis and complementary stationarity tests. Second, the appropriate lag structure is identified. Third, long-run integration is tested using the Engle–Granger residual-based approach and the Johansen multivariate cointegration procedure (Engle & Granger, 1987; Johansen, 1988; Juselius, 1990). The result of the cointegration stage determines the subsequent dynamic specification. Where a cointegrating relationship exists, a vector error-correction representation is appropriate; where no cointegration is detected, the analysis proceeds with a VAR model estimated using stationary first differences. Short-run transmission is then evaluated through Granger-causality tests, impulse-response functions (IRFs), and forecast-error variance decomposition (FEVD).

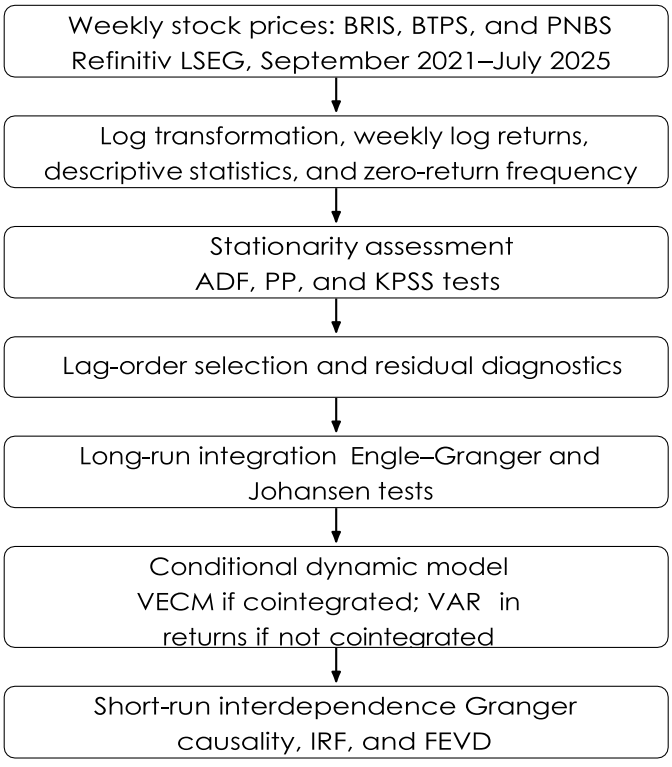


Figure 1. Empirical strategy of the study

Figure 1 summarises the empirical procedure. The sequential design avoids imposing a long-run adjustment mechanism when the data do not support one and allows market segmentation to be evaluated separately at long- and short-run horizons.

### *Data and Sample*

This study uses daily equity-price observations for three publicly listed Indonesian Islamic banks: Bank Syariah Indonesia, Bank BTPN Syariah, and Bank Panin Dubai Syariah. The market data were obtained from Refinitiv LSEG and organised into a balanced time-series dataset covering 25 September 2021 to 11 July 2025. The final sample contains 199 daily price observations for each institution.

| Code | Institution | Ticker | Series |
|---|---|---|---|
| BS | Bank Syariah Indonesia | BRIS.JK | Daily stock price |
| BT | Bank BTPN Syariah | BTPS.JK | Daily stock price |
| PN | Bank Panin Dubai Syariah | PNBS.JK | Daily stock price |

Table 1. Sample and Variable Definition

The three banks are selected because they provide separately traded Islamic banking equities operating within the same Indonesian macroeconomic, regulatory, capital-market, and Shariah banking environment. Their common institutional setting represents the "same market" dimension of the study, whereas differences in their market behaviour provide the basis for testing the "different stores" proposition.

The sample covers a substantial post-pandemic period and follows major institutional restructuring within Indonesian Islamic banking, particularly the consolidation associated with the establishment of Bank Syariah Indonesia (Utari et al., 2022). Daily rather than daily observations are employed to reduce the influence of very high-frequency market noise while retaining sufficient observations for multivariate time-series estimation. Daily frequency is also suitable where the frequency of observable price adjustment differs across individual equities.

### *Variable Transformation and Preliminary Analysis*

Because the three equities trade at substantially different nominal price levels, the analysis uses logarithmic prices and their first differences. For bank i, the transformation is defined compactly as:

$$L_{i,t} = \ln(P_{i,t}), \qquad R_{i,t} = \Delta L_{i,t} = \ln(P_{i,t}) - \ln(P_{i,t-1}), \qquad (1)$$

where $P_{i,t}$ denotes the observed weekly share price and $i \in \{BS, BT, PN\}$. Thus, $L_{i,t}$ represents the logarithmic price, while $R_{i,t}$ approximates the continuously compounded weekly return. Accordingly:

$$\mathbf{L}_t = (LBS_t, LBT_t, LPN_t)', \qquad \mathbf{R}_t = (DBS_t, DBT_t, DPN_t)'.$$

Descriptive analysis is conducted before formal time-series estimation. The analysis reports the mean, median, standard deviation, minimum, maximum, skewness, kurtosis, and number of observations. Price and return series are additionally inspected graphically to identify broad trends and differences in adjustment behaviour across the three securities. Attention is given to weeks in which the observed share price does not change. The zero-return frequency for equity i is calculated as:

$$ZR_i = \frac{1}{T-1}\sum_{t=2}^{T} \mathrm{I}(R_{i,t} = 0) \times 100, \qquad (2)$$

where $\mathrm{I}(\cdot)$ is an indicator function and T denotes the number of observations. The measure is used only as a descriptive indicator of price adjustment. It is not treated as a complete measure of liquidity because trading volume, turnover, and bid–ask spread are not incorporated in the dataset.

### *Stationarity and Order of Integration*

The order of integration must be established before testing for cointegration. Non-stationary financial variables can generate misleading regression relationships when their stochastic properties are ignored. Three complementary procedures are therefore employed: the Augmented Dickey–Fuller (ADF), Phillips–Perron (PP), and Kwiatkowski–Phillips–Schmidt–Shin (KPSS) tests. The ADF specification is represented generally as:

$$\Delta Y_t = \alpha + \beta t + \gamma Y_{t-1} + \sum_{j=1}^{P} \delta j \Delta Y t - j + \varepsilon t. \qquad (3)$$

For the ADF and PP procedures, the null hypothesis is that the series contains a unit root, whereas the KPSS test adopts stationarity as its null hypothesis. The use of tests with opposing null hypotheses provides a more robust classification of the time-series properties than reliance on a single procedure (Bisaglia & Procidano, 2002; Krämer, 1998; Rothe & Sibbertsen, 2006; Sephton, 1995). The tests are applied first to logarithmic prices and then to their first differences. A variable is treated as I(1) when its logarithmic level is non-stationary, but its first difference is stationary. The purpose of the three-test strategy is therefore not to generate separate econometric models, but to establish whether the price series satisfy the preconditions for cointegration analysis.

### *Lag Selection and Multivariate Specification*

An appropriate lag order is selected before estimating the multivariate models. Excessive lags reduce degrees of freedom, whereas insufficient lags may leave residual serial correlation and distort subsequent cointegration or causality inference. The general VAR representation is:

$$\mathbf{X}_t = \mathbf{c} + + \sum_{j=1}^{P} Aj\mathbf{X}t - j + \varepsilon t, \qquad (4)$$

where Xt denotes the relevant three-variable system, Aj contains the lag coefficients, and p is the selected lag order. Lag selection is evaluated using the Akaike Information Criterion (AIC), Schwarz Bayesian Information Criterion (BIC/SBIC), Hannan–Quinn Information Criterion (HQIC), and sequential likelihood-ratio evidence. Because the sample contains 199 observations, parsimony is also considered when the criteria provide conflicting recommendations. The selected specification is subsequently checked for residual serial correlation.

### *Testing Long-Run Market Integration*

Long-run integration is evaluated using two complementary cointegration approaches. The first is the Engle–Granger residual-based procedure (Engle and Granger, 1987). A representative long-run relationship is:

$$LBS_t = \alpha_0 + \alpha_1 LBT_t + \alpha_2 LPN_t + u_t. \quad (5)$$

If $LBS_t$, $LBT_t$, and $LPN_t$ are individually non-stationary but the estimated residual uˆt is stationary, the stock prices are cointegrated. Stationarity of the residual therefore indicates that deviations among the equities are ultimately corrected toward a stable equilibrium. Failure to establish residual stationarity supports the absence of such a long-run relationship. The residual-based approach has been widely applied to equity-market integration (Leachman et al., 1994).

Because the Engle–Granger procedure can depend on the normalisation of the long-run regression, the analysis additionally employs the Johansen multivariate procedure (Johansen, 1988; Juselius, 1990). The Johansen representation can be written compactly as:

$$\Delta \mathbf{L}_t = \boldsymbol{\mu} + \Pi \mathbf{L}_{t-1} + \sum_{j=1}^{P} \Gamma j \, \Delta \mathbf{L} t - j + \varepsilon t, \Pi = \alpha\beta. \quad (6)$$

The rank of Π determines the number of cointegrating relationships. A rank of zero indicates no long-run equilibrium relationship, whereas a positive rank smaller than the number of variables indicates one or more cointegrating vectors. Both the trace and maximum-eigenvalue statistics are used to determine the cointegration rank. Using both Engle–Granger and Johansen procedures provide a stronger basis for distinguishing genuine long-run integration from temporary co-movement

### *Short-Run Dynamic Interdependence*

The dynamic specification depends on the preceding cointegration results. If cointegration is established, a vector error-correction model is appropriate because both short-run movements and equilibrium adjustment must be represented. If the estimated cointegration rank is zero, the analysis instead employs an unrestricted VAR using the stationary return vector Rt:

$$\mathbf{R}_t = \mathbf{c} + \sum_{j=1}^{P} \mathbf{A} \mathbf{j} \mathbf{R} \mathbf{t} - \mathbf{j} + \boldsymbol{\varepsilon} \mathbf{t} \quad (7)$$

This specification treats BRIS, BTPS, and PNBS as jointly endogenous rather than imposing a predetermined causal hierarchy (Luintel & Khan, 1999; Shan, 2005). Three complementary tools are then used to interpret short-run interdependence;

- *Granger causality*. Pairwise Granger-causality tests examine whether lagged returns of one equity contain statistically significant information for predicting another equity after controlling for its own lagged returns. The tests are conducted in both directions for BRIS–BTPS, BRIS–PNBS, and BTPS–PNBS. Granger causality is interpreted as predictive information transmission rather than structural causality.
- *Impulse-response functions*. IRFs trace the reaction of one equity return to an innovation occurring in another equity over subsequent periods. They therefore indicate the direction, magnitude, and persistence of short-run responses. A rapidly dissipating response indicates temporary transmission, whereas a persistent response would suggest stronger dynamic interconnectedness.
- *Forecast-error variance decomposition*. FEVD measures how much of the fore-cast uncertainty of each Islamic bank equity is attributable to its own shocks and how much is associated with shocks originating in the other equities. A large own-shock share is interpreted as relatively autonomous price formation, whereas substantial cross-equity shares indicate greater short-run interdependence (Masih et al., 2009).

Combining these three tools is preferable to interpreting individual VAR coefficients in isolation. Granger causality identifies directional predictive content, IRFs reveal the temporal propagation of shocks, and FEVD evaluates their relative quantitative importance.

### *Model Diagnostics and Robustness*

The estimated dynamic model is subjected to several post-estimation diagnostics. Residual serial correlation is tested using LM-type procedures. VAR stability is evaluated from the roots of the characteristic polynomial; all roots must lie inside the unit circle for the dynamic responses to be interpreted as stable. Residual heteroskedasticity and normality are also inspected as supplementary diagnostics. Because financial returns frequently depart from Gaussian behaviour, these tests are used to characterise the residual process rather than as mechanical criteria for rejecting an otherwise stable model. Where relevant, inference is interpreted cautiously in the presence of heteroskedastic disturbances (Newey & West, 1987).

Robustness analysis additionally addresses heterogeneous price adjustment. The frequency of zero weekly returns is compared across the three equities, and pairwise relationships are examined alongside the full three-variable system. This is particularly relevant when one security displays substantially less frequent price variation than the others. Alternative parsimonious lag specifications are also considered where they contribute to assessing the stability of the main findings.

### *Interpretation of Market Segmentation.*

The empirical findings are interpreted by distinguishing long-run integration from short-run market interaction. Figure 2 summarises this interpretation. The framework does not treat integration and segmentation as simple opposites; instead, it allows equities to remain segmented in the long run while still exhibiting some degree of short-run connectedness.

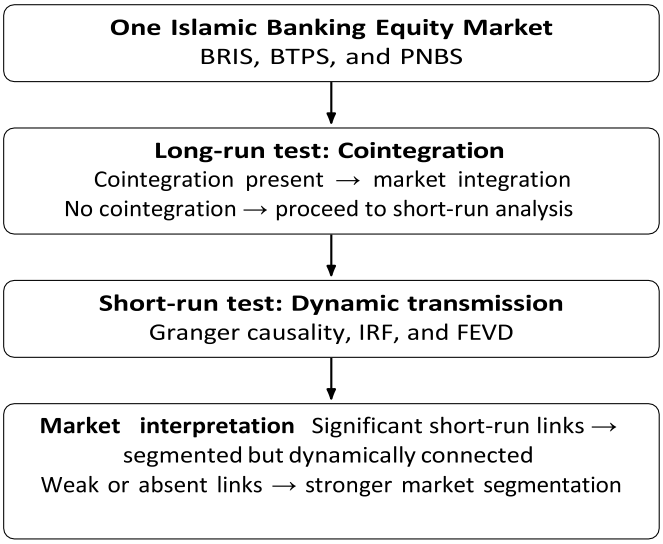


Figure 2. Framework for interpreting market integration and segmentation

Under this framework, evidence of cointegration indicates that the three Islamic banking equities share a stable long-run relationship and therefore supports market integration. In contrast, the absence of cointegration indicates that their prices follow distinct long-run trajectories. The degree of segmentation is then evaluated through the short-run evidence. If meaningful Granger-causal relationships, impulse responses, or cross-equity variance contributions remain, the market is interpreted as segmented but dynamically connected. If these relationships are weak or absent, the evidence supports a stronger form of market segmentation.

This interpretation gives empirical meaning to the expression "same Market, Different Stores." BRIS, BTPS, and PNBS operate within the same Indonesian regulatory, Shariah, macroeconomic, and capital-market environment, representing the "same market." However, differences in their long-run valuation paths and short-run price dynamics represent the "different stores." The degree of market segmentation is therefore determined by whether this common institutional environment produces common equity-price behaviour in either the long run or the short run.

## Result and Discussion

### *Descriptive Evidence: Same Market, Unequal Price Dynamics*

The analysis begins by examining whether the three Islamic banking equities display similar statistical characteristics before considering formal long-run integration. Table 2 reports descriptive statistics for the raw stock prices and their first-differenced logarithmic transformations. The results

immediately re-veal substantial heterogeneity across BRIS, BTPS, and PNBS (coded by BS, BT and PN respectively).

| Var. | N | Mean | Std. Dev | Min. | Max | Zero Return |
|---|---|---|---|---|---|---|
| *Panel A: Stock Prices* | | | | | | |
| BS | 199 | 2769.10 | 209.65 | 2080.00 | 3110.00 | – |
| BT | 199 | 1096.76 | 201.84 | 830.00 | 1540.00 | – |
| PN | 199 | 50.79 | 1.54 | 50.00 | 58.00 | – |
| *Panel B: Daily Log Returns* | | | | | | |
| DBS | 198 | 0.00025 | 0.02806 | -0.11620 | 0.11778 | 11.11% |
| DBT | 198 | -0.00127 | 0.02736 | -0.16149 | 0.08651 | 9.09% |
| DPN | 198 | 0.00029 | 0.00966 | -0.03509 | 0.03774 | 78.79% |

Table 2. Descriptive Statistics of Islamic Banking Equities

Several features of Table 2 are economically important. BRIS records the highest nominal share price over the sample, with an average of approximately IDR 2,769, compared with IDR 1,097 for BTPS and only IDR 50.79 for PNBS. Differences in nominal price levels alone are not evidence of segmentation, which is why logarithmic transformations are employed in the time-series analysis. More revealing is the behaviour of weekly price adjustment.

BRIS and BTPS display broadly comparable return volatility, with standard deviations of approximately 2.81% and 2.74%, respectively. PNBS, in contrast, records a much smaller weekly return standard deviation of approximately 0.97%. This lower measured volatility should not automatically be interpreted as lower economic risk. A striking 78.79% of PNBS weekly observations produce no change in the recorded stock price, compared with only 11.11% for BRIS and 9.09% for BTPS. In absolute terms, PNBS records an unchanged logarithmic price in 156 of the 198 weekly return intervals.

This finding represents an important first indication of the "different stores" component of the paper. PNBS appears to undergo substantially less frequent observable price adjustment than BRIS or BTPS. Without trading-volume and bid–ask spread information, the zero-return frequency cannot by itself be interpreted as a complete measure of liquidity. Nevertheless, it indicates that price discovery occurs very differently across the three securities. Consequently, a common Islamic banking classification does not translate into homogeneous market activity.

The divergence becomes clearer when the correlations among logarithmic price levels and weekly returns are considered. The return correlation between BRIS and BTPS is 0.448, indicating a meaningful contemporaneous common component between the two larger and more actively adjusting equities. In contrast, PNBS returns are almost uncorrelated with both BRIS (−0.024) and BTPS (0.024). The contrast is substantial. BRIS and BTPS therefore appear to occupy relatively neighbouring positions within the same market, whereas PNBS behaves much more independently (see Table 3.).

| | BRIS | BTPS | PNBS |
|---|---|---|---|
| *Panel A: Logarithmic Price Levels* | | | |
| BRIS | 1.000 | 0.102 | 0.460 |
| BTPS | 0.102 | 1.000 | -0.051 |
| PNBS | 0.460 | -0.051 | 1.000 |
| *Panel B: Weekly Log Returns* | | | |
| BRIS | 1.000 | 0.448 | -0.024 |
| BTPS | 0.448 | 1.000 | 0.024 |
| PNBS | -0.024 | 0.024 | 1.000 |

Table 3. Correlation Structure of Islamic Banking Equities

Simple correlation, however, cannot establish market integration. Correlation can reflect temporary responses to common information without implying that two non-stationary prices are tied together in equilibrium (Engle & Granger, 1987; Leachman et al., 1994). The subsequent analysis therefore evaluates whether these observed relationships survive the more demanding tests of stationarity and cointegration.

### *Stationarity and Order of Integration*

The stationarity analysis employs ADF, PP, and KPSS procedures to distinguish persistent price-level movements from stationary return dynamics. Table 4 summarises the principal results. The evidence points toward a common general pattern.

| Variable | Test | Intercept | Intercept + Trend | Overall Inference |
|---|---|---|---|---|
| LBS | ADF | -2.62 | -3.00 | Predominantly non-stationary |
| | PP | -2.61 | -2.85 | Weak evidence against unit root |
| | KPSS | 0.34 | 0.08 | Some stationarity evidence |
| LBT | ADF | -1.53 | -0.49 | Non-stationary |
| | PP | -1.87 | -0.60 | Non-stationary |
| | KPSS | 0.48 | 0.19 | Non-stationary |
| LPN | ADF | -1.71 | -2.82 | Non-stationary |
| | PP | -1.97 | -3.28 | Predominantly non-stationary |
| | KPSS | 0.53 | 0.18 | Non-stationary |
| DBS | ADF | -10.40 | -10.40 | Stationary |
| | PP | -13.34 | -13.30 | Stationary |
| | KPSS | 0.06 | 0.05 | Stationary |
| DBT | ADF | -9.80 | -10.01 | Stationary |
| | PP | -14.95 | -15.60 | Stationary |
| | KPSS | 0.381 | 0.08 | Stationary |
| DPN | ADF | -11.14 | -21.90 | Stationary |
| | PP | -20.64 | -21.92 | Stationary |
| | KPSS | 0.152 | 0.087 | Stationary |

Table 4. Unit-Root and Stationarity Test Results

The logarithmic price levels are predominantly non-stationary, whereas their first differences are strongly stationary. LBT and LPN exhibit particularly clear evidence of level non-stationarity. LBS provides somewhat more nuanced evidence because the KPSS specifications provide greater support for stationarity than the ADF and PP specifications. Nevertheless, the sharp rejection of unit-root behaviour once LBS is first differenced supports treating the underlying price series as predominantly I(1) for the purpose of the multivariate analysis.

The first-differenced results are considerably less ambiguous. The ADF and PP statistics for DBS, DBT, and DPN are strongly negative across specifications, while the KPSS statistics remain below their corresponding critical values. The return series can therefore be treated as stationary.

This finding has two implications. First, it prevents the apparent movements in stock-price levels from being interpreted through conventional regression without accounting for stochastic trends. Second, because the three-price series exhibit broadly compatible orders of integration, the possibility of a stationary linear combination can legitimately be examined through cointegration testing.

### *Long-Run Integration: Engle–Granger Evidence*

The first direct test of long-run market integration is the Engle–Granger residual-based procedure. If BRIS, BTPS, and PNBS belong to a common long-run equity-price system, the residual from their estimated equilibrium relationship should be stationary. Table 5 reports the results.

| Residual Test | Test Statistic | 5% Critical Value | Decision |
|---|---|---|---|
| DF | -3.0833 | -3.7865 | No cointegration |
| ADF (1) | -3.1736 | -3.7865 | No cointegration |
| ADF (2) | -2.8044 | -3.7865 | No cointegration |
| ADF (3) | -2.4280 | -3.7865 | No cointegration |
| ADF (4) | -2.3308 | -3.7865 | No cointegration |
| ADF (5) | -2.4518 | -3.7865 | No cointegration |

Table 5. Engle-Granger Residual-Based Cointegration Test

None of the residual-based statistics exceeds the relevant threshold for rejection of the no-cointegration null. The strongest result is obtained under ADF(1), with a statistic of −3.1736, but even this remains less negative than the 5% critical value of −3.7865. The residual therefore retains a stochastic trend rather than reverting systematically toward a long-run equilibrium.

This result provides the first direct empirical support for the market-segmentation proposition. The absence of residual stationarity means that deviations among BRIS, BTPS, and PNBS prices are not corrected through an identifiable common equilibrium mechanism. Their prices may occasionally rise or fall together, but those movements do not force the three securities back toward a stable relative relationship.

This distinction is important because financial-market integration is stronger than simple correlation. Cointegrated prices are constrained in the long run even if short-run deviations occur (Engle & Granger, 1987; Leachman et al., 1994). The Indonesian Islamic banking equities in the present sample do not satisfy this condition.

### *Johansen Cointegration Results*

Because the Engle–Granger procedure may depend on the normalisation chosen for the long-run regression, the Johansen system-based approach provides an important multivariate robustness test. Table 6 presents both the maximum-eigenvalue and trace statistics.

| Test | Null | Rank Statistic | 5% Critical Value | Decision |
|---|---|---|---|---|
| Max-Eigen | $r = 0$ | 19.25 | 25.42 | Fail to reject |
| | $r \leq 1$ | 10.10 | 19.22 | Fail to reject |
| | $r \leq 2$ | 5.37 | 12.39 | Fail to reject |
| Trace | $r = 0$ | 34.72 | 42.34 | Fail to reject |
| | $r \leq 1$ | 15.47 | 25.77 | Fail to reject |
| | $r \leq 2$ | 5.37 | 12.39 | Fail to reject |

Table 6. Johansen Cointegration Test Results

The Johansen evidence strongly reinforces the Engle–Granger result. For the null hypothesis of no cointegration (r = 0), the maximum-eigenvalue statistic of 19.25 remains below its 5% critical value of 25.42. Similarly, the trace statistic of 34.72 is below the corresponding critical value of 42.34. The null is also not rejected at subsequent ranks.

The estimated cointegration rank is therefore:

$$r = 0. \tag{8}$$

This is the central long-run finding of the paper. BRIS, BTPS, and PNBS do not form a stable three-equity equilibrium system during the sample period. The conclusion is especially noteworthy because the three securities operate within the same national regulatory environment and share an Islamic banking institutional identity. Common Shariah classification and exposure to the Indonesian economy are therefore insufficient to generate a common long-run market-pricing relationship.

The result is consistent with the broader proposition that Islamic financial institutions can remain heterogeneous despite belonging to one recognisable sector. Indonesian Islamic banks differ in competitive position, size, financing structure, market power, and cyclical sensitivity (Cupian & Abduh, 2017; Soedarmono & Yusgiantoro, 2023). Firm-specific characteristics can also influence market valuation (Santosa, 2020). The absence of cointegration can therefore be understood not as an anomaly but as the equity-market manifestation of deeper institutional heterogeneity.

### *Pairwise Robustness of the Segmentation Result*

The absence of system-wide cointegration could theoretically arise because one institution prevents an otherwise integrated pair from forming a common equilibrium. To assess this possibility, pairwise Engle–Granger relationships are additionally examined (see Table 7.).

None of the three pairwise relationships are cointegrated at the conventional 5% significance level. The BRIS–PNBS relationship is comparatively closer to rejection, with a p-value of 0.077, but remains statistically insufficient to establish a stable long-run equilibrium.

| Equity Pair | Test Statistic | p-Value | Inference at 5% |
|---|---|---|---|
| BRIS-BTPS | -2.489 | 0.284 | No cointegration |
| BRIS-PNBS | -3.159 | 0.077 | No cointegration |
| BTPS-PNBS | -1.813 | 0.623 | No cointegration |

Table 7. Pairwise Cointegration Robustness Test

The pairwise evidence therefore shows that the absence of system-wide integration cannot be attributed solely to one problematic combination of stocks. Even BRIS and BTPS, whose weekly returns exhibit a relatively substantial contemporaneous correlation of 0.448, do not share a stable long-run price relationship. This distinction between contemporaneous association and persistent equilibrium lies at the heart of the paper's interpretation of segmentation.

### *Lag Structure and Short-Run Dynamics*

Given the absence of cointegration, the analysis turns to stationary weekly returns to determine whether the three equities remain connected over shorter horizons. Re-estimation of the lag-selection criteria using the complete first-differenced dataset produces a highly parsimonious result.

| Lag | AIC | BIC | HQIC | FPE |
|---|---|---|---|---|
| 0 | -23.72 | -23.67 | -23.70 | $4.978 \times 10^{-11}$ |
| 1 | -23.68 | -23.47 | -23.59 | $5.211 \times 10^{-11}$ |
| 2 | -23.62 | -23.25 | -23.47 | $5.528 \times 10^{-11}$ |
| 3 | -23.60 | -23.08 | -23.39 | $5.619 \times 10^{-11}$ |
| 4 | -23.55 | -22.87 | -23.27 | $5.940 \times 10^{-11}$ |

Table 7. VAR Lag-Order Selection for Daily Log Returns

Table 8 shows all reported information criteria prefer lag zero. This result is itself informative. Once the price series are converted into stationary weekly returns, adding their lagged histories does not improve the multivariate fit sufficiently to compensate for the additional parameters. The result therefore provides little evidence of persistent, lagged information transmission among the three equities.

Because a VAR(0) contains no lagged dynamics and consequently cannot be used meaningfully for Granger-causality or impulse-response analysis, a VAR(1) is estimated as a conservative sensitivity specification. This does not overturn the information-criterion result; rather, it asks whether even the shortest plausible lag structure reveals economically meaningful predictive relationships.

The VAR(1) specification is dynamically stable. Its companion-matrix eigen-values in modulus are approximately 0.040, 0.112, and 0.158, all comfortably inside the unit circle. The residual Portmanteau test additionally fails to reject the null of no residual autocorrelation through six lags ($p = 0.463$). The sensitivity model therefore provides an adequate basis for investigating whether weak short-run relationships are hidden behind the lag-zero information criterion result.

### *Granger-Causality Results*

Table 9 presents pairwise Granger-causality tests derived from the VAR(1) sensitivity specification. None of the six directional hypotheses is statistically significant at conventional levels. Past BRIS returns do not significantly improve the prediction of BTPS or PNBS; past BTPS movements similarly add no statistically significant predictive content for BRIS or PNBS; and PNBS provides virtually no lagged predictive information for either of the other two securities.

| Direction of Predictive Effect | Wald Statistic | p-Value | Inference at 5% |
|---|---|---|---|
| BTPS → BRIS | 0.447 | 0.504 | No Granger causality |
| PNBS → BRIS | 0.323 | 0.570 | No Granger causality |
| BRIS → BTPS | 0.319 | 0.572 | No Granger causality |
| PNBS → BTPS | 0.013 | 0.908 | No Granger causality |
| BRIS → PNBS | 0.209 | 0.648 | No Granger causality |
| BTPS → PNBS | 0.062 | 0.803 | No Granger causality |

Table 9. Short-Run Granger-Causality Results

This finding substantially strengthens the segmentation interpretation. The absence of cointegration already demonstrates that there is no stable long-run equilibrium. The Granger results further indicate that the separation is not compensated by strong lagged short-run information transmission.

An important qualification is nevertheless required. BRIS and BTPS exhibit a contemporaneous weekly return correlation of approximately 0.448. Consequently, the absence of Granger causality should not be interpreted as evidence that the securities never respond to the same information. Instead, their common responses appear to occur predominantly within the same weekly interval rather than through a systematic lead–lag mechanism.

This distinction provides a more nuanced characterisation of the market. BRIS and BTPS appear capable of reacting jointly to common information, yet neither consistently leads the other. PNBS is considerably more isolated, both contemporaneously and dynamically

### *Impulse-Response Analysis*

The impulse-response functions provide a further view of how quickly innovations dissipate within the system. The results from the VAR(1) sensitivity specification indicate that own-equity shocks generate the largest immediate responses, whereas cross-equity responses are generally small and short-lived.

Across the system, responses decline rapidly after the initial innovation. By approximately the fourth weekly horizon, the estimated responses have converged close to zero, and by the eighth to twelfth horizons they are economically negligible. There is therefore no evidence that an innovation originating in one Islamic bank creates a persistent sequence of adjustments in the other two equities.

The rapid dissipation of shocks is particularly important when interpreted alongside the cointegration results. If the three equities were strongly integrated, one might expect disturbances to trigger a systematic adjustment pro-cess as the securities move back toward a common long-run relationship. Such an equilibrium-correcting mechanism is absent. Instead, shocks appear predominantly temporary and institution specific.

This does not imply that all three stocks operate in complete informational isolation. BRIS and BTPS continue to display a contemporaneous common component, but that relationship does not

develop into persistent, lagged adjustment. PNBS exhibits the weakest cross-market response, consistent with its unusually high proportion of unchanged weekly prices.

### *Forecast-Error Variance Decomposition*

Forecast-error variance decomposition provides a complementary measure of how much of each equity's future uncertainty is attributable to its own shocks and to innovations originating elsewhere in the system. Because conventional orthogonalized FEVD can depend on variable ordering, the interpretation is additionally checked using a normalised generalized decomposition. Table 10 reports the twelve-week generalized variance shares.

| Response Variable | Shock: BRIS | Shock: BTPS | Shock: PNBS |
|---|---|---|---|
| BRIS | 82.47% | 17.36% | 0.17% |
| BTPS | 17.04% | 82.90% | 0.06% |
| PNBS | 0.09% | 0.07% | 99.84% |

Table 9. Generalized Forecast-Error Variance Decomposition at Twelve Weeks

The variance decomposition produces perhaps the clearest picture of the internal structure of the market. BRIS and BTPS retain predominantly institution specific dynamics, with approximately 82–83% of their forecast uncertainty explained by their own innovations. Nevertheless, each equity attributes roughly 17% of forecast uncertainty to innovations associated with the other. There is therefore a meaningful common component between BRIS and BTPS even though it does not manifest as statistically significant Granger causality.

PNBS stands in sharp contrast. Approximately 99.84% of its twelve-week forecast-error variance is attributable to its own shocks. Innovations associated with BRIS and BTPS jointly explain less than 0.2%. Likewise, PNBS contributes virtually nothing to the forecast-error variance of either BRIS or BTPS.

The result suggests that segmentation is not uniform across the market. Rather than three equally disconnected equities, the evidence reveals a two-layer structure:

BRIS ←→ BTPS
limited common short-run component

PNBS
Predominantly idiosyncratic

This provides empirical substance to the metaphor of "different stores." BRIS and BTPS appear to occupy more closely connected parts of the same marketplace, whereas PNBS follows a considerably more autonomous price-discovery process.

### *Market Segmentation or Market Isolation?*

Taken together, the results favour market segmentation rather than market integration, but the evidence also cautions against describing the three equities as completely isolated.

The long-run evidence is unambiguous. Neither Engle–Granger nor Johansen testing identifies a stable cointegrating relationship. Pairwise robustness tests lead to the same conclusion. The three Islamic bank stock prices therefore do not converge toward a common long-run equilibrium. This places the market firmly outside the first configuration identified in the methodological framework.

The short-run evidence adds nuance. The formal lag-selection criteria indicate that adding past returns provides little improvement over a model without lags, and the VAR(1) sensitivity specification detects no statistically significant Granger-causal relationship in any direction. Impulse responses similarly dissipate rapidly. These results are more consistent with strong segmentation than with a dynamically integrated equity system.

Yet contemporaneous correlation and variance decomposition indicate that BRIS and BTPS are not completely independent. Their weekly returns share a correlation of approximately 0.45, and generalized variance decomposition attributes around 17% of each institution's forecast uncertainty to innovations associated with the other. What is absent is not all commonality, but a persistent mechanism through which one security systematically leads, corrects, or anchors the other. The market can therefore be characterised as "Long-run segmentation + limited BRIS–BTPS commonality + strong PNBS autonomy" rather than as either complete integration or complete independence.

### *Explaining the Different Stores*

The empirical differences across the three equities are consistent with the institutional heterogeneity documented in Indonesian Islamic banking. Islamic banks operating under the same Shariah and regulatory architecture may differ substantially in size, competitive position, financing structure, market power, and exposure to the business cycle (Cupian & Abduh, 2017; Soedarmono & Yusgiantoro, 2023). Firm-specific financial characteristics are also relevant to market valuation (Santosa, 2020). Consequently, common religious-financial classification does not necessarily provide investors with sufficient reason to price individual institutions according to a common stochastic trend.

BRIS occupies a distinctive position because its institutional development is associated with the consolidation of major Indonesian Islamic banking operations (Utari et al., 2022) BTPS represents a separately developed banking institution with its own business structure and investor base, while PNBS displays a substantially different pattern of observable price adjustment. These institutional differences provide plausible economic foundations for the segmentation identified econometrically.

The findings also complement evidence from the broader Islamic equity literature. Islamic stock markets exhibit heterogeneous risk characteristics rather than behaving as a universally homogeneous asset class (Muteba Mwamba et al., 2017). Investor behaviour across Islamic banking markets can similarly vary according to institution, country, and market condition (Yousaf & Alokla, 2023). The present study extends this insight inward: heterogeneity is not confined to

comparisons between Islamic and conventional markets or between different countries. It can also exist among Islamic banks operating inside the same domestic market.

The exceptionally high frequency of unchanged PNBS prices deserves particular attention in this regard. At 78.79%, the zero-return frequency is approximately seven times that observed for BRIS and almost nine times that of BTPS. Such a pattern means that PNBS contributes far less continuous price variation to the multivariate system. This helps explain why its contemporaneous correlations, lagged predictive effects, and variance-decomposition spillovers are all extremely small.

However, the result should be interpreted carefully. The present dataset does not include bid–ask spreads, transaction counts, or trading turnover, and there-fore the analysis cannot formally identify market illiquidity as the cause of the observed pattern. What the data establish is narrower but still important: observable price adjustment is markedly less frequent for PNBS. Future research incorporating direct liquidity indicators could determine whether this represents thin trading, investor concentration, differences in information arrival, or other market-microstructure characteristics.

### *The Meaning of "Same Market, Different Stores"*

The overall evidence gives substantive meaning to the title of the study. The "same market" component remains valid institutionally. BRIS, BTPS, and PNBS are Indonesian publicly listed Islamic banks exposed to the same broad national economic environment, Islamic banking architecture, and equity-market infrastructure. Yet those common conditions do not generate a single equity-price system.

The "different stores" component emerges at several empirical levels. The banks exhibit substantially different nominal price structures and frequencies of price adjustment. Their long-run prices are not cointegrated. Their lagged returns do not significantly Granger-cause one another. Innovations largely dissipate rather than propagating persistently across the system. Most importantly, PNBS displays an almost entirely idiosyncratic variance structure, while BRIS and BTPS share only a limited common component.

The findings therefore challenge an implicit assumption that sectoral or Shariah similarity necessarily implies market integration. Islamicity creates a common institutional category; it does not eliminate firm-specific fundamentals, investor preferences, market visibility, or differences in price discovery. In portfolio terms, the lack of a common long-run equilibrium also suggests that sectoral concentration in Islamic banking equities need not be equivalent to perfect expo-sure to a single common price process. At the same time, the partial BRIS–BTPS relationship demonstrates that diversification opportunities cannot be inferred merely from the absence of cointegration.

The empirical classification derived from the study can finally be summarised as:

Common Islamic banking environment

↓

No stable long-run cointegration

↓

No systematic lagged cross-equity causality

↓

Limited BRIS–BTPS commonality + strong PNBS autonomy

↓

**Market Segmentation** (11)

Accordingly, the Indonesian listed Islamic banking market during the sample period is best described not as a unified equity-pricing system, but as a common institutional marketplace containing securities with materially different price discovery dynamics. The three banks travel within the same Islamic financial ecosystem, yet the market does not price them as interchangeable representations of that ecosystem. In empirical terms, Indonesia's listed Islamic banking sector is therefore indeed one market with different stores.

## Conclusion

This study examined whether three publicly listed Indonesian Islamic banks—Bank Syariah Indonesia (BRIS), Bank BTPN Syariah (BTPS), and Bank Panin Dubai Syariah (PNBS)—form an integrated equity-market system or remain segmented despite operating within the same national, regulatory, and Shariah banking environment. Using 199 daily observations from September 2021 to July 2025, the analysis combined stationarity testing, Engle–Granger and Johansen cointegration procedures, VAR-based short-run analysis, Granger causality, impulse-response functions, forecast-error variance decomposition, and robustness checks related to heterogeneous price adjustment. The results consistently indicate that the three equity prices do not share a stable long-run equilibrium relationship. Both the residual-based and multivariate cointegration tests support a cointegration rank of zero, while pairwise tests similarly fail to establish persistent long-run integration. The evidence therefore suggests that common membership in

Indonesia's Islamic banking sector is not sufficient to generate a common long-run equity-pricing process.

The short-run results reinforce this conclusion while revealing important differences in the degree of segmentation. Formal Granger-causality tests provide little evidence of systematic lead–lag transmission among the three securities, and impulse responses dissipate rapidly. Nevertheless, BRIS and BTPS exhibit a meaningful contemporaneous relationship and some shared forecast-error variation, suggesting limited common short-run market exposure. PNBS, by contrast, displays substantially greater autonomy, with an unusually high frequency of unchanged weekly prices and forecast variation dominated almost entirely by its own innovations. The empirical picture is therefore more nuanced than either complete integration or complete independence. Indonesia's listed Islamic banking equities are best characterised as a segmented market containing a relatively connected BRIS–BTPS pair and a considerably more idiosyncratic PNBS price process.

These findings give substantive meaning to the paper's central proposition of "One Market, Different Stores." Islamic banks may share Shariah-compliant institutional classification, regulatory oversight, and exposure to the same macroeconomic environment, yet investors do not necessarily price them as interchange-able representations of a single Islamic banking sector. Differences in institutional scale, business models, financing structures, market visibility, investor participation, and price adjustment processes may therefore remain important even within a narrowly defined Shariah-compliant equity segment. This interpretation is consistent with the wider literature showing that Islamic financial institutions can differ significantly in risk, efficiency, market behaviour, and institutional characteristics (Abedifar et al., 2013; Cupian & Abduh, 2017; Soedarmono & Yusgiantoro, 2023; Warninda et al., 2019). For investors, the absence of a common long-run equilibrium suggests that diversification opportunities may remain within the Islamic banking equity segment itself. For policymakers and market developers, however, persistent segmentation may also signal uneven depth of price discovery and investor participation across listed Islamic financial institutions.

The study is subject to several limitations. The analysis focuses on only three listed Islamic banks and therefore does not represent the entire Indonesian Islamic financial sector. It also relies primarily on price information and does not directly incorporate trading volume, bid–ask spreads, ownership concentration, macroeconomic variables, or bank-specific fundamentals that could explain the observed differences in price behaviour. In particular, the high zero-return frequency observed for PNBS should not be interpreted automatically as evidence of illiquidity without additional market-microstructure data. Future research could extend the analysis by incorporating liquidity measures, structural-break tests, volatility models, time-varying connectedness, bank-specific financial indicators, and broader samples covering Islamic banks across Southeast Asia. Such extensions would help determine whether the segmentation identified here is specific to Indonesia or reflects a wider feature of emerging Islamic banking equity markets.

Overall, the evidence suggests that Islamic banking identity creates a common institutional marketplace, but not necessarily a common market trajectory. BRIS, BTPS, and PNBS operate within the same Islamic financial ecosystem, yet their stock prices remain sufficiently distinct that no stable long-run relationship binds them together. The Indonesian Islamic banking equity market is therefore appropriately described as one market with different stores: institutionally unified, but financially segmented.

## References


Abedifar, P., Molyneux, P., & Tarazi, A. (2013). Risk in islamic banking. *Review of Finance*, *17*(6), 2035–2096. https://doi.org/10.1093/ROF/RFS041

Bin-Armia, M. S. (2025). How to Ascertain the Shariah Compliance on the Islamic Financial Product? A Study on Green Sukuk. *SUKUK: INTERNATIONAL JOURNAL OF BANKING, FINANCE, MANAGEMENT AND BUSINESS*, *4*(I), 55–67.

Bin-Armia, M. S. (2026). BEYOND BELIEF: INSTITUTIONAL THEORY TOWARDS INDONESIA'S QRIS REGULATION. *PETITA: JURNAL KAJIAN ILMU HUKUM DAN SYARIAH*, *11*(1), 42–61.

Bin-Armia, M. S., Armia, M. S., & Syarif, M. F. (2024). Economical rights versus God's rights: criticising of the implementation Shariah economic in Indonesia. *International Journal of Islamic and Middle Eastern Finance and Management*, *17*(6), 1267–1290.

Bisaglia, L., & Procidano, I. (2002). On the power of the augmented Dickey-Fuller test against fractional alternatives using bootstrap. *Economics Letters*, *77*(3), 343–347. https://doi.org/10.1016/S0165-1765(02)00146-5

Borges, M. R. (2010). Efficient market hypothesis in European stock markets. *European Journal of Finance*, *16*(7), 711–726. https://doi.org/10.1080/1351847X.2010.495477

Cupian, & Abduh, M. (2017). Competitive Condition and Market Power of Islamic Banks in Indonesia. *International Journal of Islamic and Middle Eastern Finance and Management*, *10*(1), 77–91. https://doi.org/10.1108/IMEFM-09-2015-0098

Demirgüç-Kunt, A., Pedraza, A., & Ruiz-Ortega, C. (2021). Banking sector performance during the COVID-19 crisis. *Journal of Banking & Finance*, *133*, 106305.

Dombrovskyi, V. S., Plastun, O. L., & Plastun, V. L. (2013). Efficient market hypothesis as a modern concept of stock market. *Actual Problems of Economics*, *139*(1), 14–19. https://www.scopus.com/inward/record.uri?eid=2-s2.0-84930006475&partnerID=40&md5=2d408cb3a6052816bb325aa891acff7d

Engle, R. F., & Granger, C. W. J. (1987). Co-Integration and Error Correction: Representation, Estimation, and Testing. *Econometrica*, *55*(2), 251–276.

Fonseka, M., & Farooque, O. Al. (2024). Banking efficiency, ownership types, and operations: A quasi-natural experiment of conventional and Islamic banks. *The Quarterly Review of Economics and Finance*, *97*, 101882. https://doi.org/10.1016/J.QREF.2024.101882

Haddou, S., & Boughrara, A. (2025). How diversification shapes full-fledged Islamic bank Stability? A causal inference approach. *International Review of Economics & Finance*, *102*, 104367. https://doi.org/10.1016/J.IREF.2025.104367

Hassan, M. K., Kazak, H., Adıgüzel, U., Gunduz, M. A., & Akcan, A. T. (2023). Convergence in Islamic financial development: Evidence from Islamic countries using the Fourier panel KPSS stationarity test. *Borsa Istanbul Review*, *23*(6), 1289–1302. https://doi.org/10.1016/j.bir.2023.09.006

Hassler, U. (2006). A note on Phillips-Perron-type statistics for cointegration testing. *Economics Bulletin*, *3*(1). https://www.scopus.com/pages/publications/84892849910?origin=resultslist

In, F., Kim, S., Yoon, J. H., & Viney, C. (2001). Dynamic interdependence and volatility transmission of Asian stock markets: Evidence from the Asian crisis. *International Review of Financial Analysis*, *10*(1), 87–96. https://doi.org/10.1016/S1057-5219(00)00045-4

Ivancio, S. C., Isabellini, E., Adhi, C. G. S., & Prasetyo, A. (2024). Multivariate stock market forecasting using lstm on Indonesian banking stock market. *Procedia Computer Science*, *245*, 1047–1056.

Johansen, S. (1988). Statistical analysis of cointegration vectors. *Journal of Economic Dynamics and Control*, *12*(2–3), 231–254.

Juselius, K. (1990). MAXIMUM LIKELIHOOD ESTIMATION AND INFERENCE ON COINTEGRATION--WITH APPLICATIONS TO THE DEMAND FOR MONEY. *Oxford Bulletin of Economics & Statistics*, *52*(2).

Krämer, W. (1998). Fractional integration and the augmented Dickey-Fuller Test. *Economics Letters*, *61*(3), 269–272. https://doi.org/10.1016/s0165-1765(98)00194-3

Leachman, L. L., Francis, B., & Marcott, I. (1994). Implications for national equity market comovements: An application of the engle-granger two-step procedure. *Studies in Economics and Finance*, *15*(2), 31–59. https://doi.org/10.1108/eb028712

Luintel, K. B., & Khan, M. (1999). A quantitative reassessment of the finance–growth nexus: evidence from a multivariate VAR. *Journal of Development Economics*, *60*(2), 381–405.

Marfatia, H. A. (2017). A fresh look at integration of risks in the international stock markets: A wavelet approach. *Review of Financial Economics*, *34*, 33–49.

Masih, M., Al-Elg, A., & Madani, H. (2009). Causality between financial development and economic growth: an application of vector error correction and variance decomposition methods to Saudi Arabia. *Applied Economics*, *41*(13), 1691–1699.

Muteba Mwamba, J. W., Hammoudeh, S., & Gupta, R. (2017). Financial tail risks in conventional and Islamic stock markets: A comparative analysis. *Pacific Basin Finance Journal*, *42*. https://doi.org/10.1016/j.pacfin.2016.01.003

Nastiti, N. D., & Kasri, R. A. (2019). The role of banking regulation in the development of Islamic banking financing in Indonesia. *International Journal of Islamic and Middle Eastern Finance and Management*, *12*(5), 643–662. https://doi.org/10.1108/IMEFM-10-2018-0365

Nazlioglu, S., Pazarci, S., Kar, A., & Varol, O. (2024). Efficient market hypothesis in emerging stock markets: gradual shifts and common factors in panel data. *Applied Economics Letters*, *31*(18), 1773–1779. https://doi.org/10.1080/13504851.2023.2206613

Newey, W. K., & West, K. D. (1987). A SIMPLE, POSITIVE SEMI-DEFINITE, HETEROSKEDASTICITY AND AUTOCORRELATION CONSISTENT COVARIANCE MATRIX. *Econometrica (1986-1998)*, *55*(3), 703.

Nguyen, M., Skully, M., & Perera, S. (2012). Bank market power and revenue diversification: Evidence from selected ASEAN countries. *Journal of Asian Economics*, *23*(6), 688–700.

Rothe, C., & Sibbertsen, P. (2006). Phillips-Perron-type unit root tests in the nonlinear ESTAR framework. *Allgemeines Statistisches Archiv*, *90*(3), 439–456. https://doi.org/10.1007/s10182-006-0244-y

Saâdaoui, F. (2018). Testing for multifractality of Islamic stock markets. *Physica A: Statistical Mechanics and Its Applications*, *496*, 263–273. https://doi.org/10.1016/j.physa.2017.12.118

Santosa, P. W. (2020). The moderating role of firm size on financial characteristics and islamic firm value at indonesian equity market. *Business: Theory and Practice*, *21*(1), 391–401. https://doi.org/10.3846/btp.2020.12197

Sephton, P. S. (1995). Response surface estimates of the KPSS stationarity test. *Economics Letters*, *47*(3–4), 255–261. https://doi.org/10.1016/0165-1765(94)00561-F

Shan, J. (2005). Does financial development 'lead'economic growth? A vector auto-regression appraisal. *Applied Economics*, *37*(12), 1353–1367.

Soedarmono, W., Hasan, I., & Arsyad, N. (2017). Non-linearity in the finance-growth nexus: Evidence from Indonesia. *International Economics*, *150*, 19–35. https://doi.org/https://doi.org/10.1016/j.inteco.2016.11.003

Soedarmono, W., & Yusgiantoro, I. (2023). Islamic bank procyclicality in an emerging market economy: Do bank size and financing contracts matter? *The Quarterly Review of Economics and Finance*, 92, 132–141. https://doi.org/10.1016/J.QREF.2023.09.003

Tasca, P., Battiston, S., & Deghi, A. (2017). Portfolio diversification and systemic risk in interbank networks. *Journal of Economic Dynamics and Control*, *82*, 96–124. https://doi.org/https://doi.org/10.1016/j.jedc.2017.01.013

Utari, K. K., Septiyana, Y., Asnaini, A., & Elwardah, K. (2022). Efisiensi Keputusan Merger Tiga Bank Syariah di Indonesia pada Masa Pandemi Covid-19 (Studi di BSI Kc Bengkulu Panorama). *EKOMBIS REVIEW: Jurnal Ilmiah Ekonomi Dan Bisnis*, *10*(1), 311–324.

Warninda, T. D., Ekaputra, I. A., & Rokhim, R. (2019). Do Mudarabah and Musharakah financing impact Islamic Bank credit risk differently? *Research in International Business and Finance*, *49*, 166–175. https://doi.org/10.1016/J.RIBAF.2019.03.002

Yousaf, I., & Alokla, J. (2023). Herding behaviour in the Islamic bank market: evidence from the Gulf region. *Review of Behavioral Finance*, *15*(5), 617–633. https://doi.org/10.1108/RBF-02-2021-0018