

**FINANCIAL MARKET FRICTION AND STOCK MARKET PERFORMANCE
IN SOUTH AFRICA**

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**BEING A RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT OF
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DECLARATION

I, **Benita Ofure IKPEFUA** with mat no: **MGS2104747** declare that this project submitted to the Department of Finance, Faculty of Management Sciences, University of Benin, Benin City, under the supervision of DR. O. Osifo is based on a study undertaken by me. This work has not been previously submitted for the award of degree elsewhere. All ideas and views are product of my personal research and all the references made to works of other persons have been duly acknowledged.

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CERTIFICATION

This is to certify that this research project was carried out by **Benita Ofure IKPEFUA** with matriculation number **MGS2104747** in the Department of Finance, Faculty of Management Sciences, University of Benin, Benin City, in Edo State.

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DEDICATION

This project is dedicated to the Almighty God for the grace He bestowed upon me all through my study in the University of Benin and to my beloved parents.

ACKNOWLEDGEMENT

My sincere appreciation goes to Almighty God who has ordered my steps throughout my tertiary education pursuit in the University of Benin. I will forever be grateful in you, Lord. I want to express my deepest appreciation to my project supervisor, **Dr. O. Osifo** for his efforts and wonderful contribution towards the success of this project. I am really grateful sir.

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Abstract

This study investigates the impact of financial market frictions on stock market performance in South Africa over the period 1990 to 2024. Using annual time series data sourced from the South African Reserve Bank, Statistics South Africa, the Johannesburg Stock Exchange, and the World Bank, the study employs the Autoregressive Distributed Lag (ARDL) model to examine both short-run and long-run relationships between market capitalisation and key financial frictions: transaction costs, liquidity constraints, information asymmetry, and regulatory quality. The findings reveal that transaction costs have a statistically significant and positive effect on stock market performance in the short run, suggesting investor adjustment mechanisms, but no significant long-term effect. Liquidity constraints negatively affect market performance in the short term but become insignificant over time, indicating temporary disruptions. Information asymmetry is found to significantly reduce market capitalisation in both timeframes, highlighting the importance of transparency and disclosure. Regulatory quality, however, shows no statistically significant impact, pointing to potential inefficiencies or limitations in the existing regulatory framework. The study concludes that financial frictions, particularly information asymmetry and liquidity constraints, remain critical barriers to optimal stock market performance in South Africa. It is recommended that policymakers streamline transaction cost structures, enhance market liquidity, strengthen disclosure and governance frameworks, and improve regulatory coherence to foster a more efficient and resilient capital market.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Financial markets form the backbone of modern economies because they channel savings into productive investments, provide businesses with access to capital, and give investors opportunities to diversify risk (Levine, 1997; Bekaert & Harvey, 2003). Within this framework, the stock market holds a particularly central role. It not only enables firms to raise long-term funds but also serves as a mechanism for price discovery, liquidity provision, and improved corporate governance. When stock markets function effectively, they stimulate innovation, strengthen institutions, and contribute to economic growth (Demirgüç-Kunt & Maksimovic, 1998).

In practice, however, financial markets rarely operate without challenges. They are often constrained by frictions, barriers that prevent the smooth flow of capital between savers and borrowers. These frictions may appear as high trading costs, lack of transparency, information gaps, liquidity shortages, weak institutional frameworks, or even regulatory bottlenecks (Stiglitz, 1989; Holmström & Tirole, 1997). Their presence makes markets less efficient, reduces investor participation, and increases volatility (Allen & Gale, 2004).

While advanced economies have managed to ease some of these challenges through financial reforms and technological innovations, emerging economies still struggle. South Africa, for instance, despite having the most sophisticated and largest stock exchange in

Africa, it continues to face concerns around trading costs, limited liquidity in smaller firms, and vulnerability to global market shocks (Mlambo & Biekpe, 2007; Yartey & Adjasi, 2007). These issues matter greatly because they influence not only the confidence of local investors but also the willingness of foreign investors to participate.

In recent years, scholars have also emphasized the developmental role of financial markets in accelerating capital accumulation and improving the quality of investment (Roy & Madheswaran, 2020; Distia, 2023). The stock market, in particular, acts as a mirror of economic performance, reflecting investor sentiment and broader macroeconomic fundamentals. For a country like South Africa, understanding how market frictions shape stock market outcomes is essential in a global economy where competitiveness and integration matter more than ever.

1.2 Statement of the Problem

Despite its size and relative sophistication, the Johannesburg Stock Exchange (JSE) continues to experience financial frictions that limit its full potential. Transaction costs remain relatively high, discouraging active participation from retail investors (Mlambo & Biekpe, 2007). Liquidity challenges are another concern, as trading tends to be concentrated in a handful of large companies, leaving smaller firms with limited activity and weaker price discovery (Bekaert, Harvey & Lundblad, 2007). This imbalance reduces opportunities for diversification and makes the market more vulnerable when dominant firms underperform.

Information asymmetry also poses risks by creating room for insider trading and speculative manipulation, which weakens transparency and erodes investor trust (Stiglitz & Weiss, 1981). Moreover, although South Africa benefits from a relatively advanced legal and institutional system, regulatory reforms often face delays, and oversight is not always strong enough to address market inefficiencies (La Porta et al., 1997). These institutional gaps can discourage investment, especially during periods of economic uncertainty.

On a broader level, the JSE's performance is tied closely to global investor sentiment. During times of international financial stress such as the global financial crisis of 2008 or the COVID-19 pandemic, south Africa has witnessed sharp capital outflows, steep declines in stock prices, and exchange rate volatility. Episodes of corruption and governance failures further damage investor perception and highlight the need for stronger regulatory enforcement.

Although several studies have highlighted the role of stock markets in economic growth (Levine & Zervos, 1998; Adjasi & Biekpe, 2006), few have directly examined how financial market frictions shape stock market performance in South Africa. This lack of context-specific evidence creates a research gap that this study intends to address.

1.3 Research Questions

From the research problem, the following questions emerged and they are;

How does stock market performance influence liquidity constraints in South Africa?

What are the impacts of transaction cost in stock market performance?

What are the effects of information asymmetry on stock market performance in South Africa?

How does regulatory quality influence stock market performance in South Africa?

1.4 Objectives of the Study

The broad aim of this research is to explore how financial market frictions affect stock market performance in South Africa.

The specific objectives are to:

Examine the influence of liquidity constraints on stock market performance in South Africa;

Investigate the effect of information asymmetry on stock market performance in South Africa;

Access the impact of transaction cost on stock market performance in South Africa; and

Determine the influence of regulatory quality on stock market performance in South Africa.

1.5 Research Hypotheses

The following null hypotheses will be tested:

H₀₁: Liquidity constraints do not significantly affect stock market performance in South Africa.

H₀₂: Information asymmetry has no significant effect on stock market performance in South Africa.

H₀₃: Transaction cost has no significant impact on stock market performance in South Africa.

H₀₄: Regulatory quality has no significant impact on stock market performance in South Africa.

1.6 Scope of the Study

The research focuses on the relationship between financial market frictions, specifically transaction costs, liquidity constraints, information asymmetry, regulatory quality and stock market performance in South Africa. The Johannesburg Stock Exchange (JSE) is the primary focus since it is the country's leading equity market and the largest in sub-Saharan Africa.

The study covers a 35-year period from 1990 to 2024, a timeframe that captures several important phases of reform and transition. These include the demutualization of the JSE in 2005, the adoption of electronic trading systems in the late 2000s, and regulatory changes that shaped trading activity and transparency. The chosen period also spans key global and domestic shocks, such as the 1998 emerging market crisis, the 2008 global financial crisis, the COVID-19 pandemic, and recent post-pandemic adjustments. This wide coverage allows for both short-term and long-term perspectives on how frictions interact with market performance.

1.7 Significance of the Study

This study is valuable to several groups:

Policymakers and Regulators: Findings from the study will provide evidence-based insights for institutions such as the Johannesburg Stock Exchange (JSE), the Financial Sector Conduct Authority (FSCA), and the South African Reserve Bank (SARB). The results can help refine policies aimed at lowering trading costs, boosting liquidity, and improving oversight. A more efficient market will also strengthen South Africa's position as a destination for foreign investment.

Academics and Researchers: The research will contribute to the growing body of literature on financial market frictions in emerging economies, particularly within the African context where such studies are still limited (Okeahalam, 2001; Yartey & Adjasi, 2007).

Investors: Both local and international investors will gain a clearer understanding of how inefficiencies in the South African market affect returns and risks. Such knowledge can guide their portfolio strategies, risk management decisions, and timing of investments.

The Economy at Large: By proposing ways to improve the performance of the JSE, the study indirectly supports economic growth. Stronger capital markets enhance financial inclusion, encourage entrepreneurship, and provide governments and firms with better access to long-term financing (Levine & Zervos, 1998).

1.8 Limitations of the Study

Like any research, this study faces some limitations. First, it relies mainly on secondary data, meaning the results are only as reliable as the quality of the datasets obtained from institutions such as the JSE, the FSCA, the South African Reserve Bank, and the World Bank. Variations in data collection methods over the years could affect consistency.

Second, while the study emphasizes transaction costs, liquidity, and information asymmetry, financial market frictions are complex and may also include behavioral biases, political risks, and technological disruptions, which are beyond the scope of this work.

Third, since the focus is specifically on South Africa, the findings may not fully apply to other emerging economies with different institutional setups. Lastly, stock market performance is measured using indicators such as returns, liquidity, and volatility, which, while useful, do not always capture less tangible aspects like investor sentiment and market confidence.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter is organized into three primary sections: the conceptual review, the theoretical review, and the empirical review. The conceptual review offers an in-depth analysis and clarification of the central concepts and constructs pertinent to the study's subject matter. The theoretical review examines key theories that provide foundational insights and explanatory frameworks relevant to the research theme. The empirical review assesses existing scholarly studies and findings that relate directly to the current investigation. The chapter concludes by identifying the gaps present in the extant literature.

2.2 Conceptual Review

2.2.1 Stock Market Performance

Stock market performance encompasses the overall effectiveness with which a capital market fulfills its primary roles in an economy, namely mobilizing savings, facilitating investment, and ensuring efficient capital allocation. As defined by Sami and Abdallah (2021), it reflects the equity market's capacity to support economic development by channeling funds to productive enterprises, accurately pricing financial instruments, and maintaining fair and orderly trading conditions. The concept transcends traditional metrics of investment returns to embrace broader indicators of functionality, such as

liquidity provision, pricing efficiency, investor protection, regulatory integrity, and the market's resilience to systemic shocks (Silvia, 2021; Makaridze, 2021).

In a well-functioning stock market, high levels of liquidity are evidenced by narrow bid-ask spreads and deep trading volumes, while price stability is maintained through strong market infrastructure and responsive information dissemination mechanisms. These attributes collectively engender investor confidence, reduce transaction costs, and encourage long-term participation (Zaimovic, Omanovic & Arnaut-Berilo, 2021). Furthermore, efficient market performance is often underpinned by strong legal and institutional frameworks, robust corporate governance practices, and the capacity of the market to swiftly integrate new information into asset prices. This principle is central to the Efficient Market Hypothesis (EMH), as articulated by Goldstein (2023).

Importantly, stock market performance is shaped by a confluence of structural, behavioural, and regulatory determinants. Structurally, it is affected by the degree of market development, the presence of institutional investors, and the sophistication of financial instruments. Behavioural elements such as investor psychology, market sentiment, and herding behaviour also influence market efficiency and volatility (Putri & Tanno, 2024). Regulatory aspects, including disclosure requirements, accounting standards, and enforcement mechanisms, play a critical role in ensuring transparency, reducing information asymmetry, and safeguarding investor interests. In this regard, regulatory coherence and judicial efficiency are especially crucial in emerging markets

where institutional fragilities are often more pronounced (Zaimovic, Omanovic & Arnaut-Berilo, 2021).

In economies such as South Africa stock market performance must be examined within the broader context of institutional development, macroeconomic stability, and policy consistency. Persistent challenges such as inadequate investor protection, erratic monetary and fiscal policies, low financial literacy, and limited technological infrastructure can severely impede the ability of the market to perform its allocative and informational functions effectively (Aharon, 2023; Sukoco, 2024). For example, low informational transparency and regulatory unpredictability can lead to increased risk premiums, capital flight, and reduced market participation, thereby constraining the role of the stock market in economic transformation.

Consequently, evaluating stock market performance requires a multidimensional approach that considers not only quantitative measures such as returns and volatility but also qualitative dimensions like market governance, investor confidence, and institutional quality. This holistic perspective allows for a more accurate assessment of the extent to which a stock market contributes to financial stability, economic growth, and sustainable investment. As El Afari, El Khamlichi, El Mrini, and Ez-Zetouni (2024) suggest, an optimal stock market environment is characterized by regulatory robustness, transparency, active participation, and minimal inefficiencies unrelated to fundamental information. In sum, stock market performance serves as a vital indicator of a nation's

financial architecture and its ability to support inclusive and long-term economic development.

2.2.2 Measures of Stock Market Performance

Measuring stock market performance is a complex and multidimensional exercise that transcends simple tracking of stock returns or index values. It involves evaluating the extent to which a capital market performs its essential roles in mobilizing savings, facilitating efficient capital allocation, enabling effective price discovery, managing risk, and promoting economic development. A sound assessment of stock market performance requires a composite approach, integrating structural, operational, and informational dimensions of the market. As Sami and Abdallah (2021) and Silvia (2021) emphasize, the performance of a stock market must reflect its capacity to support broader economic and financial system stability, not just investor returns.

Performance indicators help to quantify these broader roles by offering empirical evidence on how well a market functions in practice. The most widely employed indicators in financial literature include market indices, market capitalization, liquidity, and volatility. Each of these metrics provides unique insights into different aspects of market behavior and institutional strength, and together they form the foundation for evaluating the functionality and developmental role of stock markets (Zaimovic, Omanovic & Arnaut-Berilo, 2021; Putri & Tanno, 2024).

2.2.2.1 Market Indices

Stock market indices, such as the All Share Index (ASI), serve as essential barometers of general market sentiment and investor confidence. These indices track the performance of a basket of publicly listed companies, offering a consolidated view of price movements across the market. As Zaimi (2022) notes, the ASI encapsulates the average price behavior of equities and serves as a reference point for benchmarking investment portfolios, evaluating monetary policy impact, and predicting macroeconomic trends.

An efficient and representative index reflects timely adjustments to new economic and financial information, embodying the principles of the Efficient Market Hypothesis (EMH) (Goldstein, 2023). When an index responds proportionally and promptly to relevant macroeconomic signals, it signals high levels of information efficiency and investor responsiveness. Conversely, lagged or exaggerated index movements may suggest information asymmetry, market manipulation, or low transparency. Thus, stock market indices not only quantify returns but also reflect the extent of market rationality and integration with the real economy (Thomas, Onakoya & Phillip, 2023).

2.2.2.2 Market Capitalization

Market capitalization, defined as the total market value of all listed equities, is a fundamental measure of the size, maturity, and investment potential of a stock market. According to Soumaré, Kanga, Tyson, and Raga (2021), a larger market capitalization indicates a more developed equity market, capable of supporting broader financing needs across sectors. This measure becomes even more meaningful when evaluated relative to

GDP, as it provides insights into the scale of financial intermediation in the broader economy.

Kuvshinov and Zimmermann (2022) highlight that countries with high market capitalization-to-GDP ratios generally experience greater capital formation, stronger financial sector inclusion, and more robust economic diversification. In such contexts, stock markets serve not merely as speculative arenas but as crucial platforms for long-term investment, corporate financing, and economic modernization. For instance, emerging markets with sustained growth in capitalization are often characterized by improvements in regulatory quality, investor protection, and macroeconomic policy coordination (Aharon, 2023; Sukoco, 2024).

Moreover, market capitalization provides a stable and aggregate measure suitable for longitudinal comparisons and cross-country benchmarking. It captures not only price movements but also structural market trends such as new listings, equity issuance, and investor base expansion. In this way, it serves as a proxy for the institutional depth and financial resilience of a stock exchange (Zaimovic et al., 2021).

2.2.2.3 Liquidity

Liquidity represents the market's ability to accommodate large buy and sell orders with minimal impact on asset prices. High liquidity is fundamental for the effective operation of stock markets, as it lowers transaction costs, enhances price stability, and allows investors to enter and exit positions with ease. According to Yahaya, John, Adegroye, and Olorunfemi (2023), liquid markets are more attractive to domestic and foreign

investors alike, since they reduce the risk of being unable to execute trades in a timely manner.

Liquidity is commonly measured using turnover ratios (value of shares traded relative to market capitalization), average daily trading volume, and bid-ask spreads. Higher turnover indicates more frequent trading, greater investor participation, and stronger market dynamism. Furthermore, as Rushdy and Samak (2025) argue, liquidity supports price discovery by ensuring that information is incorporated into stock prices efficiently and quickly, thereby reducing mispricing and speculative distortions.

Liquidity also contributes to the absorptive capacity of the market. In periods of economic or financial stress, liquid markets are better positioned to manage capital outflows, correct valuation anomalies, and prevent panic-driven declines. As El Afari et al. (2024) note, the presence of liquidity reflects both market maturity and the effectiveness of institutional frameworks that facilitate fair and transparent trading.

2.2.2.4 Volatility

Volatility measures the degree of price fluctuations in the market over a given period and is a critical indicator of risk, investor sentiment, and responsiveness to macroeconomic information. While some level of volatility is inherent and even necessary for price discovery, excessive or unpredictable volatility often signals underlying market inefficiencies or structural weaknesses. Volatility is typically assessed through standard deviation of returns, beta coefficients, or value-at-risk models.

According to Munir, Akram, and Abbas (2024), volatility that correlates with economic fundamentals and policy shifts can be considered healthy, as it indicates that the market is absorbing and adjusting to new information. However, in the absence of credible information, high volatility may reflect speculative behavior, regulatory uncertainty, or manipulation. Wu et al. (2022) further emphasize that unmanaged volatility can deter long-term investment, increase risk premiums, and reduce market participation, particularly in emerging markets where institutional protections are weaker.

Volatility, when interpreted alongside other indicators such as liquidity and capitalization, provides a comprehensive picture of market dynamics. It reveals not only the level of investor uncertainty but also the quality of the market's response to real economic events.

However, given the multidimensional nature of stock market performance, this study adopts both the All Share Index (ASI) and Market Capitalization (MCAP) as complementary indicators for evaluating market performance. The choice to utilize these two measures is rooted in their empirical robustness, theoretical relevance, and ability to jointly capture both dynamic and structural aspects of the equity market.

2.2.3 Structure of the Stock Market

The structure of the stock market refers to the organizational framework, institutional components, and regulatory mechanisms that collectively facilitate the trading, clearing, and settlement of equity securities. It encompasses the physical and institutional architecture through which capital is mobilized, ownership is transferred, and information

is disseminated in an orderly, transparent, and efficient manner. A well-structured stock market is fundamental for capital allocation, corporate governance, and long-term economic growth, especially in both developed and emerging economies (Makaridze, 2021; Sami & Abdallah, 2021).

The structure of the stock market can be broadly analyzed through several interrelated components: market segmentation, trading platforms, market participants, regulatory bodies, and support infrastructure. These components interact dynamically to ensure liquidity, transparency, and systemic integrity.

2.2.3.1 Market Segmentation

At its core, the stock market is divided into two major segments: the primary market and the secondary market.

The primary market is where newly issued securities are sold for the first time, enabling companies to raise fresh capital for investment and expansion. Through Initial Public Offerings (IPOs) and rights issues, firms can access long-term financing while offering investors ownership stakes. This segment plays a critical role in capital formation and economic development. As noted by Soumaré, Kanga, Tyson, and Raga (2021), well-functioning primary markets are essential for attracting domestic and foreign investment and deepening financial inclusion.

The secondary market, in contrast, facilitates the trading of previously issued securities among investors. This market ensures liquidity and enables price discovery, as the continuous buying and selling of shares reflects collective investor sentiment and

available information. Zaimovic, Omanovic, and Arnaut-Berilo (2021) argue that an active secondary market enhances the attractiveness of the primary market by providing exit opportunities and marketability for investors.S

2.2.3.2 Trading Platforms

Stock trading may occur through centralized exchanges or over-the-counter (OTC) platforms. Centralized exchanges such as the Johannesburg Stock Exchange (JSE), the New York Stock Exchange (NYSE), or the London Stock Exchange (LSE) operate as formal marketplaces governed by standardized rules and listing requirements. These exchanges enhance transparency, reduce transaction costs, and support regulatory oversight. According to El Afari, El Khamlichi, El Mrini, and Ez-Zetouni (2024), centralized exchanges provide a stable institutional environment for trade execution and market surveillance.

Alternatively, OTC markets involve decentralized trading between parties without the intermediation of a formal exchange. OTC platforms may offer greater flexibility, especially for smaller or less liquid securities, but they often involve higher counterparty risk and lower regulatory scrutiny. While OTC markets can promote financial innovation, they may also pose systemic risks if left unregulated, as witnessed during the 2008 global financial crisis (Goldstein, 2023).

2.2.3.3 Market Participants

A diverse range of actors participates in the stock market ecosystem, including retail and institutional investors, issuers (corporations), and financial intermediaries such as brokers, dealers, and investment banks.

Retail investors are individuals trading on their own account, often influenced by market sentiment, financial literacy, and behavioural biases.

Institutional investors, such as pension funds, mutual funds, and insurance companies, typically engage in larger and more sophisticated transactions and contribute to market stability and efficiency through long-term strategies (Putri & Tanno, 2024).

Issuers such as public companies and, in some cases, governments provide the securities that populate the market. Their disclosures, governance practices, and financial health influence market integrity and investor trust.

Intermediaries facilitate transactions, provide liquidity, and bridge informational gaps. The role of intermediaries is especially critical in emerging markets, where informational asymmetries are prevalent, and investor protection frameworks are still evolving (Aharon, 2023; Sukoco, 2024).

2.2.3.4 Regulatory Bodies

Effective market regulation ensures transparency, reduces systemic risk, and promotes investor confidence. Stock markets are typically regulated by securities and exchange commissions or equivalent national regulatory authorities. These bodies enforce rules on disclosure, insider trading, market manipulation, and corporate governance.

For example, in South Africa, the Financial Sector Conduct Authority (FSCA) oversees the operations of the capital market, working in conjunction with the Johannesburg Stock Exchange (JSE) and the Central Securities Depository, Strate Ltd. As Silvia (2021) explains, strong regulatory oversight enhances market efficiency and prevents malpractices that may undermine investor trust.

Moreover, regulatory bodies also set prudential requirements for market intermediaries and engage in financial education programs to improve investor awareness. According to Sami and Abdallah (2021), the credibility of the regulatory environment is a key determinant of market performance, especially in countries where rule of law and institutional capacity may be weak.

2.2.3.5 Market Infrastructure

Modern stock markets rely on robust technological and institutional infrastructure to ensure secure and timely transaction processing. Clearing and settlement systems, such as Central Securities Depositories (CSDs), facilitate the post-trade process by ensuring that securities and funds are exchanged efficiently. Efficient settlement mechanisms reduce counterparty risk and support market integrity.

Additionally, the integration of electronic trading platforms and real-time data systems has revolutionized market operations. Automated trading improves execution speed, enhances transparency, and reduces operational inefficiencies. According to Rushdy and Samak (2025), technological advancements such as algorithmic trading and blockchain-based settlement systems are reshaping the architecture of modern equity markets.

However, technological progress also introduces new challenges, such as cybersecurity threats and flash crashes, which demand adaptive regulatory responses and continuous infrastructure upgrades.

2.2.4 Financial Market Friction

Financial market frictions broadly refer to the array of constraints, distortions, and inefficiencies that impair the smooth operation of capital markets and hinder the effective allocation of financial resources across the economy. These frictions stand in contrast to the assumptions of the Efficient Market Hypothesis (EMH), which posits that asset prices fully and instantaneously reflect all available information and that markets operate without transaction costs or informational delays (Hapnes, 2021). In reality, however, financial markets are shaped by complex institutional, structural, and behavioural conditions that deviate markedly from the idealized frictionless models presented in neoclassical finance theory. Financial frictions can arise from numerous sources. Some originate in the cost structures of trading and intermediation, while others emerge from deeper informational, regulatory, and governance-related asymmetries (Hasan et al., 2023). For instance, transaction costs, including brokerage commissions, taxes, and settlement fees, create economic barriers to frequent trading and efficient portfolio adjustment, particularly for retail investors operating in less sophisticated markets.

Beyond transactional barriers, the more pervasive and disruptive frictions often stem from information imperfections. In many markets, investors do not have equal access to relevant, timely, or reliable information, which distorts risk assessments and valuation

decisions. This asymmetry gives rise to phenomena such as adverse selection and moral hazard. In such contexts, less-informed participants face disproportionate risks, while better-informed agents may take advantage of opaque environments to exploit arbitrage or engage in strategic misrepresentation (Otchere, 2023; Aharon, 2023). These dynamics not only undermine investor confidence but also weaken the credibility of price signals, thereby impeding the market's ability to efficiently allocate capital. Moreover, liquidity-related frictions further complicate market functioning, as limited market depth, inconsistent trading activity, and wide bid-ask spreads prevent investors from executing transactions smoothly. The absence of sufficient liquidity makes markets more vulnerable to volatility and discourages long-term participation, particularly by institutional investors who require stable and predictable exit opportunities (Aldridge & Zhao, 2025). Equally important are governance and institutional frictions, which arise from ambiguous or weakly enforced regulatory frameworks, inadequate legal protections for investors, and bureaucratic inefficiencies in listing, disclosure, and compliance processes. These governance constraints diminish trust in the financial system, making capital markets less attractive for both domestic and foreign investors (Morelli, 2023). In developing economies, where regulatory institutions are often under-resourced and policy implementation is inconsistent, such frictions are more pronounced and persistent. Financial market infrastructures, including clearing and settlement systems, may lack the technological and operational resilience to support efficient and secure transactions. This increases operational risk and delays capital flows.

The cumulative impact of these frictions is a market environment where capital is misallocated, risks are under- or over-priced, and investor participation remains narrow and uneven. In such settings, the theoretical benefits of stock markets, including effective price discovery, risk sharing, and productive investment, are only partially realized, if at all. Kaboski (2023) underscores that these frictions offer a compelling explanation for the persistent gap between financial theory and observed market outcomes, particularly in emerging and frontier markets where institutional development is still in progress. Moreover, financial frictions have broader macroeconomic implications, as they can amplify financial cycles, constrain credit access, and reduce the efficiency of monetary policy transmission. For these reasons, addressing financial market frictions is essential for fostering deeper and more resilient capital markets that can support inclusive economic growth, improve financial intermediation, and enhance the overall stability of the financial system.

2.2.4.1 Liquidity Constraints

Liquidity constraints refer to the limitations in a financial market's ability to accommodate large-volume transactions without causing significant price volatility or incurring excessive transaction costs. These constraints manifest in various forms, including low trading volumes, limited market depth, sparse investor participation, and restricted access to market-making mechanisms (Brunnermeier & Pedersen, 2009). In essence, liquidity is not merely about the frequency of trades but about the capacity of a market to absorb trades efficiently, without causing price distortions or delays in

execution. When liquidity is constrained, even marginal transactions can lead to substantial price fluctuations, thereby increasing market volatility and deterring participation.

In emerging markets such as South Africa, structural and institutional factors often exacerbate these liquidity constraints. These include concentrated ownership structures, limited institutional investor bases, weak financial intermediation, and regulatory inefficiencies (Yartey & Adjasi, 2007; Akerlof & Schiller, 2015). Moreover, insufficient transparency, delayed financial disclosures, and inconsistent enforcement of corporate governance standards can reduce investor confidence, further constraining liquidity. According to He et al. (2025), such constraints also elevate operational risks and transaction costs particularly in post-trade processes such as clearing and settlement which in turn discourage market participation and reduce turnover ratios.

Liquidity constraints in South Africa's equity markets are also shaped by the dominance of a few highly liquid stocks, such as those listed in the Top 40 index, while a significant portion of the broader market remains thinly traded. This segmentation reinforces illiquidity among small- and mid-cap stocks, which struggle to attract institutional attention or benefit from active market-making (Zingales, 2017). Furthermore, cross-border capital flow restrictions and macroeconomic uncertainties, including exchange rate volatility and interest rate fluctuations, contribute to episodic liquidity shortages.

The implications of persistent liquidity constraints are far-reaching. They impair the efficiency of price discovery, increase the cost of capital, and may ultimately deter

foreign and domestic investment. Su and Tokmakcioglu (2021) emphasize that without sufficient liquidity, even well-functioning markets cannot transmit information effectively, thereby weakening the allocative function of capital markets. Thus, enhancing liquidity through regulatory reform, infrastructure modernization, and broader market participation remains a strategic imperative for policymakers aiming to foster resilient and inclusive financial systems in South Africa.

2.2.4.2 Transaction Costs

Transaction costs, defined as the total expenses incurred during the execution of financial trades, represent a critical determinant of investor behavior and market efficiency. These costs encompass both direct charges such as brokerage commissions, regulatory levies, and taxes, as well as indirect costs arising from market impact and price slippage during trade execution (Egloff et al., 2025). The magnitude of these costs significantly influences investment strategies, particularly by affecting net returns and discouraging high-frequency trading or regular portfolio rebalancing. According to Hindersland (2024), the presence of high transaction costs can lead to investor inertia, whereby market participants delay or avoid trade execution to minimize expenses, even when market conditions warrant adjustment. Over time, such frictions can result in price distortions, reduced market depth, and inefficiencies in asset allocation. Transaction costs also affect the elasticity of capital markets in response to new information, since costly trading may delay price adjustments and hinder the speed of information incorporation into asset valuations.

In developing and emerging market contexts, the burden of transaction costs is often more severe, due to infrastructural deficits, underdeveloped trading platforms, and limited regulatory competition (Morrison, 2022). These constraints tend to amplify the costs of participation, especially for retail investors and smaller institutional players who may lack access to sophisticated trading technologies or preferential fee structures. Fohlin (2023) notes that elevated costs in such settings often depress overall trading volumes and restrict the participation of broader segments of the population, thereby limiting financial inclusion and weakening market liquidity. Moreover, where regulatory inefficiencies persist, transaction costs may reflect not only operational expenses but also systemic inefficiencies, including bureaucratic delays and redundant compliance requirements. In this way, transaction costs function as a fundamental institutional friction that impairs the allocative efficiency of capital markets. They distort investor incentives, reduce the capacity for timely and informed trading, and ultimately weaken the financial system's role in supporting inclusive and productive economic growth. Addressing the structural sources of transaction costs through improved infrastructure, regulatory modernization, and market integration is therefore essential for enhancing the transparency, competitiveness, and developmental potential of financial markets globally.

2.2.4.3 Information Asymmetry

Information asymmetry occurs when certain market participants possess more accurate or timely information than others, leading to imbalances in decision-making and reduced market efficiency. In well-functioning capital markets, asset prices are expected to reflect

all publicly available information; however, when informational gaps persist, prices tend to deviate from intrinsic values. As Agustina, Sadikin, and Ferdinata (2025) note, such disparities often hinder accurate price discovery, elevate risk perceptions, and reduce the effectiveness of capital allocation mechanisms. In environments characterized by weak transparency, uneven access to corporate disclosures, and inconsistent regulatory enforcement, information asymmetry becomes a persistent structural challenge.

Emerging markets such as South Africa frequently exhibit elevated levels of information asymmetry due to a combination of institutional and infrastructural constraints. Imbern (2024) highlights that limited financial literacy, underdeveloped media coverage, and delayed dissemination of company performance data exacerbate the information divide between institutional and retail investors. This often results in a concentration of trading activity among informed agents while deterring wider market participation. Vidani (2024) emphasizes that under such conditions, investors may rely on speculation or heuristics rather than fundamental analysis, contributing to mispricing and heightened volatility. Moreover, the resulting uncertainty increases the risk premium demanded by investors, thereby raising the cost of capital for issuers and limiting market depth.

Information asymmetry also interacts with other market frictions, particularly low trading volumes and wide bid-ask spreads, to further impair market efficiency. As Ngene and Mungai (2022) observe, when reliable information is scarce, liquidity providers face higher adverse selection risks, which discourages active market-making and increases transaction costs. This self-reinforcing dynamic limits the ability of markets to absorb

shocks or facilitate smooth entry and exit for investors. Therefore, addressing information asymmetry through improved disclosure standards, real-time data access, and stronger regulatory frameworks is essential for enhancing investor confidence and promoting sustainable capital market development in South Africa.

2.2.4.4 Regulatory Quality Index

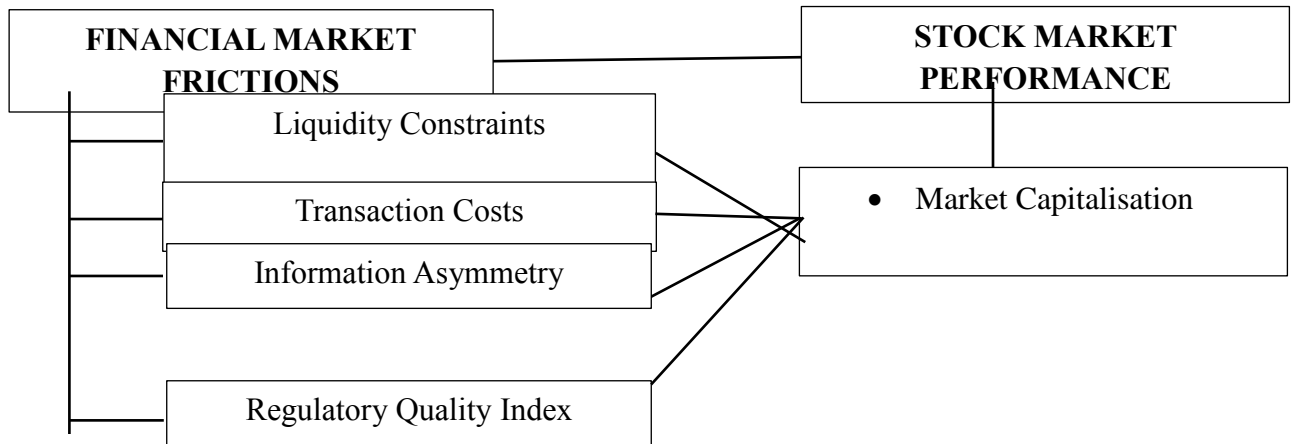
The regulatory quality index, as conceptualized by the World Bank's Worldwide Governance Indicators, serves as a critical proxy for assessing the institutional capacity of a government to formulate and implement sound policies that foster private sector development and support market-based economic systems (Abaidoo & Agyapong, 2023). Within the context of financial markets, regulatory quality encompasses the effectiveness, transparency, and consistency with which laws and rules are applied. A high regulatory quality score reflects a stable institutional environment where legal frameworks are clear, enforcement is predictable, and regulatory bodies operate with professional independence. This fosters a level playing field for all market participants, promotes contractual certainty, and supports the enforcement of property rights. As Al-Shebli and Alhajri (2024) highlight, such conditions are vital for maintaining the credibility of financial disclosures and preventing manipulative practices, thereby strengthening investor trust and enhancing the overall integrity of capital markets. By encouraging transparency and accountability, a robust regulatory environment mitigates information asymmetries and reduces systemic risks, ultimately contributing to greater market depth, efficiency, and resilience.

In contrast, poor regulatory quality undermines market confidence and inhibits capital formation by introducing institutional uncertainty, bureaucratic inefficiencies, and inconsistent policy enforcement. In such environments, opportunistic behavior is more likely to flourish, as investors face unclear rules, weak protection mechanisms, and limited recourse in the event of fraud or contractual disputes (Morelli, 2023). The negative implications are particularly acute in developing economies, where regulatory institutions are often under-resourced and vulnerable to political interference. As Alabdullah (2023) notes, weak regulatory frameworks deter both domestic and international investment, impair capital market functionality, and constrain long-term financial development. In these contexts, the regulatory quality index not only serves as a barometer of governance effectiveness but also as a determinant of financial market performance. Improvements in regulatory quality can lead to more active stock markets, higher levels of financial inclusion, and increased participation by institutional investors. Therefore, sustained efforts to enhance regulatory quality through legal reforms, capacity-building, and improved enforcement are essential for fostering trust, reducing risk premia, and enabling capital markets to fulfill their developmental potential.

2.3 Conceptual Framework

The conceptual framework illustrated in Figure 2.1 depicts the relationship among the study's independent variables (Liquidity constraints, transaction costs, information asymmetry, and regulatory quality index), and the dependent variable, stock market performance, measured using the market capitalization.

Figure 2.2 Conceptual Framework



Source: Researcher's conceptual framework (2025).

2.4 Theoretical Review

In examining this study's research focus, three theories offer essential insights: the Efficient Market Hypothesis (EMH), market microstructure theory, and the theory of asymmetric information.

2.4.1 Efficient Market Hypothesis (EMH)

The Efficient Market Hypothesis (EMH), originally formulated by Fama (1970), remains one of the foundational theories in modern financial economics. It posits that security prices fully reflect all available information, making it impossible for investors to consistently achieve abnormal returns through either technical analysis or fundamental valuation. EMH is structured into three forms: weak, semi-strong, and strong efficiency (Figure 2.3).

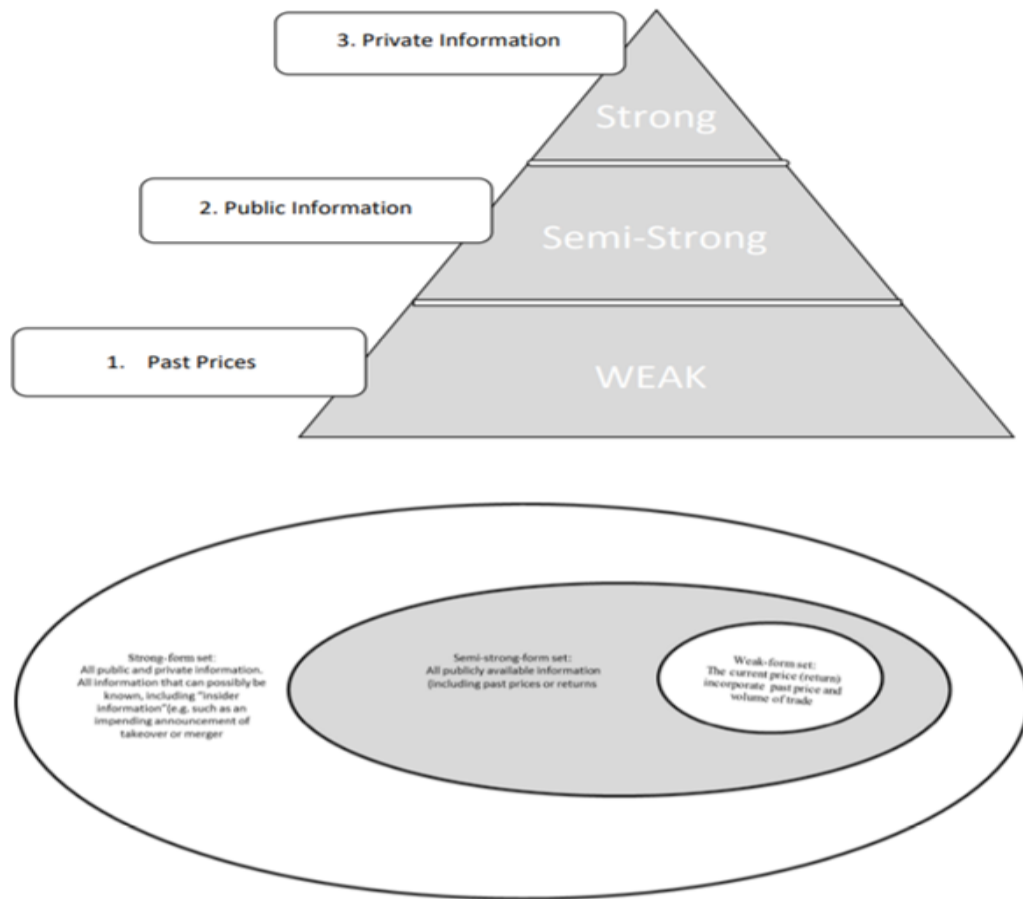


Figure 2.3: Distinct Market Efficiency Forms (Agbam, Essi & Dagogo, 2024)

The weak form asserts that current stock prices incorporate all past trading information such as historical prices and volumes. The semi-strong form expands this by asserting that all publicly available information is already reflected in stock prices, including earnings reports and macroeconomic data. The strong form goes further, suggesting that all information, public and private, is already embedded in market prices. Central to all three forms are key assumptions, including rational investor behavior, homogenous expectations, instantaneous information dissemination, and costless trading.

However, the real-world applicability of these assumptions is often challenged, particularly in emerging and developing markets. The empirical relevance of EMH has been widely questioned due to persistent structural and institutional inefficiencies. Several studies have documented anomalies inconsistent with even weak-form efficiency, such as serial correlation in returns, delayed reactions to corporate disclosures, and investor overreaction to market news (Mobarek & Keasey, 2000; Ntim, 2012; Hoque, 2014; Wang, Chen, & Huang, 2016). Lim and Brooks (2011) argue that such deviations often stem from poor market depth, low trading volumes, and inadequate regulatory enforcement. These inefficiencies are further aggravated by a lack of sophisticated institutional investors, the prevalence of noise trading, and infrastructural deficits that delay the processing and dissemination of market-relevant information. Consequently, asset prices in the Nigerian stock market often diverge from their fundamental values, limiting the reliability of market signals and undermining price discovery mechanisms. Moreover, the theory's assumption of frictionless markets is rarely observed in practice. Trading is often constrained by high transaction costs, significant bid-ask spreads, and limited liquidity, all of which create substantial barriers to efficient price formation. Financial frictions, such as information asymmetries, regulatory inconsistencies, and speculative behavior, further reduce market transparency and hinder rational price adjustments. Narayan, Ahmed, and Narayan (2015) suggest that these conditions weaken investor confidence and reduce participation, particularly from institutional and foreign investors. While EMH remains a critical theoretical benchmark for evaluating market

efficiency, its practical applicability is contingent upon a market's institutional maturity, regulatory framework, and technological infrastructure. In contexts like South Africa, EMH serves more as a diagnostic tool for identifying inefficiencies than as a description of market behavior. It underscores the need for targeted reforms aimed at improving transparency, reducing friction, and enhancing investor education in order to approximate the conditions under which EMH may hold true.

2.4.2 Market Microstructure Theory

Market microstructure theory provides a detailed analytical framework for understanding the mechanics of trading processes and their impact on asset pricing, liquidity, and market efficiency. Unlike traditional financial theories that focus primarily on investor rationality and equilibrium pricing, market microstructure theory investigates the procedural aspects of trading, including order flow, price formation, bid-ask spreads, and transaction timing (Madhavan, 2000; O'Hara, 1995). Central to the theory is the premise that markets are not frictionless and that the institutional design of trading platforms, the behavior of market participants, and the quality of market information significantly influence how prices evolve. It also considers the role of market intermediaries, such as dealers and brokers, who provide liquidity by facilitating trades, but whose actions may introduce inefficiencies due to inventory risk, asymmetric information, and strategic order processing. The theory distinguishes between different types of orders such as limit orders, market orders, and stop orders, and explores how their execution affects market depth, transaction costs, and volatility.

In the context of the South Africa stock market, market microstructure theory is particularly relevant for explaining the operational and institutional constraints that hinder efficient trading and liquidity provision. Empirical evidence suggests that the markets are characterized by wide bid-ask spreads, irregular trading activity, and limited depth, all of which elevate transaction costs and impede price discovery (Alagidede & Mensah, 2013; Ibenta & Anyanwaokoro, 2016). These conditions are exacerbated by infrastructural limitations such as slow order execution systems, manual trading components, and inadequate real-time data dissemination, which increase latency and contribute to pricing inefficiencies. Poor regulatory oversight and limited surveillance further weaken enforcement of market rules, creating opportunities for manipulation and discouraging both institutional and foreign investors from participating actively. In such a trading environment, liquidity is highly fragmented, and price signals are often distorted by non-informational trades, such as noise trading or herding behavior, which further undermine market efficiency and transparency.

Moreover, the slow adoption of modern trading technologies underscores a critical gap between its market infrastructure and those of more developed economies. In advanced markets, algorithmic trading, electronic communication networks, and real-time order book transparency have transformed trading dynamics by reducing execution costs, minimizing human error, and enhancing market responsiveness (Glosten & Harris, 1988; Foucault, Pagano & Röell, 2013). These tools have improved liquidity and market stability by allowing for more accurate and faster price adjustments. In contrast, stock

exchanges have only partially integrated such technologies, and where implemented, they often suffer from connectivity issues, limited investor familiarity, and underutilization. Consequently, market microstructure theory offers a compelling lens through which to understand the structural barriers that limit efficiency in equity markets. It emphasizes the importance of technological innovation, institutional design, and regulatory robustness in shaping trading outcomes and promoting more inclusive and efficient capital markets.

2.4.3 Theory of Asymmetric Information

The theory of asymmetric information provides a foundational explanation for many inefficiencies observed in financial markets, particularly those related to valuation, trading, and capital allocation. Introduced by Akerlof (1970) through his seminal work on the "market for lemons" and later extended by Stiglitz and Weiss (1981) in the context of credit markets, the theory highlights how unequal access to information between economic agents leads to suboptimal outcomes such as adverse selection and moral hazard. Adverse selection arises when less informed investors are unable to distinguish between high-quality and low-quality securities, thereby demanding higher risk premiums or withdrawing from the market altogether. Moral hazard, on the other hand, emerges when informed parties, such as company insiders, exploit their informational advantage at the expense of uninformed investors. These imbalances distort market signals, impair price discovery, and ultimately lead to a misallocation of resources. The theory underscores the fundamental role of transparency, enforcement, and monitoring in maintaining market discipline and investor protection.

Within the South African financial landscape, the implications of asymmetric information are particularly severe due to long-standing structural deficiencies in financial reporting, regulatory enforcement, and corporate governance. Disclosure standards are often weakly enforced, and a significant number of publicly listed companies provide limited or irregular financial disclosures. Furthermore, analyst coverage remains minimal, particularly for small and medium-sized firms, leaving many securities under-researched and opaque to the investing public. These conditions create an environment where informed insiders, including corporate executives and politically connected individuals, are able to exploit their privileged access to non-public information. Such practices are exacerbated by inconsistent enforcement of insider trading laws and limited institutional capacity to monitor compliance. As a result, the stock market suffers from elevated bid-ask spreads, reduced trading volume, and lower foreign investor participation, all of which are symptoms of high information asymmetry (Bhattacharya & Daouk, 2002; Brown & Hillegeist, 2007; Chen et al., 2011).

Empirical studies have confirmed that information asymmetry contributes to a higher cost of equity, diminished liquidity, and weaker investor confidence, particularly in emerging and frontier markets (Hope et al., 2009; Akins, Ng, & Verdi, 2012). These effects are magnified by poor investor education, fragmented information dissemination systems, and limited media scrutiny of corporate governance practices. As noted by Asongu, Nwachukwu, and Tchamyu (2017), the absence of credible and timely information hampers market participation and constrains long-term capital formation. Investors,

especially institutional and foreign participants, are less likely to engage with markets where uncertainty about firm quality, governance standards, and regulatory protections is high. Thus, the theory of asymmetric information not only explains micro-level inefficiencies in trading and pricing but also provides insight into broader institutional weaknesses that inhibit the development of South Africa's equity markets. Addressing these challenges requires a comprehensive approach involving stronger disclosure requirements, effective regulatory oversight, the development of independent research institutions, and increased transparency in corporate and market governance.

2.5 Empirical Literature

Tran, Tam, and Hong (2024) investigated the causal dynamics among economic policy uncertainty, economic growth, and stock market liquidity across six ASEAN countries. Employing Granger causality tests and utilizing both price-based and volume-based measures of liquidity, the study analyzed the reciprocal interactions among these macro-financial variables. The authors found that while economic policy uncertainty did not have a direct or immediate impact on either market liquidity or economic growth, the growth variable exhibited a strong influence on liquidity in price terms, thereby confirming the directional causality from macroeconomic fundamentals to financial market conditions. Moreover, the study identified feedback effects from liquidity to policy uncertainty, suggesting the presence of self-adjusting mechanisms within emerging market financial systems. These findings underscore the complexity and interdependence of economic and financial variables in determining market resilience,

and the importance of a well-functioning market structure for buffering against uncertainty shocks.

Ogbeifun (2024) conducted an extensive empirical investigation into the impact of financial market frictions on the Nigerian capital market, using a robust dataset spanning 1992 to 2021. The study employed a multivariate regression model based on the Ordinary Least Squares (OLS) estimation technique to explore how frictions such as transaction costs, asymmetric information, regulatory burdens, and taxation influence market performance. Drawing data from the Central Bank of Nigeria, World Development Indicators, and the Nigerian Stock Exchange Factbook, the study revealed that asymmetric information and transaction costs significantly and negatively affected the capital market, whereas taxation and regulation exerted a small but statistically significant positive influence. These results highlight how structural inefficiencies disrupt pricing efficiency, investor confidence, and the overall vibrancy of Nigeria's equity market. The study concluded that unless institutional and informational frictions are mitigated through reforms, the long-term developmental potential of Nigeria's capital market will remain underutilized.

Omoruyi and Osaigbovo (2023) assessed the dynamic effects of financial market frictions on trading activities within the Nigerian Exchange Limited using a time series dataset covering 1981 to 2019. The study adopted the Autoregressive Distributed Lag (ARDL) bounds testing approach to distinguish between short-run and long-run effects of direct trading costs and tax-based frictions, which were disaggregated into capital gains taxes

and dividend taxes. The empirical findings demonstrated that dividend taxation had a statistically significant and negative effect on trading activity, indicating that it acts as a disincentive for market participation. In contrast, capital gains taxes appeared to have a positive influence, suggesting their relatively less distortionary effect on trading behaviour. Interestingly, direct transaction costs were found to be statistically insignificant, pointing to the possibility that Nigerian investors have adapted to such costs through evolved trading strategies or informational adjustments. These findings highlight the nuanced impact of tax and cost structures on investor decisions and call for targeted fiscal reforms to enhance market activity and liquidity.

Ozekhome and Braimah (2023) provided an empirical examination of the effects of information asymmetry, liquidity constraints, and transaction costs on asset pricing within the Nigerian Exchange Limited, using data spanning from 1988 to 2022. The study applied the Generalized Method of Moments (GMM) estimator to account for potential endogeneity and serial correlation in the dynamic panel structure. The results indicated that both information asymmetry and illiquidity exerted significant negative effects on asset prices, consistent with theoretical expectations that lower transparency and restricted trading capacity undermine valuation accuracy and investor confidence. However, transaction costs showed a counterintuitive positive relationship with asset prices, suggesting that investors may be more focused on expected returns and investment potential, even when transaction costs are high. Additionally, economic vulnerability, used as a proxy for external shocks, had a statistically significant and

adverse effect on asset prices. The study concluded that market frictions, both microstructural and macroeconomic, play a critical role in asset mispricing and capital allocation inefficiencies in Nigeria.

Mafiejor (2023) conducted a comprehensive study on the influence of multiple financial market frictions on stock market performance in Nigeria. Using time series econometric techniques such as correlation analysis and co-integration testing, the research examined variables including transaction costs, regulatory taxes, asset indivisibility, and non-tradability, all of which reflect common market frictions. The findings revealed that these frictions significantly influence investor behaviour, alter pricing mechanisms, and reduce the responsiveness of the capital market to both internal policy changes and external shocks. The study provided empirical support for the view that market imperfections operate through multiple channels and are often interlinked, leading to systemic inefficiencies. The author emphasized that effective market development in Nigeria requires not only transactional reforms but also broader institutional restructuring to address the heterogeneous nature of market frictions.

Igbinedion and Abudu (2023) explored the micro- and macro-level impacts of financial market frictions on portfolio investment outcomes in Nigeria by applying panel least squares and two-stage least squares (2SLS) techniques. Drawing on firm-level data covering five years and macroeconomic indicators spanning eleven years, the study offered a dual-perspective analysis of how frictions like transaction costs, exchange rate instability, and inconsistent regulatory frameworks influence portfolio decision-making.

The results revealed that these frictions significantly distort both capital allocation and risk-return expectations, prompting investors to adopt defensive strategies and reallocate portfolios across asset classes. The study found that institutional frictions are not only persistent but also evolve over time, shaping the cyclical nature of portfolio performance. The authors concluded that improving regulatory coherence and reducing transaction-related barriers would be essential for enhancing investor participation and market inclusivity.

Chengying, Rui, and Ying (2022) applied an event-driven methodology to investigate the short-term and sector-specific effects of the US-China trade war on China's stock market. Focusing on major tariff announcements in 2018 and 2019, the study tested for the presence of contagion and present value effects across different industry sectors. The findings revealed that the announcement of tariffs targeting US\$50 billion worth of Chinese exports triggered significant and immediate stock market reactions, particularly in export-oriented industries. However, these effects were largely short-lived and did not result in sustained long-term volatility, suggesting the presence of adaptive behaviour and partial market absorption of external shocks. The study concluded that while international policy shocks may cause transient disruptions, the underlying resilience of market mechanisms can mitigate broader instability in the absence of prolonged uncertainty.

Oshadare, Idolor, and Adelowotan (2022) examined the effects of financial market frictions specifically transaction costs, regulatory burdens, and asset indivisibility on stock market performance in Nigeria over the period 1981 to 2018. The authors used

econometric techniques including unit root tests, co-integration analysis, and regression modeling to explore both the long-term and short-term relationships. The findings revealed that all three frictions exert distinct yet substantial influences on stock market performance, affecting investor participation, capital flow, and pricing mechanisms. The study concluded that mitigating these frictions would require not only improved regulatory oversight but also the introduction of diversified financial instruments and mechanisms that improve the accessibility and efficiency of Nigeria's capital markets.

Muondo (2022) examines the relationship between liquidity, trading activity, and stock price volatility in Zimbabwe's stock market. Applying Hausman's (1982) specification test and a Generalized Method of Moments (GMM) estimation within a five-equation structural model, the study analyzes data from 2009 to 2021. The results indicate a positive correlation between inflation and stock price volatility, suggesting that equities serve as a hedge against inflation. Moreover, there is no significant difference in findings obtained using random effects (RE), fixed effects (FE), and pooled ordinary least squares (POLS), highlighting the robustness of the study.

Uhunmwangho (2022) evaluated the impact of post-crisis financial regulations on stock market volatility in Nigeria by analyzing data from thirteen listed banks between 2010 and 2020. Using a dynamic Generalized Method of Moments (GMM) approach, the study found that regulatory liquidity ratios and monetary policy rates significantly increased stock market volatility, whereas the prescribed cash reserve ratio had a dampening effect. These results suggest that while some regulatory tools are designed to stabilize the

financial system, they may inadvertently contribute to market instability if not appropriately calibrated. The study emphasized the need for a balanced and flexible regulatory framework that addresses systemic risk without stifling market activity.

Hossain (2021) conducted an empirical investigation into the persistence of trading anomalies within the U.S. stock market and their implications for market efficiency. The study revisited three well-established market anomalies including the size effect, short-term return reversal, and momentum effect by employing back-testing procedures and integrating asset pricing models that account for systematic risk. The empirical evidence showed that both the size effect and the short-term return reversal produced statistically significant abnormal returns, even after adjusting for risk factors. These findings suggest that despite the sophistication and depth of the U.S. capital market, inefficiencies persist at the weak-form level. The study emphasized that these anomalies are not merely statistical artifacts but reflect underlying behavioural and informational frictions within financial markets. Hossain concluded that market efficiency is context-dependent and that recurring anomalies highlight the need for continuous model refinement and regulatory attention.

Onyesonmazun (2020) analyzed the relationship between financial market frictions and capital market development in Nigeria over the period 1992 to 2017. Utilizing the Ordinary Least Squares (OLS) method, the study examined how variables such as gross capital formation, foreign direct investment, domestic share trading, and inflation influenced market capitalization. Results revealed a positive and significant relationship

between gross capital formation and market capitalization, suggesting that increased domestic investment directly supports capital market growth. However, foreign direct investment showed a positive but statistically insignificant effect, indicating the presence of barriers or inefficiencies that limit the productivity of foreign capital inflows. These findings point to the dual impact of financial frictions, where some variables enhance market development while others fail to translate into performance gains due to institutional and structural bottlenecks. The study recommended targeted reforms to reduce entry barriers, improve transparency, and attract more meaningful foreign participation.

Brière, Lehalle, Nefedova, and Raboun (2019) undertook a large-scale empirical study focusing on how transaction costs influence the profitability of investment strategies that exploit known asset pricing anomalies. Using a detailed dataset from U.S. institutional investors, the authors examined strategies based on size, value, investment, profitability, and momentum anomalies. They discovered that while transaction costs do reduce net returns, especially for large institutional portfolios, these anomalies remain profitable for average-sized portfolios. For instance, the momentum strategy showed the highest sensitivity to trading costs but still yielded significant net returns. The study calculated break-even fund sizes for each strategy, providing practical guidance for portfolio managers. The researchers concluded that transaction costs must be factored into asset pricing and portfolio construction models, as they play a critical role in determining the

sustainability and scalability of anomaly-based investment strategies, especially for institutional investors operating at scale.

Debata and Mahakud (2018) explored the relationship between economic policy uncertainty and stock market liquidity within the context of emerging markets, using a vector autoregressive (VAR) framework. Through Granger causality tests, impulse response functions, and variance decomposition, the study assessed how fluctuations in policy-related uncertainty influence investor behaviour and market conditions. The results indicated that while policy uncertainty had limited impact during stable periods, its influence became highly significant during episodes of financial crisis or macroeconomic stress. Notably, the study found that investor sentiment, rather than purely macroeconomic fundamentals, explained a substantial proportion of liquidity variation under these stressed conditions. These findings underscored the importance of communication clarity and policy predictability in maintaining market stability in emerging economies, where volatility is often amplified by institutional fragility and lower investor risk tolerance.

Nurhayati (2018) investigated trading frictions in the Indonesian Stock Exchange using high-frequency data and correlation-based techniques. The study focused on measuring the implicit costs that investors face when executing trades, particularly for high-capitalization and high-liquidity stocks. Results showed that trading frictions were significantly and negatively correlated with stock prices, market capitalization, and the number of trades, suggesting that larger and more liquid stocks are associated with lower

implicit costs. Interestingly, no significant relationship was found between frictions and trade volume, indicating that pricing inefficiencies and informational disparities are more critical sources of trading friction than volume itself. The study concluded that improving pricing transparency and reducing asymmetries in market access could enhance liquidity and reduce costs, thereby supporting market efficiency and investor confidence.

Iwuagwu (2016) examined the interaction between stock return volatility and market efficiency in Nigeria using a range of advanced econometric models, including GARCH, ARCH, Johansen co-integration, Granger causality tests, and impulse response functions. Relying on data from the Central Bank of Nigeria's 2014 Statistical Bulletin, the study assessed whether price fluctuations were reflective of new information or indicative of market inefficiencies. Findings showed that although volatility was often triggered by information shocks, its prolonged and erratic nature pointed to deeper inefficiencies in the Nigerian capital market. These inefficiencies were attributed to inadequate disclosure, speculative behaviour, and regulatory lapses. The study concluded that the Nigerian stock market does not conform fully to the Efficient Market Hypothesis, particularly in its weak form, and recommended institutional reforms aimed at improving market transparency and enforcement.

Table 2.1 Summary of Empirical Review

| S/NO | Author(s) | Year | Topic | Location | Methodology | Findings |
|-------------|---------------------|-------------|---|---------------------|---|---|
| 1 | Tran, Tam, and Hong | 2024 | Economic policy uncertainty, growth, and liquidity | ASEAN (6 countries) | Granger causality, price & volume-based liquidity | Growth significantly influences price-based liquidity; feedback loop exists from liquidity to policy uncertainty. |
| 2 | Ogbeifun | 2024 | Impact of market frictions on Nigerian capital market | Nigeria | Multivariate regression (OLS) | Asymmetric information and transaction costs negatively affect the market; taxation and regulation have |

| | | | | | | |
|---|-----------------------|------|--|---------|---------------------|--|
| | | | | | | small positive effects. |
| 3 | Omoruyi and Osaigbovo | 2023 | Effects of frictions on trading activity | Nigeria | ARDL bounds testing | Dividend tax reduces trading; capital gains tax increases it; transaction costs are statistically insignificant. |
| 4 | Ozekhome and Braimah | 2023 | Frictions and asset pricing | Nigeria | GMM estimation | Asymmetry and illiquidity negatively affect prices; transaction costs show a positive relationship; economic vulnerability |

| | | | | | | |
|---|-------------------------|------|---|---------|---|--|
| | | | | | | also harms asset prices. |
| 5 | Mafiejor | 2023 | Influence of market frictions on stock market performance | Nigeria | Correlation and co- integration analysis | Frictions influence pricing, investor behavior, and market responsiveness; systemic inefficiencies are interlinked. |
| 6 | Igbinedion and Abudu | 2023 | Frictions and portfolio investment outcomes | Nigeria | Panel least squares and 2SLS | Frictions distort capital allocation and risk-return expectations; regulatory coherence needed. |
| 7 | Chengying, | 2022 | US-China | China | Event-study | Tariff |

| | | | | | | |
|---|------------------------------|------|---|----------|--|--|
| | Rui, and Ying | | trade war and China's stock market | | methodology | announcements caused short-term shocks, especially in export sectors; no sustained long-term effects. |
| 8 | Oshadare, Idolor, Adelowotan | 2022 | Market frictions and stock performance | Nigeria | Unit root, co-integration, regression analysis | Frictions impact participation and capital flow; calls for improved regulation and market diversification. |
| 9 | Mupondo | 2022 | Liquidity, trading activity, and volatility | Zimbabwe | GMM and structural model | Inflation positively correlates with volatility; RE, |

| | | | | | | |
|----|--------------|------|--|---------------|--|---|
| | | | | | | FE, and POLS yielded similar results. |
| 10 | Uhunmwangho | 2022 | Post-crisis financial regulation and volatility | Nigeria | Dynamic GMM | Liquidity ratios and monetary rates increase volatility; cash reserve ratio stabilizes market. |
| 11 | Hossain | 2021 | Persistence of trading anomalies and market efficiency | United States | Back-testing with asset pricing models | Size and short-term reversal effects yield abnormal returns; inefficiencies persist despite market depth. |
| 12 | Onyesonmazun | 2020 | Financial frictions and capital | Nigeria | OLS estimation | Capital formation boosts market |

| | | | | | | |
|----|--------------------|------|--|------------------|--|--|
| | | | market development | | | cap; FDI has insignificant effects due to inefficiencies. |
| 13 | Brière et al. | 2019 | Transaction costs and anomaly-based strategies | United States | Empirical analysis using institutional data | Transaction costs reduce net returns; anomalies remain profitable for smaller portfolios; momentum strategy most cost-sensitive. |
| 14 | Debata and Mahakud | 2018 | Policy uncertainty and stock liquidity | Emerging Markets | VAR, Granger causality, impulse response functions | Policy uncertainty affects liquidity during crises; sentiment plays a major role. |

| | | | | | | |
|----|-----------|------|--|-----------|--|--|
| 15 | Nurhayati | 2018 | Trading frictions in the Indonesian Stock Exchange | Indonesia | High-frequency data and correlation-based techniques | Trading frictions negatively correlate with stock prices and liquidity; no significant relation to volume. |
| 16 | Iwuagwu | 2016 | Volatility and market efficiency | Nigeria | GARCH, ARCH, Johansen, Granger, impulse response | Market inefficiencies revealed by volatility patterns; weak-form EMH not satisfied; speculative behavior and poor regulation are key issues. |

Author's Compilation (2025)

2.6 Research Gaps

A critical review of extant literature reveals several unresolved empirical and methodological gaps regarding the relationship between financial market frictions and stock market performance in South Africa. Despite the valuable contributions of studies in other contexts such as Ozekhome and Braimah (2023), Uhunamure and Uhunmwangho (2022), and Oshadare, Idolor, and Adelowotan (2022), most prior investigations remain limited in their analytical scope. These studies typically isolate particular frictions such as transaction costs, regulatory burdens, or information asymmetry without integrating a broader institutional and market microstructure perspective. For instance, while Mafiejor (2023) and Igbinedion and Abudu (2023) provide insights into how financial frictions shape investor behaviour and portfolio allocations, their analyses do not decompose these frictions into distinct operational elements like bid-ask spread, regulatory quality, or trading volume. Similarly, comparative evidence from emerging markets, such as that presented by Nurhayati (2018) in Indonesia and Mupondo (2022) in Zimbabwe, although methodologically rigorous, fails to fully align with the institutional specificities and market constraints prevalent in South Africa. This context-specific misalignment restricts the relevance and transferability of their findings to the South African bourse.

From a methodological standpoint, an evident gap lies in the limited use of dynamic econometric frameworks capable of capturing both short-run fluctuations and long-run equilibrium relationships between market frictions and stock performance. Many existing

studies rely heavily on static models such as Ordinary Least Squares (e.g., Ogbeifun, 2024; Onyesonmazun, 2020), panel least squares (Igbinedion & Abudu, 2023), or GMM estimation techniques (Ozekhome & Braimah, 2023; Uhunmwangho, 2022), which often do not accommodate the temporal dependencies and endogeneity issues inherent in macro-financial data. While the ARDL bounds testing method applied by Omoruyi and Osaigbovo (2023) offers some advancement in this regard, it has not yet been widely adopted in studies that simultaneously consider multiple frictions and control for macroeconomic variability. Furthermore, empirical studies frequently omit critical macroeconomic control variables such as the exchange rate and inflation rate, despite their well-documented influence on capital market volatility, valuation distortions, and investor behaviour in frontier markets like Nigeria (Asongu, Nwachukwu & Tchamyou, 2017; Al-Shebli & Alhajri, 2024). This omission undermines the robustness of model specifications and limits the generalizability of findings.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents the research methodology, encompassing the research design, population, sample of the study, sources of data, model specification, measurement and operationalization of variable as well as method of data analysis.

3.2 Research Design

This study adopts an ex-post facto research design, which is appropriate for empirical analysis relying on historical data where the variables are observed without manipulation (Kerlinger & Lee, 2000). This approach is well-suited for financial and macroeconomic research in which the researcher seeks to assess cause-effect relationships based on naturally occurring events and conditions (Creswell & Creswell, 2018). Specifically, it facilitates an empirical examination of the long-run and short-run effects of financial market frictions on stock market performance in South Africa. In this context, frictions such as liquidity constraints, transaction costs, information asymmetry, and regulatory quality are analyzed retrospectively to determine their influence on market capitalization over the period from 1990 to 2024.

3.3 Population of the Study

The population of this study covers the entire South African economy to provide a comprehensive analysis of the relationship between financial market frictions and stock market performance dynamics.

3.4 Sample and Sampling Techniques

As a result of the macro nature of this study, a census sampling technique where the population and sample size are identical will be adopted. This method enhances the accuracy of representation by ensuring that the entire population is comprehensively included.

3.5 Sources of Data

The secondary data for this study will be obtained directly from reputable South African financial and statistical institutions. Specifically, data will be sourced from the South African Reserve Bank (SARB) Statistical Publications, the Statistics South Africa (Stats SA) annual reports, and the Johannesburg Stock Exchange (JSE) Fact Book for the years under investigation, covering the period from 1990 to 2024.

3.6 Theoretical Framework and Model Specification

This study adopts the Efficient Market Hypothesis (EMH) as its theoretical framework, as it provides a foundational lens for evaluating the relationship between financial market frictions and stock market performance. EMH, as articulated by Fama (1970), posits that in an efficient market, asset prices fully reflect all available information, implying that no investor can consistently achieve above-average returns without assuming additional risk. The theory rests on key assumptions such as rational investor behavior, costless information dissemination, and frictionless trading environments. However, the extent to which these assumptions hold true varies significantly across markets. In the context of South Africa, persistent deviations from weak-form efficiency such as delayed price

adjustments, autocorrelated returns, and overreaction to news indicate the presence of substantial frictions, including high transaction costs, limited liquidity, poor regulatory enforcement, and information asymmetry (Mobarek & Keasey, 2000; Ntim, 2012; Hoque, 2014; Narayan, Ahmed & Narayan, 2015). By using EMH as a theoretical benchmark, this study is able to systematically assess how these frictions prevent the South Africa stock market from achieving efficiency, thereby justifying the investigation of specific variables such as liquidity constraints, transaction costs, information asymmetry, and regulatory quality in understanding stock market performance.

Following the above theory, this study adapts the model proposed by Mafiejor (2023). His model was econometrically specified thus:

$$TVM = \beta_0 + \beta_1 TB + \beta_2 AIP + \beta_3 MKD + \beta_4 NTDA + \mu \text{-----} (3.1)$$

This study modifies the above model to reflect the South African context by utilizing the Autoregressive Distributed Lag (ARDL) framework, which is well-suited for analyzing both short-run dynamics and long-run relationships in time series data, particularly when variables are integrated at different levels (Pesaran, Shin & Smith, 2001). The modification entails measuring the dependent variable, stock market performance, using market capitalization (MCAP). The core independent variables include financial market frictions such as liquidity constraints (LQS), transaction cost (TC), information asymmetry (IAS), and regulatory quality index (RQI). Exchange rate (EXR) is incorporated as macroeconomic control variable.

ARDL Model Specification for Market Capitalisation (MCAP)

The functional form of the model is:

$$MCAP_t = f(LQS_t, TC_t, IAS_t, RQI_t, EXR_t) \text{ ----- (3.2)}$$

Following the functional form outlined in Equation (3.2), the Autoregressive Distributed Lag (ARDL) model for analyzing the impact of financial market frictions on stock market performance in South Africa is specified as follows:

$$\begin{aligned} \Delta \ln(MCAP_t) = & \alpha_0 + \sum_{i=1}^p \phi_i \Delta \ln(MCAP_{t-i}) + \sum_{j=0}^{q_1} \beta_{1j} \Delta \ln(LQS_{t-j}) + \sum_{j=0}^{q_2} \beta_{2j} \Delta \ln(TC_{t-j}) \\ & + \sum_{j=0}^{q_3} \beta_{3j} \Delta \ln(IAS_{t-j}) + \sum_{j=0}^{q_4} \beta_{4j} \Delta \ln(RQI_{t-j}) + \sum_{j=0}^{q_5} \beta_{5j} \Delta \ln(EXR_{t-j}) \\ & + \lambda_1 \ln(MCAP_{t-1}) + \lambda_2 \ln(LQS_{t-1}) + \lambda_3 \ln(TC_{t-1}) + \lambda_4 \ln(IAS_{t-1}) \\ & + \lambda_5 \ln(RQI_{t-1}) + \lambda_6 \ln(EXR_{t-1}) + \varepsilon_t \end{aligned}$$

(3.3)

Where:

Δ = First difference operator

\ln = Natural logarithm

MCAP = Market capitalisation

LQS = Liquidity constraints

TC = Transaction cost

IAS = Information asymmetry

RQI = Regulatory quality index

EXR = Exchange rate

α_0 = Constant term

ϕ_i = Coefficient of lagged dependent variable (short-run dynamics)

β_1 to β_7 = Short-run coefficients of independent variables

λ_1 to λ_8 = Long-run coefficients

ε_t = Error term

A Priori Expectations

The expected signs for the coefficients in the ARDL model are specified as follows:

Liquidity Constraints (LQS): A negative relationship is expected between liquidity constraints and market capitalization. Higher liquidity constraints imply reduced ability to buy or sell securities quickly and at stable prices, thereby discouraging market participation and depressing stock market activity. Hence, $\beta_1 < 0$.

Transaction Costs (TC): Transaction costs such as brokerage fees, taxes, and settlement charges increase the cost of trading and reduce net returns. Elevated transaction costs are expected to deter trading activity and shrink market size. Therefore, a negative sign is expected. $\beta_2 < 0$.

Information Asymmetry (IAS): Markets with higher information asymmetry are prone to adverse selection and moral hazard, which undermines investor confidence and impairs price discovery. This typically reduces market depth and capitalization. Thus, $\beta_3 < 0$.

Regulatory Quality Index (RQI): A higher regulatory quality index reflects stronger institutions, better investor protection, and effective enforcement of market rules, all of which promote market development. Hence, a positive relationship is expected between RQI and MCAP. $\beta_4 > 0$.

Exchange Rate (EXR): The effect of exchange rate movements on market capitalization is ambiguous and context-dependent. Currency depreciation may deter foreign investment due to valuation risk, suggesting a negative relationship. However, a depreciated currency could boost export-driven firms’ profitability, potentially enhancing equity values. For South Africa, which has a relatively open capital account, a **negative relationship** is anticipated due to capital flight and foreign investor sensitivity to rand volatility. Hence, $\beta_5 < 0$.

3.7 Measurement of Variables

The measurement of the study variables is presented in the table below.

Table 3.1: Variable Measurement and Operationalization

| Variable Type | Variable | Abbreviation | Measurement / Estimation | Reference |
|---------------|--|--------------|---|---|
| Dependent | Stock Market Performance (Market Capitalization) | MCAP | Total market value of listed equities on the JSE; measured in South African Rand (ZAR), annual data | Ogbeifun (2024); Onyesonmazun (2020) |
| Independent | Liquidity Constraints | LQS | Measured using turnover ratio (total value traded / | Ozekhome & Braimah (2023); Nurhayati (2018) |

| | | | | |
|-------------|--------------------------|-----|--|--|
| | | | average market capitalization) or bid-ask spread | |
| Independent | Transaction Cost | TC | Cost of executing trades (brokerage fees, taxes, regulatory charges); expressed as a percentage of trade volume or value | Omoruyi & Osaigbovo (2023); Brière et al. (2019) |
| Independent | Information Asymmetry | IAS | Proxied by earnings forecast dispersion or volume-to-volatility ratio; may also use analyst coverage or disclosure quality index | Chengying et al. (2022); Onyesonmazun (2020) |
| Independent | Regulatory Quality Index | RQI | Composite index from World Bank Worldwide | Igbinedion & Abudu (2023); Oshadare et al. |

| | | | | |
|---------|---------------|-----|---|--|
| | | | Governance Indicators (WGI), scaled 0–100 | (2022) |
| Control | Exchange Rate | EXR | Official ZAR/USD exchange rate (annual average) | Adjasi et al. (2011); Ozkan & Erden (2015) |

Source: Author’s Compilation (2025)

3.8 Method of Data Analysis

This study adopts the Autoregressive Distributed Lag (ARDL) bounds testing approach as the principal analytical technique for examining the relationship between financial market frictions and stock market performance in South Africa. The ARDL methodology, developed by Pesaran, Shin, and Smith (2001), is particularly well-suited for time series models that involve variables integrated at different orders specifically, a mix of level stationary variables $I(0)$ and first-difference stationary variables $I(1)$, provided none is integrated of order two $I(2)$. This makes it an appropriate tool for macro-financial research, especially in emerging markets such as South Africa, where variables often exhibit heterogeneous integration properties and structural volatility.

The analytical process begins with the computation of descriptive statistics including measures of central tendency (mean, median), dispersion (standard deviation), and distributional shape (skewness and kurtosis) to provide an overview of the underlying data characteristics. These statistics help identify potential outliers and assess the degree

of normality in the data. Subsequently, unit root tests, namely the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests, are applied to determine the order of integration of each time series. This pre-testing stage is essential, as the ARDL approach requires that none of the variables be integrated beyond $I(1)$.

Upon confirming the integration order, the ARDL bounds test is conducted to assess the existence of a long-run cointegration relationship among the variables. If the calculated F-statistic exceeds the upper critical bound, cointegration is confirmed; if it falls below the lower bound, no long-run relationship exists. Once cointegration is established, the long-run coefficients are estimated to evaluate the persistent impact of financial market frictions specifically liquidity constraints (LQS), transaction costs (TC), information asymmetry (IAS), and regulatory quality (RQI) on stock market performance, proxied by market capitalization (MCAP). Control variable such as exchange rate (EXR) is also included to account for macroeconomic influence. The short-run dynamics are then captured through the Error Correction Model (ECM), with the error correction term (ECT) indicating the speed at which deviations from long-run equilibrium are corrected.

To ensure the robustness and reliability of the estimated model, several post-estimation diagnostic tests are performed. These include the Breusch-Godfrey LM test for serial correlation, Breusch-Pagan-Godfrey and ARCH tests for heteroskedasticity, the Jarque-Bera test for normality of residuals, and the Ramsey RESET test to evaluate model specification. The presence of multicollinearity is assessed using the Variance Inflation Factor (VIF).

All statistical analyses will be conducted using EViews 10 software, which provides comprehensive tools for time series econometrics, diagnostic testing, and graphical analysis. This methodological approach ensures that the study adheres to rigorous empirical standards and produces reliable insights into how financial market frictions affect stock market performance in South Africa over the study period.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSES

4.1 Introduction

This chapter presents and analyzes a time series dataset from 1990 to 2024, sourced from the South African Reserve Bank (SARB) Statistical Publications, the Statistics South Africa (Stats SA) annual reports, the Johannesburg Stock Exchange (JSE) Fact Book, and the World Bank. Analysis was conducted with EViews 10, and results are displayed in tables with detailed explanations. The chapter is divided into sections on data presentation, hypothesis testing, and a discussion of the findings.

4.2 Data Presentation and Interpretation

This section begins with an initial evaluation of the study's variables through descriptive statistics and stationarity tests (e.g., unit root assessments). It then examines relationships among variables using correlation analysis and checks for long-term equilibrium with cointegration testing. To ensure the regression model's robustness, diagnostic tests are performed: the Breusch-Godfrey test for serial correlation, the Breusch-Pagan test for heteroscedasticity, and the Ramsey RESET test for model misspecification.

Table 4.1 Descriptive statistics

| | MCAP | LQS | TC | IAS | RQI | EXR |
|---|-------------|------------|-----------|------------|------------|------------|
| Mean | 11.68317 | 0.228228 | 1.180584 | 0.721000 | 0.376023 | 8.920403 |
| Maximum | 12.09025 | 0.423032 | 2.159960 | 0.800000 | 0.819586 | 18.45350 |
| Minimum | 11.13630 | 0.036456 | 0.882378 | 0.642000 | -0.223700 | 2.588500 |
| Std. Dev. | 0.327647 | 0.104710 | 0.264805 | 0.050588 | 0.292941 | 4.682494 |
| Skewness | -0.315208 | -0.389108 | 1.761867 | 1.02E-15 | -0.695277 | 0.534166 |
| Kurtosis | 1.441341 | 2.516899 | 6.980390 | 1.737116 | 2.434179 | 2.191593 |
| | | | | | | |
| Jarque-Bera | 4.122481 | 1.223552 | 41.21281 | 2.325860 | 3.286781 | 2.617499 |
| Probability | 0.127296 | 0.542387 | 0.000000 | 0.312569 | 0.193324 | 0.270158 |
| | | | | | | |
| MCAP= Market Capitalisation (Logged); LQS = Liquidity Constraints; TC = Transactions Costs; IAS = Information Asymmetry; RQI = Regulatory Quality Index; EXR = Exchange Rate (Rand/USD) | | | | | | |

Source: Researcher's compilation (2025)

The descriptive statistics presented in Table 4.1 offer a comprehensive overview of the central tendencies, dispersion, and distributional properties of the key variables observed between 1990 and 2024. Market Capitalisation (MCAP), expressed in logarithmic terms, has a mean of 11.6832 and a relatively narrow standard deviation of 0.3276, suggesting moderate variability in the size of the South African stock market over time. Its

distribution is slightly negatively skewed (-0.3152), implying a longer tail on the left side, and exhibits a kurtosis of 1.44, which is below the normal distribution benchmark of 3, indicating a flatter distribution with lighter tails. The Jarque-Bera test statistic (4.12) has a p-value of 0.1273, implying no significant departure from normality at the 5% level.

Liquidity Constraints (LQS) show a mean value of 0.2282 and a standard deviation of 0.1047, reflecting moderate variation in liquidity conditions. The variable is also negatively skewed (-0.3891) and has a kurtosis value of 2.52, indicating a distribution close to normal. The Jarque-Bera probability of 0.5424 confirms the normality of this variable. Transaction Costs (TC), on the other hand, present a different pattern, with a mean of 1.1806 and a standard deviation of 0.2648. The distribution of TC is markedly positively skewed (1.7619), meaning that higher transaction cost values are more prevalent, and the kurtosis of 6.98 indicates a leptokurtic distribution—one with fat tails and a sharper peak compared to a normal distribution. This is confirmed by the highly significant Jarque-Bera statistic of 41.21 ($p = 0.0000$), which decisively rejects the null hypothesis of normality.

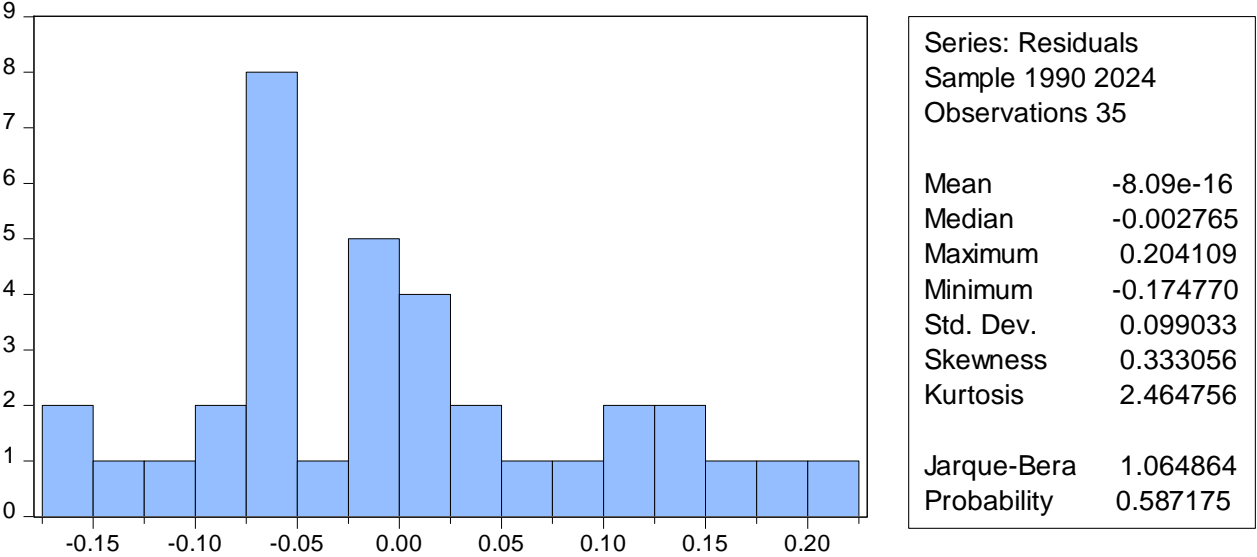
Information Asymmetry (IAS) exhibits the least variation among all variables, with a mean of 0.7210 and a small standard deviation of 0.0506. The skewness is effectively zero ($1.02E-15$), indicating a perfectly symmetrical distribution, while its kurtosis value of 1.74 suggests a flatter than normal distribution. The Jarque-Bera statistic (2.33) and its associated probability (0.3126) confirm that IAS is normally distributed. The Regulatory Quality Index (RQI) shows more variation (standard deviation = 0.2929) and has a mean

of 0.3760. The distribution is moderately negatively skewed (-0.6953), with a kurtosis of 2.43. Although it deviates slightly from the normal shape, the Jarque-Bera statistic (3.29) and its p-value (0.1933) do not provide sufficient evidence to reject normality.

Finally, the Exchange Rate (EXR), measured as the Rand/USD, displays the highest degree of variability among all the variables, with a standard deviation of 4.6825 and a wide range between 2.59 and 18.45. This reflects the historical volatility of the South African rand over the 34-year period. The distribution of EXR is positively skewed (0.5342), indicating a tendency toward higher exchange rate values, and it has a kurtosis of 2.19, which is slightly platykurtic. The Jarque-Bera statistic of 2.62 and the corresponding p-value of 0.2702 indicate that the exchange rate series does not significantly deviate from normality.

Figure 4.1 presents the aggregate normality graph of the variables.

Figure 4.1 Aggregate Normality Graph



Source: Eviews 10

From Figure 4.1, the p.value of 0.5872 is greater than 0.05, thus it is inferred that on aggregate the variables of the study are normally distributed.

Table 4.2: Unit Root Tests

| Variable | ADF Test Statistic (Level) | 95% Critical ADF Value | Remark | ADF Test Statistic (1st Diff.) | 95% Critical ADF Value | Remark | Order of Integration |
|-----------------|---|---|-------------------|---|---|---------------|---------------------------------|
| MCAP | - 2.280491 | - 3.548490 | Not Stationary | - 6.485870 | - 3.552973 | Stationary | I(1) |
| LQS | - 1.862095 | - 3.548490 | Not Stationary | - 5.803997 | - 3.587527 | Stationary | I(1) |
| TC | - 4.495439 | - 2.951125 | Stationary | - 9.284103 | - 2.954021 | Stationary | I(0) |
| IAS | - 2.478835 | - 3.552973 | Not stationary | - 9.795515 | - 3.580623 | Stationary | I(1) |
| RQI | - 1.256283 | - 3.548490 | Not Stationary | - 7.536811 | - 3.552973 | Stationary | I(1) |
| EXR | - 1.900100 | - 3.548490 | Not Stationary | - 5.208320 | - 3.552973 | Stationary | I(1) |

Source: Author's Computation (2025)

The unit root test results presented in Table 4.2 reveal a mixed order of integration among the variables. Specifically, Market Capitalisation (MCAP), Liquidity Constraints (LQS), Information Asymmetry (IAS), Regulatory Quality Index (RQI), and Exchange Rate (EXR) are all non-stationary at level but become stationary after first differencing, indicating they are integrated of order one, I(1). In contrast, Transaction Costs (TC) is stationary at level, implying it is integrated of order zero, I(0). This combination of I(0) and I(1) variables, with no series integrated at order two or higher, satisfies the precondition for applying the Autoregressive Distributed Lag (ARDL) bounds testing approach, which is suitable for estimating both short-run and long-run relationships in models with variables of mixed integration orders.

Table 4.3 Correlation Matrix

| | MCAP | LQS | TC | IAS | RQI | EXR | VIF |
|------|------------|------------|------------|------------|----------|----------|----------|
| MCAP | 1.000000 | | | | | | |
| LQS | 0.496517* | 1.000000 | | | | | 2.501986 |
| TC | -0.216488 | 0.257331 | 1.000000 | | | | 1.434401 |
| IAS | -0.911854* | -0.573537* | 0.226498 | 1.000000 | | | 9.323620 |
| RQI | -0.633869* | -0.139926 | 0.374489** | 0.751813* | 1.000000 | | 4.207831 |
| | | | | | - | | |
| EXR | 0.744209* | 0.494674* | -0.190747 | -0.926267* | 0.807700 | 1.000000 | 9.360106 |

*

* Sig @ 1%; ** Sig @ 5%

Source: Researcher's compilation (2025)

The correlation matrix in Table 4.3 reveals several statistically significant relationships among the study's variables, providing insights into their potential interactions and guiding expectations for subsequent regression analysis. Market Capitalisation (MCAP) is positively and significantly correlated with Liquidity Constraints (LQS) ($r = 0.4965$, $p < 0.01$), suggesting that higher market capitalization is associated with improved liquidity, likely reflecting deeper and more active markets. Conversely, MCAP shows a strong negative correlation with Information Asymmetry (IAS) ($r = -0.9119$, $p < 0.01$), indicating that higher information asymmetry tends to reduce market capitalization—consistent with theoretical expectations that opacity deters investment and valuation. A similar inverse relationship is observed between MCAP and Regulatory Quality Index (RQI) ($r = -0.6339$, $p < 0.01$), which may reflect investor sensitivity to regulatory inefficiencies in the South African context. The exchange rate (EXR) shows a strong positive correlation with MCAP ($r = 0.7442$, $p < 0.01$), potentially indicating that a depreciating currency corresponds with rising market capitalization, possibly through inflationary asset valuation effects.

Furthermore, IAS is negatively and significantly associated with LQS ($r = -0.5735$, $p < 0.01$) and strongly negatively correlated with EXR ($r = -0.9263$, $p < 0.01$), suggesting that increased asymmetry not only reduces liquidity but is also linked to exchange rate

instability. RQI exhibits a strong positive correlation with IAS ($r = 0.7518$, $p < 0.01$), which is somewhat counterintuitive and may suggest endogeneity or complex regulatory dynamics where formal quality measures rise in response to increased asymmetry. Notably, Transaction Costs (TC) shows relatively weak correlations with other variables, though it has a modest positive correlation with RQI ($r = 0.3745$, $p < 0.05$), possibly reflecting increased compliance costs under stricter regulations.

Variance Inflation Factor (VIF) values, used to assess multicollinearity, remain below the commonly accepted threshold of 10 for all variables, with the highest values observed for EXR (9.36) and IAS (9.32). Although approaching the critical limit, these figures suggest no immediate multicollinearity concerns but warrant caution, especially given the strong intercorrelation between EXR and IAS. Overall, the correlation results highlight significant interactions that support the inclusion of all variables in the regression model, with careful attention to potential endogeneity and multicollinearity in estimation.

Table 4.4 Johansen Multivariate Cointegration Tests Results

| <i>Trace Test</i> | | | | <i>Maximum Eigenvalue Test</i> | | | |
|-------------------|----------------|----------------|--------|--------------------------------|----------------|----------------|--------|
| Null Hypothesis | Test Statistic | Critical Value | Prob. | Null Hypothesis | Test Statistic | Critical Value | Prob. |
| $r = 0^*$ | 104.3908 | 95.7536 6 | 0.0111 | $r = 0$ | 39.35946 | 40.0775 7 | 0.0601 |
| $r \leq 1$ | 65.03136 | 69.8188 | 0.1135 | $r \leq 1$ | 24.63541 | 33.8768 | 0.4101 |

| | | | | | | | |
|------------|----------|---------|--------|------------|----------|---------|--------|
| | | 9 | | | | 7 | |
| $r \leq 2$ | 40.39595 | 47.8561 | 0.2087 | $r \leq 2$ | 17.40672 | 27.5843 | 0.5452 |
| $r \leq 3$ | 22.98923 | 29.7970 | 0.2466 | $r \leq 3$ | 13.54132 | 21.1316 | 0.4038 |
| $r \leq 4$ | 9.447912 | 15.4947 | 0.3256 | $r \leq 4$ | 8.768441 | 14.2646 | 0.3059 |
| $r \leq 5$ | 0.679470 | 3.84146 | 0.4098 | $r \leq 5$ | 0.679470 | 3.84146 | 0.4098 |

Source: Author's Compilation (2025)

The Johansen multivariate cointegration test results presented in Table 4.4 provide evidence on the existence of a long-run equilibrium relationship among the study's variables. The trace test indicates that the null hypothesis of no cointegration ($r = 0$) can be rejected at the 5% significance level, as the test statistic (104.3908) exceeds the critical value (95.7537) with a corresponding p-value of 0.0111. This suggests that at least one cointegrating vector exists among the variables, confirming a statistically significant long-run association. However, for subsequent hypotheses ($r \leq 1$ to $r \leq 5$), the trace statistics fall below their respective critical values, and all associated p-values exceed 0.05, indicating no further cointegrating relationships.

The maximum eigenvalue test, which focuses on the most dominant cointegrating relationship at each stage, fails to reject the null hypothesis at all levels, including $r = 0$,

where the test statistic (39.3595) is slightly below the critical value (40.0776) with a p-value of 0.0601. This implies that while the strongest cointegrating relationship is near significance, it does not meet the strict 5% threshold under the eigenvalue criterion. Despite this, the trace test is generally considered more robust in determining the number of cointegrating vectors, particularly in small sample sizes.

Overall, the evidence from the trace test supports the existence of a long-run equilibrium relationship among the variables, thus justifying the use of an error correction-based framework such as the ARDL bounds testing approach, which is capable of capturing both short-run dynamics and long-run cointegration relationships.

Table 4.5 Diagnostics Test: Serial, Heteroskedasticity, and Specification Tests

| <i>Breusch-Godfrey Serial Correlation LM Test:</i> | | | |
|--|----------|---------------------|--------|
| F-statistic | 0.954631 | Prob. F(2,27) | 0.3976 |
| Obs*R-squared | 2.311513 | Prob. Chi-Square(2) | 0.3148 |
| <i>Heteroskedasticity Test: Breusch-Pagan-Godfrey</i> | | | |
| F-statistic | 2.524365 | Prob. F(5,29) | 0.0515 |
| Obs*R-squared | 10.61376 | Prob. Chi-Square(5) | 0.0596 |
| <i>Ramsey RESET Test: Specification: MCAP LQS TC IAS RQI EXR C</i> | | | |
| t-statistic | 3.147023 | 28 | 0.0039 |
| F-statistic | 9.903752 | (1, 28) | 0.0039 |
| Likelihood ratio | 10.59960 | 1 | 0.0011 |

Source: Researcher's compilation (2025)

The diagnostic test results reported in Table 4.5 provide important insights into the reliability and statistical soundness of the estimated model. The Breusch-Godfrey Serial Correlation LM Test indicates no evidence of autocorrelation in the residuals, as both the F-statistic (0.9546) and the ObsR-squared statistic (2.3115) have p-values of 0.3976 and 0.3148, respectively—well above the 5% significance level. This suggests that the error terms are independently distributed, meeting a key assumption of classical linear regression. Similarly, the Breusch-Pagan-Godfrey test for heteroskedasticity does not indicate significant heteroskedasticity, with a p-value of 0.0515 for the F-statistic and 0.0596 for the ObsR-squared statistic. Although these values are marginally above the conventional threshold, they do not provide sufficient evidence to reject the null hypothesis of homoskedasticity, implying that the variance of the residuals is largely stable across observations.

However, the Ramsey RESET test for functional specification reveals potential model misspecification, with a highly significant F-statistic (9.9038, $p = 0.0039$) and likelihood ratio statistic (10.5996, $p = 0.0011$). This suggests that the current model may omit relevant variables or suffer from an incorrect functional form, indicating the need for model refinement through the inclusion of nonlinear dynamics or additional explanatory variables. Despite this, the absence of serial correlation and heteroskedasticity supports the model's overall stability and reliability. Given the mix of integration orders among the variables, combined with these diagnostic outcomes, the Autoregressive Distributed Lag (ARDL) approach remains appropriate, as it accommodates variables integrated at

different orders $I(0)$ and $I(1)$) and allows for flexible model specification that can address dynamic relationships effectively.

4.2.1 Multivariate Analysis

The multivariate analysis is carried out using the ARDL. The result of the Bounds Test and subsequent estimates are presented below.

Table 4.6: ARDL Bounds Test Result

| F-Bounds Test | | Null Hypothesis: No levels relationship | | |
|----------------|--------------|---|------|------|
| Test Statistic | Value | Signif. | I(0) | I(1) |
| F-statistic | 2.86006 7 | 10% | 2.08 | 3 |
| k | 5 | 5% | 2.39 | 3.38 |
| | | 2.5% | 2.7 | 3.73 |
| | | 1% | 3.06 | 4.15 |

Source: Author's Computation (2025) Using E-views 10

The ARDL bounds test results presented in Table 4.6 assess the existence of a long-run equilibrium relationship among the variables under investigation. The computed F-statistic is 2.8601 with five regressors ($k = 5$), which falls between the lower bound ($I(0) = 2.39$) and the upper bound ($I(1) = 3.38$) at the 5% significance level. Since the F-statistic lies within the bounds, the result is inconclusive according to the Pesaran, Shin, and Smith (2001) framework. This means that the test does not provide definitive

evidence either to reject or to accept the null hypothesis of no long-run relationship. Nevertheless, given prior evidence of cointegration from the Johansen trace test and the theoretical justification for expecting long-run interactions among the variables, it remains methodologically sound to proceed with the ARDL model estimation to explore both short-run dynamics and long-run equilibrium relationships.

Table 4.7: ARDL Error Correction Regression- Short Run Estimates

Dependent Variable: MCAP

Method: ARDL

Number of models evaluated: 486

Selected Model: ARDL(1, 0, 1, 0, 0, 0)

Note: final equation sample is larger than selection sample

| Variable | Coefficient | Std. Error | t-Statistic | Prob.* |
|----------|-------------|------------|-------------|--------|
| MCAP(-1) | 0.566009 | 0.171134 | 3.307401 | 0.0028 |
| LQS | -0.532536 | 0.234147 | -2.274368 | 0.0314 |
| TC | -0.029069 | 0.073033 | -0.398031 | 0.6939 |
| TC(-1) | 0.171188 | 0.061754 | 2.772091 | 0.0102 |
| IAS | -5.390031 | 1.886343 | -2.857397 | 0.0083 |
| RQI | 0.134810 | 0.121860 | 1.106272 | 0.2787 |
| EXR | -0.019082 | 0.014232 | -1.340802 | 0.1916 |
| C | 9.043701 | 3.345758 | 2.703035 | 0.0119 |

| | | | |
|--------------------|----------|-----------------------|-----------|
| R-squared | 0.940637 | Mean dependent var | 11.69926 |
| Adjusted R-squared | 0.924655 | S.D. dependent var | 0.318240 |
| S.E. of regression | 0.087354 | Akaike info criterion | -1.835374 |
| Sum squared resid | 0.198398 | Schwarz criterion | -1.476230 |
| Log likelihood | 39.20135 | Hannan-Quinn criter. | -1.712895 |
| F-statistic | 58.85491 | Durbin-Watson stat | 2.047316 |
| Prob(F-statistic) | 0.000000 | | |

*Note: p-values and any subsequent tests do not account for model selection.

Source: Author's Computation (2025) Using *E-views 10*

The short-run estimates from the ARDL error correction regression, as presented in Table 4.7, provide insight into the dynamic adjustments of market capitalisation (MCAP) in response to changes in the explanatory variables. The lagged dependent variable, MCAP(-1), is positive and highly significant (coefficient = 0.5660, $p = 0.0028$), confirming the model's dynamic structure and suggesting that approximately 56.6% of previous period shocks to MCAP persist into the current period. Liquidity Constraints (LQS) exhibit a statistically significant and negative impact on MCAP in the short run (coefficient = -0.5325, $p = 0.0314$), indicating that tighter liquidity conditions tend to reduce market capitalisation, consistent with expectations in thin financial markets. Information Asymmetry (IAS) also shows a strong negative and statistically significant effect (coefficient = -5.3900, $p = 0.0083$), underscoring the adverse role of informational

opacity on investor confidence and market value. Transaction Costs (TC) display mixed effects: while the contemporaneous coefficient is insignificant (coefficient = -0.0291, $p = 0.6939$), the lagged term is positive and significant (coefficient = 0.1712, $p = 0.0102$), suggesting a delayed adjustment mechanism whereby higher past transaction costs are associated with increased MCAP, possibly reflecting lagged investor adaptation or market frictions. Regulatory Quality Index (RQI) and Exchange Rate (EXR) are statistically insignificant in the short run, with p -values of 0.2787 and 0.1916 respectively, indicating that their immediate effects on MCAP are not robust within the sample period. The model's overall fit is strong, with an R-squared of 0.9406 and an adjusted R-squared of 0.9247, implying that over 92% of the variation in MCAP is explained by the included variables. Additionally, the Durbin-Watson statistic of 2.047 suggests no significant autocorrelation in the residuals. The high F-statistic (58.8549, $p < 0.0001$) confirms the joint statistical significance of the model. These findings support the suitability of the ARDL framework in capturing the short-run dynamics influencing market capitalisation in South Africa.

Table 4.8: ARDL Long Run Form

ARDL Long Run Form and Bounds Test

Dependent Variable: D(MCAP)

Selected Model: ARDL(1, 0, 1, 0, 0, 0)

Conditional Error Correction Regression

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|-----------|-------------|------------|-------------|--------|
| C | 9.043701 | 3.345758 | 2.703035 | 0.0119 |
| MCAP(-1)* | -0.433991 | 0.171134 | -2.535973 | 0.0176 |
| LQS** | -0.532536 | 0.234147 | -2.274368 | 0.0314 |
| TC(-1) | 0.142119 | 0.090855 | 1.564229 | 0.1299 |
| IAS** | -5.390031 | 1.886343 | -2.857397 | 0.0083 |
| RQI** | 0.134810 | 0.121860 | 1.106272 | 0.2787 |
| EXR** | -0.019082 | 0.014232 | -1.340802 | 0.1916 |
| D(TC) | -0.029069 | 0.073033 | -0.398031 | 0.6939 |

* p-value incompatible with t-Bounds distribution.

** Variable interpreted as $Z = Z(-1) + D(Z)$.

Levels Equation

Case 2: Restricted Constant and No Trend

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|----------|-------------|------------|-------------|--------|
| LQS | -1.227066 | 0.775842 | -1.581592 | 0.1258 |
| TC | 0.327469 | 0.222015 | 1.474986 | 0.1522 |
| IAS | -12.41968 | 2.374259 | -5.230970 | 0.0000 |
| RQI | 0.310628 | 0.355241 | 0.874416 | 0.3899 |

| | | | | |
|-----|-----------|----------|-----------|--------|
| EXR | -0.043969 | 0.023553 | -1.866766 | 0.0733 |
| C | 20.83844 | 1.784388 | 11.67820 | 0.0000 |

$$EC = MCAP - (-1.2271 * LQS + 0.3275 * TC - 12.4197 * IAS + 0.3106 * RQI - 0.0440 * EXR + 20.8384)$$

Source: Author's Computation (2025) Using E-views 10

The ARDL long-run estimation results in Table 4.8 provide evidence on the equilibrium relationships between market capitalisation (MCAP) and its explanatory variables within a conditional error correction framework. The lagged dependent variable, MCAP(-1), is negative and statistically significant (coefficient = -0.4340, p = 0.0176), confirming the existence of a stable long-run relationship and validating the error correction mechanism. Interpreting the levels equation, Information Asymmetry (IAS) exerts a substantial and statistically significant negative impact on market capitalisation in the long run (coefficient = -12.4197, p < 0.001), underscoring the adverse effects of poor information transparency on investor confidence and market valuation. The Exchange Rate (EXR) also shows a negative association with MCAP (coefficient = -0.0440), approaching statistical significance (p = 0.0733), which may suggest that currency depreciation adversely affects market valuation through inflationary pressures or capital flight.

Although Liquidity Constraints (LQS) and Transaction Costs (TC) have the expected signs—negative for LQS and positive for TC—their coefficients are statistically insignificant in the long run (p = 0.1258 and p = 0.1522, respectively), indicating that

their enduring effects on MCAP are limited. Similarly, Regulatory Quality Index (RQI), despite a positive coefficient (0.3106), does not reach statistical significance ($p = 0.3899$), suggesting that improvements in regulatory quality alone may not have a strong direct impact on long-term market capitalisation without being complemented by reductions in information asymmetry or exchange rate volatility. The model's constant term (20.8384, $p < 0.0001$) is highly significant, reflecting the baseline level of MCAP when all regressors are at zero.

Overall, the long-run estimates highlight the dominant role of information asymmetry and exchange rate dynamics in shaping the level of market capitalisation over time.

4.3 Hypotheses Testing

In this study, the hypotheses were evaluated at a 5% level of significance, meaning that a p-value less than or equal to 0.05 indicates rejection of the null hypothesis, while a p-value greater than 0.05 leads to acceptance of the null hypothesis. Table 4.7 and 4.8 presents the results of the analysis, which are used to assess each hypothesis. Below is an extensive discussion of the hypotheses, their respective tests, and the decisions based on the results:

H_{01} : Transaction costs have no significant impact on stock market performance in South Africa.

The short-run ARDL results show that current transaction costs (TC) are not statistically significant ($p = 0.6939$), but lagged transaction costs (TC(-1)) are significant ($p = 0.0102$), indicating a delayed but positive effect on market capitalisation. In the long run,

TC remains statistically insignificant ($p = 0.1522$). Since only the lagged short-run effect is significant, and there is no evidence of long-term impact, we reject the null hypothesis **in the short run only** and conclude that transaction costs have a significant short-term, but not long-term, effect on stock market performance in South Africa.

H₀₂: Liquidity constraints do not significantly affect stock market performance in South Africa.

Liquidity constraints (LQS) are statistically significant in the short-run model ($p = 0.0314$), with a negative coefficient, and remain consistently significant in the conditional error correction regression. However, the long-run coefficient for LQS is not statistically significant ($p = 0.1258$). Based on these results, we reject the null hypothesis in the short run, concluding that liquidity constraints significantly affect stock market performance in the short term, though no strong evidence supports a long-run effect.

H₀₃: Information asymmetry has no significant effect on stock market performance in South Africa.

Information asymmetry (IAS) shows a statistically significant and negative impact on market capitalisation both in the short run ($p = 0.0083$) and long run ($p = 0.0000$). This strong and consistent effect implies that higher levels of information asymmetry depress stock market performance across both time horizons. Therefore, we reject the null hypothesis and conclude that information asymmetry has a significant and negative effect on stock market performance in South Africa.

Ho₄: Regulatory quality has no significant impact on stock market performance in South Africa.

Regulatory quality (RQI) is not statistically significant in either the short-run ARDL estimation ($p = 0.2787$) or the long-run levels equation ($p = 0.3899$), suggesting it does not have a measurable impact on market capitalisation during the study period. Based on this, we accept the null hypothesis and conclude that regulatory quality does not significantly affect stock market performance in South Africa within the estimated model.

4.4 Discussion of Findings

4.4.1. Transaction Costs and Market Performance

The results indicate that transaction costs have a statistically significant positive effect on stock market performance in the short run (lagged TC, $p = 0.0102$), while the current and long-run effects are statistically insignificant. This suggests that investors may adjust to transaction costs over time, possibly reflecting market adaptation mechanisms. This finding partially aligns with Ozekhome and Braimah (2023), who found a positive relationship between transaction costs and asset prices, suggesting that investors may overlook high costs if expected returns remain attractive. It also mirrors Omoruyi and Osaigbovo (2023), who found transaction costs insignificant in the long run, reinforcing the notion that such frictions may not deter sustained market participation in emerging markets. Additionally, Brière et al. (2019) found that transaction costs reduce net returns primarily for large portfolios but that strategies remain viable for average investors—implying that transaction cost effects are context-dependent. This nuanced impact

suggests that in South Africa's case, investors may tolerate transaction costs in the short term while factoring them into long-run return expectations. The short-run significance justifies continued regulatory monitoring of market frictions, although reforms may not need to prioritize cost reduction over other structural improvements.

4.4.2. Liquidity Constraints and Market Capitalisation

Liquidity constraints were found to have a statistically significant and negative short-run effect on market capitalisation ($p = 0.0314$), while the long-run effect was statistically insignificant. This implies that liquidity shocks can quickly impair investor confidence and market participation but may be less impactful over time as markets adjust. This result aligns with Tran, Tam, and Hong (2024), who found that macroeconomic fundamentals, such as growth, directly influence liquidity, and that liquidity disruptions can have self-correcting feedback mechanisms. It also supports Mupondo (2022), who linked liquidity to market volatility, and Ozekhome and Braimah (2023), who reported that illiquidity significantly depresses asset prices due to reduced trading efficiency. Similarly, Nurhayati (2018) showed that trading frictions negatively correlate with liquidity and stock prices. These findings suggest that in the South African context, liquidity constraints operate primarily through short-term channels, immediately affecting capital flow and pricing accuracy, but are absorbed over time through adaptive investor behavior. This underscores the need for liquidity-enhancing interventions, such as market-making incentives and broader asset participation, to cushion short-run shocks and maintain market stability.

4.4.3. Information Asymmetry and Stock Market Performance

The study found that information asymmetry (IAS) has a significant and negative effect on stock market performance in both the short run ($p = 0.0083$) and long run ($p < 0.001$). This result is strongly supported by several empirical studies. Ogbeifun (2024) found that information asymmetry reduces investor confidence and disrupts pricing efficiency in Nigeria, leading to weaker market outcomes. Similarly, Ozekhome and Braimah (2023) demonstrated that lower transparency results in depressed asset valuations due to increased risk perception. The finding is also consistent with Hossain (2021), who argued that persistent trading anomalies in mature markets like the U.S. stem from behavioural and informational frictions, highlighting that market efficiency is often undermined by asymmetric information. Furthermore, Iwuagwu (2016) identified poor disclosure and speculative behavior as key contributors to volatility and inefficiency in Nigeria's capital market. South Africa's capital market, though relatively more developed, still appears susceptible to the damaging effects of asymmetry, particularly on valuation and capital allocation. This reinforces the call for stronger corporate governance, enhanced disclosure frameworks, and real-time market information systems to improve transparency and restore investor confidence over both time horizons.

4.4.4. Regulatory Quality and Market Capitalisation

The findings indicate that regulatory quality (RQI) does not exert a statistically significant influence on market capitalisation in either the short run ($p = 0.2787$) or the long run ($p = 0.3899$), suggesting that the existing regulatory environment may not be

sufficiently robust or targeted to impact investor behaviour or market dynamics directly. This contrasts with Ogbeifun (2024) and Oshadare, Idolor, and Adelowotan (2022), who found that regulation—while modest in magnitude—has a significant positive effect on market performance by improving market access and ensuring compliance. However, the South African case aligns more closely with Igbinedion and Abudu (2023), who emphasized that regulatory frictions may persistently distort investment decisions when frameworks are inconsistent or weakly enforced. It also echoes Uhunmwangho (2022), who argued that poorly calibrated financial regulations can increase volatility rather than promote stability. The absence of significant regulatory impact in this study may reflect either a lag in policy effectiveness or investor perception of regulation as insufficiently transformative. This calls for a reevaluation of regulatory frameworks to ensure coherence, adaptability, and investor-centric reform particularly through enforcement, simplification of compliance procedures, and alignment with global best practices.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION, AND RECOMMENDATIONS

5.1 Introduction

As the study draws to a close, this concluding chapter presents a comprehensive summary of the key findings, the overall conclusions derived from the analysis, and practical recommendations aimed at addressing the issues explored in the research.

5.2 Summary of Findings

This research explored how financial market frictions affect stock market performance in South Africa over the period 1990 to 2024, utilizing data availability as the basis for the time frame. To achieve the study's objectives, four hypotheses were formulated and analyzed through the application of the ARDL technique, a robust method suited for exploring short and long-run relationships. Based on the analysis conducted, the following findings were made:

The results indicate that transaction costs have a statistically significant positive effect on stock market performance in the short run (lagged TC, $p = 0.0102$), while the current and long-run effects are statistically insignificant. This suggests that investors may adjust to transaction costs over time, possibly reflecting market adaptation mechanisms.

Liquidity constraints were found to have a statistically significant and negative short-run effect on market capitalisation ($p = 0.0314$), while the long-run effect was statistically insignificant. This implies that liquidity shocks can quickly impair investor confidence and market participation but may be less impactful over time as markets adjust.

The study found that information asymmetry (IAS) has a significant and negative effect on stock market performance in both the short run ($p = 0.0083$) and long run ($p < 0.001$).

The findings indicate that regulatory quality (RQI) does not exert a statistically significant influence on market capitalisation in either the short run ($p = 0.2787$) or the long run ($p = 0.3899$), suggesting that the existing regulatory environment may not be sufficiently robust or targeted to impact investor behaviour or market dynamics directly.

5.3 Conclusion

This study set out to examine the impact of financial market frictions on stock market performance in South Africa, focusing on the roles of transaction costs, liquidity constraints, information asymmetry, and regulatory quality over the period 1990–2024. Employing the ARDL approach, which effectively captures both short- and long-run dynamics, the study found that while transaction costs have a short-term positive effect, their influence diminishes over time. Liquidity constraints negatively affect market performance in the short run but lack long-term significance, pointing to temporal disruptions in capital flows. Information asymmetry emerged as the most critical friction, significantly and negatively influencing market capitalisation in both timeframes, thereby underlining the central role of transparency in capital markets. In contrast, regulatory quality was found to have no statistically significant effect, suggesting either a perception gap or deficiencies in policy design or enforcement. Collectively, these findings underscore the differentiated nature of financial frictions and call for targeted, evidence-

based policy interventions to enhance market efficiency and investor confidence in South Africa's capital market.

5.4 Recommendations

Based on the findings of the study, the following recommendations were made;

Although the short-run impact of transaction costs is statistically significant, reforms should aim to simplify and standardize transaction fee structures to improve market accessibility and reduce investor uncertainty. Enhancing technological infrastructure (e.g., digital platforms and automated trading systems) could also reduce indirect trading costs and increase efficiency.

Policymakers and regulators should implement liquidity-enhancing measures, such as expanding market-making programs, promoting secondary listings, and encouraging institutional investor participation. These steps would reduce temporary shocks in trading activity and foster sustained investor engagement.

Strengthening disclosure requirements, corporate governance, and real-time market surveillance systems is crucial. Regulatory bodies like the Financial Sector Conduct Authority (FSCA) and the Johannesburg Stock Exchange (JSE) should enhance transparency by enforcing timely and accurate information dissemination by listed firms.

While regulatory quality was not statistically significant, efforts should still be directed at improving policy coherence, enforcement consistency, and stakeholder engagement.

Reforms should focus on eliminating procedural bottlenecks, aligning regulations with

international standards, and increasing market participants' trust in regulatory institutions.

5.5 Suggestions for Further Studies

Future research could expand on this study by incorporating additional market frictions such as taxation, capital mobility restrictions, and foreign investment barriers, which were not examined here but are known to influence investor behavior and capital market depth. Moreover, disaggregating market capitalisation into sectoral indices (e.g., financial, industrial, mining) could help in identifying sector-specific friction effects and policy sensitivities. This would provide more granular insight into how different components of the capital market respond to structural inefficiencies.

In addition, subsequent studies should consider employing panel data approaches that incorporate firm-level characteristics over time. This would allow for a more nuanced understanding of how firm-specific factors interact with macro-level frictions to shape stock market performance. Also, using high-frequency data or intraday trading information could offer deeper insights into the microstructure of the market, capturing short-term adjustments and behavioural responses to frictions with greater precision.

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APPENDICES

APPENDIX 1: DATA

| Year | Market Capitalization (Current Dollar) | LogMCAP | Stock Traded | Li_Constraint | Transaction Cost (%) | Information Asymmetry (Index) | Regulatory Quality Index (0-100) | Exchange Rate (ZAR/USD) |
|------|--|------------|--------------|---------------|----------------------|-------------------------------|----------------------------------|-------------------------|
| 1990 | 1.36869E+11 | 11.1363042 | 8245810000 | 0.06025 | 1.2 | 0.8 | 0.45501 | 2.5885 |
| 1991 | 1.84705E+11 | 11.2664779 | 8078710000 | 0.04374 | 1.18 | 0.797 | 0.46501 | 2.7633 |
| 1992 | 1.64046E+11 | 11.2149651 | 7242640000 | 0.04415 | 1.25 | 0.794 | 0.47501 | 2.8524 |
| 1993 | 2.17098E+11 | 11.3366549 | 7914560000 | 0.03646 | 1.22 | 0.791 | 0.48501 | 3.2721 |
| 1994 | 2.59523E+11 | 11.4141765 | 13356750000 | 0.05147 | 1.15 | 0.788 | 0.49501 | 3.5526 |
| 1995 | 2.77389E+11 | 11.4430898 | 15947900000 | 0.05749 | 1.1 | 0.785 | 0.50501 | 3.6284 |
| 1996 | 2.41571E+11 | 11.3830450 | 26646700000 | 0.11031 | 1.12 | 0.782 | 0.51501 | 4.3011 |
| 1997 | 2.3004E+11 | 11.3618030 | 42069040000 | 0.18288 | 1.3 | 0.765 | 0.51139 | 4.6072 |
| 1998 | 1.68536E+11 | 11.2266915 | 54282820000 | 0.32209 | 1.35 | 0.762 | 0.50777 | 5.5417 |
| 1999 | 2.59739E+11 | 11.4145377 | 72818840000 | 0.28035 | 1.28 | 0.759 | 0.52436 | 6.1191 |
| 2000 | 2.04301E+11 | 11.3102700 | 70501850000 | 0.34509 | 1.2 | 0.756 | 0.54094 | 6.9468 |
| 2001 | 1.47472E+11 | 11.1687081 | 35362320000 | 0.23979 | 1.18 | 0.753 | 0.63736 | 8.6093 |
| 2002 | 1.81998E+11 | 11.2600675 | 47686360000 | 0.26202 | 1.22 | 0.75 | 0.73377 | 10.5176 |
| 2003 | 2.60748E+11 | 11.4162214 | 49058710000 | 0.18815 | 1.15 | 0.747 | 0.81959 | 7.555 |
| 2004 | 4.4252E+11 | 11.6459326 | 83768360000 | 0.1893 | 1.1 | 0.73 | 0.69247 | 6.4402 |

| | | | | | | | | |
|------|-------------|------------|-------------|---------|---------|-------|---------|---------|
| 2005 | 5.4931E+11 | 11.7398177 | 1.11313E+11 | 0.20264 | 1.08 | 0.727 | 0.7151 | 6.3606 |
| 2006 | 7.11232E+11 | 11.8520114 | 1.7374E+11 | 0.24428 | 1.75458 | 0.724 | 0.74697 | 6.7668 |
| 2007 | 8.28185E+11 | 11.9181275 | 2.57725E+11 | 0.31119 | 1.34692 | 0.721 | 0.59567 | 7.0477 |
| 2008 | 4.827E+11 | 11.6836772 | 2.02637E+11 | 0.4198 | 2.15996 | 0.718 | 0.65697 | 8.248 |
| 2009 | 7.99024E+11 | 11.9025596 | 2.17514E+11 | 0.27222 | 1.27756 | 0.715 | 0.44918 | 8.4117 |
| 2010 | 9.25007E+11 | 11.9661450 | 2.77224E+11 | 0.2997 | 0.90622 | 0.712 | 0.44557 | 7.3159 |
| 2011 | 7.89037E+11 | 11.8970974 | 2.25831E+11 | 0.28621 | 1.01795 | 0.695 | 0.44641 | 7.251 |
| 2012 | 9.07723E+11 | 11.9579534 | 2.26864E+11 | 0.24993 | 0.93384 | 0.692 | 0.39866 | 8.2014 |
| 2013 | 9.42812E+11 | 11.9744251 | 2.3225E+11 | 0.24634 | 0.90056 | 0.689 | 0.38048 | 9.6436 |
| 2014 | 9.33931E+11 | 11.9703146 | 2.45697E+11 | 0.26308 | 0.89145 | 0.686 | 0.23083 | 10.842 |
| 2015 | 7.35945E+11 | 11.8668454 | 2.33988E+11 | 0.31794 | 1.20538 | 0.683 | 0.20859 | 12.7645 |
| 2016 | 9.5132E+11 | 11.9783267 | 4.02439E+11 | 0.42303 | 1.4284 | 0.68 | 0.11978 | 14.6821 |
| 2017 | 1.23098E+12 | 12.0902500 | 4.09717E+11 | 0.33284 | 0.95569 | 0.677 | 0.13888 | 13.2943 |
| 2018 | 8.65328E+11 | 11.9371805 | 2.95012E+11 | 0.34093 | 1.05617 | 0.66 | -0.0408 | 13.2255 |
| 2019 | 1.05634E+12 | 12.0238043 | 2.84817E+11 | 0.26963 | 0.88238 | 0.657 | 0.00851 | 14.4475 |
| 2020 | 1.05153E+12 | 12.0218211 | 2.93832E+11 | 0.27943 | 1.66325 | 0.654 | 0.0205 | 16.4932 |
| 2021 | 1.143E+12 | 12.0580475 | 2.57974E+11 | 0.2257 | 1.02194 | 0.651 | -0.0907 | 14.7751 |
| 2022 | 1.17175E+12 | 12.0688342 | 2.34088E+11 | 0.19978 | 0.98483 | 0.648 | -0.1851 | 16.3598 |
| 2023 | 1.02583E+12 | 12.0110741 | 2.00029E+11 | 0.19499 | 0.9512 | 0.645 | -0.2237 | 18.4535 |
| 2024 | 9.85697E+11 | 11.9937436 | 1.92028E+11 | 0.19481 | 0.90214 | 0.642 | -0.2237 | 18.3346 |

APPENDIX 2

OUTPUT FROM ANALYSIS

| | MCAP | LQS | TC | IAS | RQI | EXR |
|--------------|-----------|-----------|----------|----------|-----------|----------|
| Mean | 11.68317 | 0.228228 | 1.180584 | 0.721000 | 0.376023 | 8.920403 |
| Median | 11.85201 | 0.246338 | 1.150000 | 0.721000 | 0.465014 | 7.555000 |
| Maximum | 12.09025 | 0.423032 | 2.159960 | 0.800000 | 0.819586 | 18.45350 |
| Minimum | 11.13630 | 0.036456 | 0.882378 | 0.642000 | -0.223700 | 2.588500 |
| Std. Dev. | 0.327647 | 0.104710 | 0.264805 | 0.050588 | 0.292941 | 4.682494 |
| Skewness | -0.315208 | -0.389108 | 1.761867 | 1.02E-15 | -0.695277 | 0.534166 |
| Kurtosis | 1.441341 | 2.516899 | 6.980390 | 1.737116 | 2.434179 | 2.191593 |
| Jarque-Bera | 4.122481 | 1.223552 | 41.21281 | 2.325860 | 3.286781 | 2.617499 |
| Probability | 0.127296 | 0.542387 | 0.000000 | 0.312569 | 0.193324 | 0.270158 |
| Sum | 408.9110 | 7.987982 | 41.32043 | 25.23500 | 13.16081 | 312.2141 |
| Sum Sq. Dev. | 3.649990 | 0.372781 | 2.384129 | 0.087010 | 2.917693 | 745.4754 |
| Observations | 35 | 35 | 35 | 35 | 35 | 35 |

Covariance Analysis: Ordinary

Date: 10/11/25 Time: 09:34

Sample: 1990 2024

Included observations: 35

Covariance

Correlation

t-Statistic

Probability MCAP LQS TC IAS RQI EXR

MCAP 0.104285

1.000000

LQS 0.016548 0.010651

0.496517 1.000000

3.285929 -----

0.0024 -----

TC -0.018246 0.006931 0.068118

| | | | | | | |
|-----|-----------|-----------|-----------|-----------|-----------|----------|
| | -0.216488 | 0.257331 | 1.000000 | | | |
| | -1.273839 | 1.529771 | ----- | | | |
| | 0.2116 | 0.1356 | ----- | | | |
| IAS | -0.014682 | -0.002951 | 0.002947 | 0.002486 | | |
| | -0.911854 | -0.573537 | 0.226498 | 1.000000 | | |
| | -12.76008 | -4.021972 | 1.335849 | ----- | | |
| | 0.0000 | 0.0003 | 0.1907 | ----- | | |
| RQI | -0.059101 | -0.004169 | 0.028220 | 0.010823 | 0.083363 | |
| | -0.633869 | -0.139926 | 0.374489 | 0.751813 | 1.000000 | |
| | -4.707922 | -0.811802 | 2.320107 | 6.549886 | ----- | |
| | 0.0000 | 0.4227 | 0.0267 | 0.0000 | ----- | |
| EXR | 1.109147 | 0.235610 | -0.229758 | -0.213142 | -1.076264 | 21.29930 |
| | 0.744209 | 0.494674 | -0.190747 | -0.926267 | -0.807700 | 1.000000 |
| | 6.400435 | 3.269766 | -1.116254 | -14.11905 | -7.869640 | ----- |
| | 0.0000 | 0.0025 | 0.2724 | 0.0000 | 0.0000 | ----- |

Null Hypothesis: MCAP has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=8)

| | t-Statistic | Prob.* |
|--|-------------|--------|
| Augmented Dickey-Fuller test statistic | -2.280491 | 0.4326 |
| Test critical values: 1% level | -4.252879 | |
| 5% level | -3.548490 | |
| 10% level | -3.207094 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(MCAP)

Method: Least Squares

Date: 10/11/25 Time: 09:36

Sample (adjusted): 1991 2024

Included observations: 34 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|----------------|-------------|------------|-------------|--------|
| MCAP(-1) | -0.315050 | 0.138150 | -2.280491 | 0.0296 |
| C | 3.559156 | 1.540385 | 2.310562 | 0.0277 |
| @TREND("1990") | 0.008227 | 0.004551 | 1.807847 | 0.0803 |

| | | | |
|--------------------|----------|-----------------------|-----------|
| R-squared | 0.154662 | Mean dependent var | 0.025219 |
| Adjusted R-squared | 0.100124 | S.D. dependent var | 0.111022 |
| S.E. of regression | 0.105317 | Akaike info criterion | -1.579583 |
| Sum squared resid | 0.343843 | Schwarz criterion | -1.444904 |
| Log likelihood | 29.85291 | Hannan-Quinn criter. | -1.533654 |
| F-statistic | 2.835866 | Durbin-Watson stat | 1.946085 |
| Prob(F-statistic) | 0.073955 | | |

Null Hypothesis: D(MCAP) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=8)

| | t-Statistic | Prob.* |
|--|-------------|--------|
| Augmented Dickey-Fuller test statistic | -6.485870 | 0.0000 |
| Test critical values: 1% level | -4.262735 | |
| 5% level | -3.552973 | |
| 10% level | -3.209642 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(MCAP,2)

Method: Least Squares

Date: 10/11/25 Time: 09:36

Sample (adjusted): 1992 2024

Included observations: 33 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|----------------|-------------|------------|-------------|--------|
| D(MCAP(-1)) | -1.158083 | 0.178555 | -6.485870 | 0.0000 |
| C | 0.043617 | 0.042923 | 1.016175 | 0.3177 |
| @TREND("1990") | -0.000966 | 0.002077 | -0.465073 | 0.6452 |

| | | | |
|--------------------|----------|-----------------------|-----------|
| R-squared | 0.583888 | Mean dependent var | -0.004470 |
| Adjusted R-squared | 0.556147 | S.D. dependent var | 0.169716 |
| S.E. of regression | 0.113069 | Akaike info criterion | -1.435138 |
| Sum squared resid | 0.383535 | Schwarz criterion | -1.299091 |
| Log likelihood | 26.67977 | Hannan-Quinn criter. | -1.389362 |
| F-statistic | 21.04797 | Durbin-Watson stat | 1.994255 |
| Prob(F-statistic) | 0.000002 | | |

Null Hypothesis: LQS has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=8)

| | t-Statistic | Prob.* |
|--|-------------|--------|
| Augmented Dickey-Fuller test statistic | -1.862095 | 0.6518 |
| Test critical values: 1% level | -4.252879 | |
| 5% level | -3.548490 | |
| 10% level | -3.207094 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(LQS)

Method: Least Squares

Date: 10/11/25 Time: 09:37

Sample (adjusted): 1991 2024

Included observations: 34 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|--------------------|-------------|-----------------------|-------------|--------|
| LQS(-1) | -0.228930 | 0.122942 | -1.862095 | 0.0721 |
| C | 0.048989 | 0.025033 | 1.956993 | 0.0594 |
| @TREND("1990") | 0.000425 | 0.001310 | 0.324580 | 0.7477 |
| R-squared | 0.128132 | Mean dependent var | 0.003958 | |
| Adjusted R-squared | 0.071883 | S.D. dependent var | 0.061297 | |
| S.E. of regression | 0.059053 | Akaike info criterion | -2.736659 | |
| Sum squared resid | 0.108106 | Schwarz criterion | -2.601981 | |
| Log likelihood | 49.52321 | Hannan-Quinn criter. | -2.690730 | |
| F-statistic | 2.277925 | Durbin-Watson stat | 2.094301 | |
| Prob(F-statistic) | 0.119395 | | | |

Null Hypothesis: D(LQS) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 6 (Automatic - based on SIC, maxlag=8)

| | t-Statistic | Prob.* |
|--|-------------|--------|
| Augmented Dickey-Fuller test statistic | -5.803997 | 0.0003 |

| | |
|--------------------------------|-----------|
| Test critical values: 1% level | -4.339330 |
| 5% level | -3.587527 |
| 10% level | -3.229230 |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(LQS,2)

Method: Least Squares

Date: 10/11/25 Time: 09:37

Sample (adjusted): 1998 2024

Included observations: 27 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|--------------|-------------|------------|-------------|--------|
| D(LQS(-1)) | -4.362660 | 0.751665 | -5.803997 | 0.0000 |
| D(LQS(-1),2) | 2.773319 | 0.643798 | 4.307745 | 0.0004 |
| D(LQS(-2),2) | 2.497977 | 0.523057 | 4.775729 | 0.0002 |
| D(LQS(-3),2) | 2.036326 | 0.444740 | 4.578686 | 0.0002 |
| D(LQS(-4),2) | 1.548637 | 0.374935 | 4.130413 | 0.0006 |
| D(LQS(-5),2) | 1.132916 | 0.307241 | 3.687382 | 0.0017 |
| D(LQS(-6),2) | 0.622848 | 0.182955 | 3.404376 | 0.0032 |

| | | | | |
|--------------------|-----------|-----------------------|-----------|--------|
| C | 0.156270 | 0.040171 | 3.890157 | 0.0011 |
| @TREND("1990") | -0.006180 | 0.001671 | -3.699012 | 0.0016 |
| <hr/> | | | | |
| R-squared | 0.843307 | Mean dependent var | -0.002694 | |
| Adjusted R-squared | 0.773665 | S.D. dependent var | 0.104064 | |
| S.E. of regression | 0.049508 | Akaike info criterion | -2.912158 | |
| Sum squared resid | 0.044119 | Schwarz criterion | -2.480212 | |
| Log likelihood | 48.31413 | Hannan-Quinn criter. | -2.783717 | |
| F-statistic | 12.10927 | Durbin-Watson stat | 1.716980 | |
| Prob(F-statistic) | 0.000008 | | | |
| <hr/> | | | | |

Null Hypothesis: TC has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=8)

| | t-Statistic | Prob.* |
|--|-------------|--------|
| Augmented Dickey-Fuller test statistic | -4.495439 | 0.0011 |
| Test critical values: 1% level | -3.639407 | |

5% level -2.951125

10% level -2.614300

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(TC)

Method: Least Squares

Date: 10/11/25 Time: 09:38

Sample (adjusted): 1991 2024

Included observations: 34 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|----------|-------------|------------|-------------|--------|
| TC(-1) | -0.791023 | 0.175961 | -4.495439 | 0.0001 |
| C | 0.931586 | 0.214135 | 4.350460 | 0.0001 |

| | | | |
|--------------------|-----------|-----------------------|-----------|
| R-squared | 0.387079 | Mean dependent var | -0.008760 |
| Adjusted R-squared | 0.367925 | S.D. dependent var | 0.335973 |
| S.E. of regression | 0.267109 | Akaike info criterion | 0.254701 |
| Sum squared resid | 2.283108 | Schwarz criterion | 0.344487 |
| Log likelihood | -2.329921 | Hannan-Quinn criter. | 0.285321 |

| | | | |
|-------------------|----------|--------------------|----------|
| F-statistic | 20.20897 | Durbin-Watson stat | 2.024521 |
| Prob(F-statistic) | 0.000086 | | |

Null Hypothesis: D(TC) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=8)

| | t-Statistic | Prob.* |
|--|-------------|--------|
| Augmented Dickey-Fuller test statistic | -9.284103 | 0.0000 |
| Test critical values: 1% level | -3.646342 | |
| 5% level | -2.954021 | |
| 10% level | -2.615817 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(TC,2)

Method: Least Squares

Date: 10/11/25 Time: 09:38

Sample (adjusted): 1992 2024

Included observations: 33 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|-----------|-------------|------------|-------------|--------|
| D(TC(-1)) | -1.471172 | 0.158461 | -9.284103 | 0.0000 |
| C | -0.011972 | 0.053240 | -0.224871 | 0.8236 |

| | | | |
|--------------------|-----------|-----------------------|-----------|
| R-squared | 0.735483 | Mean dependent var | -0.000881 |
| Adjusted R-squared | 0.726950 | S.D. dependent var | 0.585148 |
| S.E. of regression | 0.305764 | Akaike info criterion | 0.526688 |
| Sum squared resid | 2.898247 | Schwarz criterion | 0.617385 |
| Log likelihood | -6.690349 | Hannan-Quinn criter. | 0.557205 |
| F-statistic | 86.19457 | Durbin-Watson stat | 2.068462 |
| Prob(F-statistic) | 0.000000 | | |

Null Hypothesis: RQI has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=8)

| | t-Statistic | Prob.* |
|--|-------------|--------|
| Augmented Dickey-Fuller test statistic | -1.256283 | 0.8818 |

| | |
|--------------------------------|-----------|
| Test critical values: 1% level | -4.252879 |
| 5% level | -3.548490 |
| 10% level | -3.207094 |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(RQI)

Method: Least Squares

Date: 10/11/25 Time: 09:40

Sample (adjusted): 1991 2024

Included observations: 34 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|----------------|-------------|------------|-------------|--------|
| RQI(-1) | -0.081923 | 0.065211 | -1.256283 | 0.2184 |
| C | 0.090044 | 0.054862 | 1.641285 | 0.1108 |
| @TREND("1990") | -0.004443 | 0.001819 | -2.442091 | 0.0205 |

| | | | |
|--------------------|----------|-----------------------|-----------|
| R-squared | 0.173895 | Mean dependent var | -0.019962 |
| Adjusted R-squared | 0.120598 | S.D. dependent var | 0.076372 |
| S.E. of regression | 0.071619 | Akaike info criterion | -2.350805 |

| | | | |
|-------------------|----------|----------------------|-----------|
| Sum squared resid | 0.159009 | Schwarz criterion | -2.216126 |
| Log likelihood | 42.96368 | Hannan-Quinn criter. | -2.304875 |
| F-statistic | 3.262753 | Durbin-Watson stat | 2.514894 |
| Prob(F-statistic) | 0.051766 | | |

Null Hypothesis: D(RQI) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=8)

| | t-Statistic | Prob.* |
|--|-------------|--------|
| Augmented Dickey-Fuller test statistic | -7.536811 | 0.0000 |
| Test critical values: 1% level | -4.262735 | |
| 5% level | -3.552973 | |
| 10% level | -3.209642 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(RQI,2)

Method: Least Squares

Date: 10/11/25 Time: 09:41

Sample (adjusted): 1992 2024

Included observations: 33 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|----------------|-------------|------------|-------------|--------|
| D(RQI(-1)) | -1.322835 | 0.175516 | -7.536811 | 0.0000 |
| C | 0.042607 | 0.027076 | 1.573573 | 0.1261 |
| @TREND("1990") | -0.003895 | 0.001406 | -2.770011 | 0.0095 |

| | | | |
|--------------------|----------|-----------------------|-----------|
| R-squared | 0.654584 | Mean dependent var | -0.000303 |
| Adjusted R-squared | 0.631556 | S.D. dependent var | 0.116458 |
| S.E. of regression | 0.070690 | Akaike info criterion | -2.374526 |
| Sum squared resid | 0.149911 | Schwarz criterion | -2.238479 |
| Log likelihood | 42.17967 | Hannan-Quinn criter. | -2.328750 |
| F-statistic | 28.42585 | Durbin-Watson stat | 1.957455 |
| Prob(F-statistic) | 0.000000 | | |

Null Hypothesis: EXR has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=8)

| | t-Statistic | Prob.* |
|--|-------------|--------|
| Augmented Dickey-Fuller test statistic | -1.900100 | 0.6325 |
| Test critical values: 1% level | -4.252879 | |
| 5% level | -3.548490 | |
| 10% level | -3.207094 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(EXR)

Method: Least Squares

Date: 10/11/25 Time: 09:41

Sample (adjusted): 1991 2024

Included observations: 34 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|----------|-------------|------------|-------------|--------|
| EXR(-1) | -0.230366 | 0.121239 | -1.900100 | 0.0668 |

| | | | | |
|--------------------|-----------|-----------------------|----------|--------|
| C | 0.484245 | 0.424197 | 1.141555 | 0.2624 |
| @TREND("1990") | 0.112574 | 0.054209 | 2.076670 | 0.0462 |
| <hr/> | | | | |
| R-squared | 0.122391 | Mean dependent var | 0.463121 | |
| Adjusted R-squared | 0.065771 | S.D. dependent var | 1.155423 | |
| S.E. of regression | 1.116780 | Akaike info criterion | 3.142873 | |
| Sum squared resid | 38.66313 | Schwarz criterion | 3.277552 | |
| Log likelihood | -50.42885 | Hannan-Quinn criter. | 3.188803 | |
| F-statistic | 2.161623 | Durbin-Watson stat | 1.696680 | |
| Prob(F-statistic) | 0.132180 | | | |
| <hr/> | | | | |

Null Hypothesis: D(EXR) has a unit root

Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=8)

| | t-Statistic | Prob.* |
|--|-------------|--------|
| Augmented Dickey-Fuller test statistic | -5.208320 | 0.0009 |
| Test critical values: 1% level | -4.262735 | |
| 5% level | -3.552973 | |
| 10% level | -3.209642 | |

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(EXR,2)

Method: Least Squares

Date: 10/11/25 Time: 09:42

Sample (adjusted): 1992 2024

Included observations: 33 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|--------------------|-------------|-----------------------|-------------|--------|
| D(EXR(-1)) | -0.959305 | 0.184187 | -5.208320 | 0.0000 |
| C | 0.172902 | 0.446550 | 0.387196 | 0.7013 |
| @TREND("1990") | 0.015522 | 0.022261 | 0.697253 | 0.4910 |
| R-squared | 0.475318 | Mean dependent var | -0.008900 | |
| Adjusted R-squared | 0.440340 | S.D. dependent var | 1.602114 | |
| S.E. of regression | 1.198548 | Akaike info criterion | 3.286607 | |
| Sum squared resid | 43.09555 | Schwarz criterion | 3.422654 | |
| Log likelihood | -51.22902 | Hannan-Quinn criter. | 3.332383 | |
| F-statistic | 13.58877 | Durbin-Watson stat | 1.955865 | |
| Prob(F-statistic) | 0.000063 | | | |

Date: 10/11/25 Time: 09:43

Sample (adjusted): 1992 2024

Included observations: 33 after adjustments

Trend assumption: Linear deterministic trend

Series: MCAP LQS TC IAS RQI EXR

Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

| Hypothesized | Trace | 0.05 | | |
|--------------|------------|-----------|----------------|---------|
| No. of CE(s) | Eigenvalue | Statistic | Critical Value | Prob.** |
| None * | 0.696602 | 104.3908 | 95.75366 | 0.0111 |
| At most 1 | 0.525990 | 65.03136 | 69.81889 | 0.1135 |
| At most 2 | 0.409908 | 40.39595 | 47.85613 | 0.2087 |
| At most 3 | 0.336577 | 22.98923 | 29.79707 | 0.2466 |
| At most 4 | 0.233339 | 9.447912 | 15.49471 | 0.3256 |
| At most 5 | 0.020379 | 0.679470 | 3.841466 | 0.4098 |

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

| Hypothesized | Max-Eigen | 0.05 | | |
|--------------|------------|-----------|----------------|---------|
| No. of CE(s) | Eigenvalue | Statistic | Critical Value | Prob.** |
| None | 0.696602 | 39.35946 | 40.07757 | 0.0601 |
| At most 1 | 0.525990 | 24.63541 | 33.87687 | 0.4101 |
| At most 2 | 0.409908 | 17.40672 | 27.58434 | 0.5452 |
| At most 3 | 0.336577 | 13.54132 | 21.13162 | 0.4038 |
| At most 4 | 0.233339 | 8.768441 | 14.26460 | 0.3059 |
| At most 5 | 0.020379 | 0.679470 | 3.841466 | 0.4098 |

Max-eigenvalue test indicates no cointegration at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

| MCAP | LQS | TC | IAS | RQI | EXR |
|-----------|-----------|----------|-----------|----------|----------|
| -4.285911 | -4.291660 | 2.034390 | -15.63971 | 1.015132 | 0.007819 |

| | | | | | |
|----------|-----------|-----------|-----------|-----------|-----------|
| 11.97259 | 2.484459 | 0.170179 | 158.9087 | 1.973432 | 1.075084 |
| 1.843165 | 11.37214 | -6.768901 | 71.41764 | -0.354065 | 0.304948 |
| 1.263609 | -13.39090 | -1.322036 | -4.386092 | 7.953485 | 0.450343 |
| 6.545044 | -4.423341 | -0.033284 | 36.83699 | -0.770720 | -0.105752 |
| 3.223311 | 7.132699 | -0.563057 | 21.25364 | 3.389509 | -0.006591 |

Unrestricted Adjustment Coefficients (alpha):

| | | | | | | |
|---------|-----------|-----------|-----------|-----------|-----------|-----------|
| D(MCAP) | 0.026964 | -0.015878 | -0.009035 | 0.018591 | -0.033225 | 0.006387 |
| D(LQS) | 0.003964 | -0.001333 | 0.004499 | 0.012956 | 0.024789 | 0.001543 |
| D(TC) | -0.068035 | -0.077159 | 0.057263 | 0.100220 | 0.056157 | -0.013509 |
| D(IAS) | 0.001393 | -0.001561 | -0.001101 | -0.000154 | 1.34E-05 | -0.000182 |
| D(RQI) | 0.029917 | -0.005509 | 0.022270 | 0.003516 | -0.004723 | -0.003627 |
| D(EXR) | -0.182225 | -0.515842 | 0.133991 | -0.081061 | 0.278864 | -0.008400 |

1 CointegratingLog

Equation(s): likelihood 259.7130

Normalized cointegrating coefficients (standard error in parentheses)

| | | | | | |
|----------|----------|-----------|----------|-----------|-----------|
| MCAP | LQS | TC | IAS | RQI | EXR |
| 1.000000 | 1.001341 | -0.474669 | 3.649098 | -0.236853 | -0.001824 |

(0.61126) (0.21706) (2.40920) (0.26664) (0.02509)

Adjustment coefficients (standard error in parentheses)

D(MCAP) -0.115565

(0.08020)

D(LQS) -0.016988

(0.04931)

D(TC) 0.291590

(0.23262)

D(IAS) -0.005970

(0.00273)

D(RQI) -0.128223

(0.04230)

D(EXR) 0.780998

(0.82236)

2 CointegratingLog

Equation(s): likelihood 272.0308

Normalized cointegrating coefficients (standard error in parentheses)

MCAP LQS TC IAS RQI EXR

| | | | | | |
|----------|----------|-----------|-----------|-----------|-----------|
| 1.000000 | 0.000000 | 0.142011 | 15.78839 | 0.269832 | 0.113745 |
| | | (0.13362) | (1.43511) | (0.15927) | (0.01739) |
| 0.000000 | 1.000000 | -0.615855 | -12.12303 | -0.506006 | -0.115415 |
| | | (0.27040) | (2.90423) | (0.32230) | (0.03520) |

Adjustment coefficients (standard error in parentheses)

| | | |
|---------|-----------|-----------|
| D(MCAP) | -0.305665 | -0.155168 |
| | (0.23452) | (0.09145) |
| D(LQS) | -0.032949 | -0.020323 |
| | (0.14626) | (0.05703) |
| D(TC) | -0.632208 | 0.100282 |
| | (0.66171) | (0.25804) |
| D(IAS) | -0.024655 | -0.009855 |
| | (0.00705) | (0.00275) |
| D(RQI) | -0.194181 | -0.142082 |
| | (0.12473) | (0.04864) |
| D(EXR) | -5.394965 | -0.499542 |
| | (2.05728) | (0.80225) |

3 CointegratingLog

Equation(s): likelihood 280.7341

Normalized cointegrating coefficients (standard error in parentheses)

| MCAP | LQS | TC | IAS | RQI | EXR |
|----------|----------|----------|-----------|-----------|-----------|
| 1.000000 | 0.000000 | 0.000000 | 961.1458 | 25.99414 | 7.500091 |
| | | | (177.860) | (18.5646) | (2.13500) |
| 0.000000 | 1.000000 | 0.000000 | -4111.813 | -112.0635 | -32.14745 |
| | | | (769.950) | (80.3660) | (9.24236) |
| 0.000000 | 0.000000 | 1.000000 | -6656.912 | -181.1426 | -52.01234 |
| | | | (1246.17) | (130.073) | (14.9588) |

Adjustment coefficients (standard error in parentheses)

| | | | |
|---------|-----------|-----------|-----------|
| D(MCAP) | -0.322318 | -0.257917 | 0.113311 |
| | (0.23583) | (0.22769) | (0.12976) |
| D(LQS) | -0.024658 | 0.030835 | -0.022613 |
| | (0.14733) | (0.14225) | (0.08106) |
| D(TC) | -0.526662 | 0.751489 | -0.539150 |
| | (0.65223) | (0.62974) | (0.35887) |
| D(IAS) | -0.026683 | -0.022371 | 0.010018 |
| | (0.00654) | (0.00631) | (0.00360) |
| D(RQI) | -0.153134 | 0.111174 | -0.090817 |
| | (0.11228) | (0.10841) | (0.06178) |
| D(EXR) | -5.147998 | 1.024225 | -1.365475 |

(2.05006) (1.97936) (1.12799)

4 CointegratingLog

Equation(s): likelihood 287.5048

Normalized cointegrating coefficients (standard error in parentheses)

| MCAP | LQS | TC | IAS | RQI | EXR |
|----------|----------|----------|----------|-----------|-----------|
| 1.000000 | 0.000000 | 0.000000 | 0.000000 | -0.072414 | -0.006370 |
| | | | | (0.23716) | (0.01438) |
| 0.000000 | 1.000000 | 0.000000 | 0.000000 | -0.549918 | -0.034572 |
| | | | | (0.12269) | (0.00744) |
| 0.000000 | 0.000000 | 1.000000 | 0.000000 | -0.605162 | -0.022467 |
| | | | | (0.27137) | (0.01646) |
| 0.000000 | 0.000000 | 0.000000 | 1.000000 | 0.027120 | 0.007810 |
| | | | | (0.01947) | (0.00118) |

Adjustment coefficients (standard error in parentheses)

| | | | | |
|---------|-----------|-----------|-----------|-----------|
| D(MCAP) | -0.298827 | -0.506865 | 0.088733 | -3.671656 |
| | (0.23205) | (0.32808) | (0.12927) | (3.14472) |
| D(LQS) | -0.008286 | -0.142663 | -0.039742 | -0.009393 |
| | (0.14421) | (0.20389) | (0.08034) | (1.95435) |

| | | | | |
|--------|-----------|-----------|-----------|-----------|
| D(TC) | -0.400023 | -0.590549 | -0.671644 | -7.547231 |
| | (0.60212) | (0.85129) | (0.33542) | (8.15984) |
| D(IAS) | -0.026879 | -0.020303 | 0.010222 | -0.347708 |
| | (0.00656) | (0.00927) | (0.00365) | (0.08888) |
| D(RQI) | -0.148690 | 0.064086 | -0.095466 | 0.231699 |
| | (0.11246) | (0.15900) | (0.06265) | (1.52405) |
| D(EXR) | -5.250427 | 2.109710 | -1.258308 | -69.19696 |
| | (2.04929) | (2.89735) | (1.14160) | (27.7718) |

5 CointegratingLog

Equation(s): likelihood 291.8890

Normalized cointegrating coefficients (standard error in parentheses)

| MCAP | LQS | TC | IAS | RQI | EXR |
|----------|----------|----------|----------|----------|-----------------------|
| 1.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.003394 (0.01077) |
| 0.000000 | 1.000000 | 0.000000 | 0.000000 | 0.000000 | 0.039578 (0.01601) |
| 0.000000 | 0.000000 | 1.000000 | 0.000000 | 0.000000 | 0.059131 (0.02020) |
| 0.000000 | 0.000000 | 0.000000 | 1.000000 | 0.000000 | 0.004153 |

| | | | | | |
|----------|----------|----------|----------|----------|-----------|
| | | | | | (0.00126) |
| 0.000000 | 0.000000 | 0.000000 | 0.000000 | 1.000000 | 0.134837 |
| | | | | | (0.02964) |

Adjustment coefficients (standard error in parentheses)

| | | | | | |
|---------|-----------|-----------|-----------|-----------|-----------|
| D(MCAP) | -0.516283 | -0.359902 | 0.089839 | -4.895547 | 0.172706 |
| | (0.24173) | (0.31365) | (0.12011) | (2.98594) | (0.13861) |
| D(LQS) | 0.153961 | -0.252314 | -0.040567 | 0.903771 | 0.083743 |
| | (0.14488) | (0.18799) | (0.07199) | (1.78965) | (0.08308) |
| D(TC) | -0.032476 | -0.838949 | -0.673513 | -5.478591 | 0.512210 |
| | (0.65519) | (0.85015) | (0.32555) | (8.09326) | (0.37570) |
| D(IAS) | -0.026791 | -0.020362 | 0.010221 | -0.347213 | -0.002515 |
| | (0.00735) | (0.00954) | (0.00365) | (0.09083) | (0.00422) |
| D(RQI) | -0.179600 | 0.084975 | -0.095308 | 0.057733 | 0.043221 |
| | (0.12534) | (0.16264) | (0.06228) | (1.54827) | (0.07187) |
| D(EXR) | -3.425252 | 0.876201 | -1.267590 | -58.92447 | -2.110048 |
| | (2.15103) | (2.79108) | (1.06881) | (26.5707) | (1.23346) |

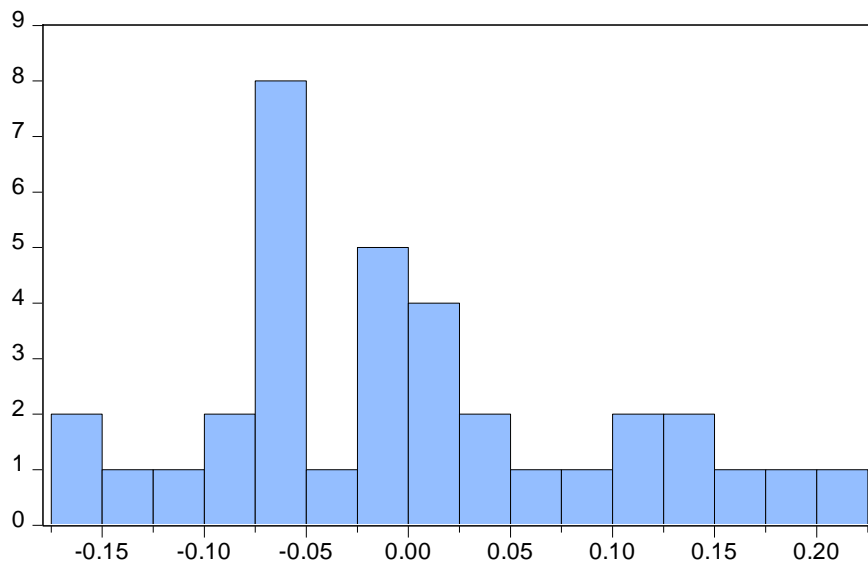
Variance Inflation Factors

Date: 10/11/25 Time: 09:47

Sample: 1990 2024

Included observations: 35

| | Coefficient | Uncentered | Centered |
|----------|-------------|------------|----------|
| Variable | Variance | VIF | VIF |
| LQS | 0.077175 | 14.73792 | 2.501986 |
| TC | 0.006918 | 30.78401 | 1.434401 |
| IAS | 1.232137 | 1958.962 | 9.323620 |
| RQI | 0.016583 | 11.34484 | 4.207831 |
| EXR | 0.000144 | 44.32920 | 9.360106 |
| C | 0.764937 | 2328.359 | NA |



| | |
|-------------------|-----------|
| Series: Residuals | |
| Sample 1990 2024 | |
| Observations 35 | |
| Mean | -8.09e-16 |
| Median | -0.002765 |
| Maximum | 0.204109 |
| Minimum | -0.174770 |
| Std. Dev. | 0.099033 |
| Skewness | 0.333056 |
| Kurtosis | 2.464756 |
| Jarque-Bera | 1.064864 |
| Probability | 0.587175 |

Breusch-Godfrey Serial Correlation LM Test:

| | | | |
|---------------|----------|---------------------|--------|
| F-statistic | 0.954631 | Prob. F(2,27) | 0.3976 |
| Obs*R-squared | 2.311513 | Prob. Chi-Square(2) | 0.3148 |

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 10/11/25 Time: 09:49

Sample: 1990 2024

Included observations: 35

Presample missing value lagged residuals set to zero.

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|--------------------|-------------|-----------------------|-------------|--------|
| LQS | -0.005740 | 0.289812 | -0.019806 | 0.9843 |
| TC | -0.012966 | 0.084092 | -0.154188 | 0.8786 |
| IAS | 0.067467 | 1.153360 | 0.058496 | 0.9538 |
| RQI | 0.006537 | 0.144056 | 0.045381 | 0.9641 |
| EXR | 0.001070 | 0.014098 | 0.075915 | 0.9400 |
| C | -0.044144 | 0.920754 | -0.047943 | 0.9621 |
| RESID(-1) | 0.235886 | 0.204689 | 1.152414 | 0.2593 |
| RESID(-2) | -0.165407 | 0.211828 | -0.780856 | 0.4417 |
| R-squared | 0.066043 | Mean dependent var | -8.09E-16 | |
| Adjusted R-squared | -0.176094 | S.D. dependent var | 0.099033 | |
| S.E. of regression | 0.107400 | Akaike info criterion | -1.426891 | |
| Sum squared resid | 0.311436 | Schwarz criterion | -1.071382 | |
| Log likelihood | 32.97059 | Hannan-Quinn criter. | -1.304169 | |
| F-statistic | 0.272752 | Durbin-Watson stat | 1.865266 | |
| Prob(F-statistic) | 0.959270 | | | |

Heteroskedasticity Test: Breusch-Pagan-Godfrey

| | | | |
|-------------|----------|---------------|--------|
| F-statistic | 2.524365 | Prob. F(5,29) | 0.0515 |
|-------------|----------|---------------|--------|

Obs*R-squared 10.61376 Prob. Chi-Square(5) 0.0596
 Scaled explained SS 5.336594 Prob. Chi-Square(5) 0.3762

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 10/11/25 Time: 09:49

Sample: 1990 2024

Included observations: 35

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|--------------------|-------------|-----------------------|-------------|--------|
| C | -0.113402 | 0.086242 | -1.314927 | 0.1988 |
| LQS | 0.097092 | 0.027393 | 3.544363 | 0.0014 |
| TC | -0.009170 | 0.008202 | -1.118048 | 0.2727 |
| IAS | 0.172256 | 0.109455 | 1.573759 | 0.1264 |
| RQI | -0.020984 | 0.012698 | -1.652526 | 0.1092 |
| EXR | -0.000528 | 0.001185 | -0.445645 | 0.6592 |
| R-squared | 0.303250 | Mean dependent var | 0.009527 | |
| Adjusted R-squared | 0.183121 | S.D. dependent var | 0.011699 | |
| S.E. of regression | 0.010574 | Akaike info criterion | -6.106077 | |

| | | | |
|-------------------|----------|----------------------|-----------|
| Sum squared resid | 0.003242 | Schwarz criterion | -5.839446 |
| Log likelihood | 112.8563 | Hannan-Quinn criter. | -6.014036 |
| F-statistic | 2.524365 | Durbin-Watson stat | 1.898123 |
| Prob(F-statistic) | 0.051502 | | |

Ramsey RESET Test

Equation: UNTITLED

Specification: MCAP LQS TC IAS RQI EXR C

Omitted Variables: Squares of fitted values

| | Value | Df | Probability |
|------------------|----------|---------|-------------|
| t-statistic | 3.147023 | 28 | 0.0039 |
| F-statistic | 9.903752 | (1, 28) | 0.0039 |
| Likelihood ratio | 10.59960 | 1 | 0.0011 |

F-test summary:

| | Sum | of | Mean |
|------------------|----------|----|----------|
| | Sq. | df | Squares |
| Test SSR | 0.087128 | 1 | 0.087128 |
| Restricted SSR | 0.333458 | 29 | 0.011499 |
| Unrestricted SSR | 0.246330 | 28 | 0.008798 |

LR test summary:

| | Value |
|-------------------|----------|
| Restricted LogL | 31.77490 |
| Unrestricted LogL | 37.07469 |

Unrestricted Test Equation:

Dependent Variable: MCAP

Method: Least Squares

Date: 10/11/25 Time: 09:49

Sample: 1990 2024

Included observations: 35

| Variable | Coefficien | | | |
|----------|------------|------------|-------------|--------|
| | t | Std. Error | t-Statistic | Prob. |
| LQS | -8.629942 | 2.659681 | -3.244728 | 0.0030 |
| TC | 1.797533 | 0.555578 | 3.235430 | 0.0031 |
| IAS | -304.6587 | 93.39633 | -3.261998 | 0.0029 |
| RQI | -1.423938 | 0.452752 | -3.145076 | 0.0039 |
| EXR | -1.524498 | 0.467446 | -3.261338 | 0.0029 |
| C | 405.7763 | 122.6108 | 3.309467 | 0.0026 |

FITTED^2 -1.174689 0.373270 -3.147023 0.0039

| | | | |
|--------------------|----------|-----------------------|-----------|
| R-squared | 0.932512 | Mean dependent var | 11.68317 |
| Adjusted R-squared | 0.918050 | S.D. dependent var | 0.327647 |
| S.E. of regression | 0.093795 | Akaike info criterion | -1.718554 |
| Sum squared resid | 0.246330 | Schwarz criterion | -1.407484 |
| Log likelihood | 37.07469 | Hannan-Quinn criter. | -1.611173 |
| F-statistic | 64.48155 | Durbin-Watson stat | 1.673000 |
| Prob(F-statistic) | 0.000000 | | |

Dependent Variable: MCAP

Method: ARDL

Date: 10/11/25 Time: 09:50

Sample (adjusted): 1991 2024

Included observations: 34 after adjustments

Maximum dependent lags: 2 (Automatic selection)

Model selection method: Akaike info criterion (AIC)

Dynamic regressors (2 lags, automatic): LQS TC IAS RQI EXR

Fixed regressors: C

Number of models evaluated: 486

Selected Model: ARDL(1, 0, 1, 0, 0, 0)

Note: final equation sample is larger than selection sample

| Variable | Coefficient | Std. Error | t-Statistic | Prob.* |
|--------------------|-------------|-----------------------|-------------|--------|
| MCAP(-1) | 0.566009 | 0.171134 | 3.307401 | 0.0028 |
| LQS | -0.532536 | 0.234147 | -2.274368 | 0.0314 |
| TC | -0.029069 | 0.073033 | -0.398031 | 0.6939 |
| TC(-1) | 0.171188 | 0.061754 | 2.772091 | 0.0102 |
| IAS | -5.390031 | 1.886343 | -2.857397 | 0.0083 |
| RQI | 0.134810 | 0.121860 | 1.106272 | 0.2787 |
| EXR | -0.019082 | 0.014232 | -1.340802 | 0.1916 |
| C | 9.043701 | 3.345758 | 2.703035 | 0.0119 |
| R-squared | 0.940637 | Mean dependent var | 11.69926 | |
| Adjusted R-squared | 0.924655 | S.D. dependent var | 0.318240 | |
| S.E. of regression | 0.087354 | Akaike info criterion | -1.835374 | |
| Sum squared resid | 0.198398 | Schwarz criterion | -1.476230 | |
| Log likelihood | 39.20135 | Hannan-Quinn criter. | -1.712895 | |
| F-statistic | 58.85491 | Durbin-Watson stat | 2.047316 | |
| Prob(F-statistic) | 0.000000 | | | |

*Note: p-values and any subsequent tests do not account for model selection.

ARDL Error Correction Regression

Dependent Variable: D(MCAP)

Selected Model: ARDL(1, 0, 1, 0, 0, 0)

Case 2: Restricted Constant and No Trend

Date: 10/11/25 Time: 09:50

Sample: 1990 2024

Included observations: 34

ECM Regression

Case 2: Restricted Constant and No Trend

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|--------------------|-------------|-----------------------|-------------|--------|
| D(TC) | -0.029069 | 0.046889 | -0.619962 | 0.5407 |
| CointEq(-1)* | -0.433991 | 0.087429 | -4.963928 | 0.0000 |
| R-squared | 0.512238 | Mean dependent var | 0.025219 | |
| Adjusted R-squared | 0.496995 | S.D. dependent var | 0.111022 | |
| S.E. of regression | 0.078740 | Akaike info criterion | -2.188315 | |
| Sum squared resid | 0.198398 | Schwarz criterion | -2.098529 | |
| Log likelihood | 39.20135 | Hannan-Quinn criter. | -2.157695 | |
| Durbin-Watson stat | 2.047316 | | | |

* p-value incompatible with t-Bounds distribution.

Null Hypothesis: No levels
relationship

F-Bounds Test

| Test Statistic | Value | Signif. | I(0) | I(1) |
|----------------|----------|---------|------|------|
| F-statistic | 2.860067 | 10% | 2.08 | 3 |
| k | 5 | 5% | 2.39 | 3.38 |
| | | 2.5% | 2.7 | 3.73 |
| | | 1% | 3.06 | 4.15 |

ARDL Long Run Form and Bounds Test

Dependent Variable: D(MCAP)

Selected Model: ARDL(1, 0, 1, 0, 0, 0)

Case 2: Restricted Constant and No Trend

Date: 10/11/25 Time: 09:51

Sample: 1990 2024

Included observations: 34

Conditional Error Correction Regression

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|-----------|-------------|------------|-------------|--------|
| C | 9.043701 | 3.345758 | 2.703035 | 0.0119 |
| MCAP(-1)* | -0.433991 | 0.171134 | -2.535973 | 0.0176 |
| LQS** | -0.532536 | 0.234147 | -2.274368 | 0.0314 |
| TC(-1) | 0.142119 | 0.090855 | 1.564229 | 0.1299 |
| IAS** | -5.390031 | 1.886343 | -2.857397 | 0.0083 |
| RQI** | 0.134810 | 0.121860 | 1.106272 | 0.2787 |
| EXR** | -0.019082 | 0.014232 | -1.340802 | 0.1916 |
| D(TC) | -0.029069 | 0.073033 | -0.398031 | 0.6939 |

* p-value incompatible with t-Bounds distribution.

** Variable interpreted as $Z = Z(-1) + D(Z)$.

Levels Equation

Case 2: Restricted Constant and No Trend

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|----------|-------------|------------|-------------|--------|
| LQS | -1.227066 | 0.775842 | -1.581592 | 0.1258 |
| TC | 0.327469 | 0.222015 | 1.474986 | 0.1522 |
| IAS | -12.41968 | 2.374259 | -5.230970 | 0.0000 |
| RQI | 0.310628 | 0.355241 | 0.874416 | 0.3899 |

| | | | | |
|-----|-----------|----------|-----------|--------|
| EXR | -0.043969 | 0.023553 | -1.866766 | 0.0733 |
| C | 20.83844 | 1.784388 | 11.67820 | 0.0000 |

$$EC = MCAP - (-1.2271 * LQS + 0.3275 * TC - 12.4197 * IAS + 0.3106 * RQI - 0.0440 * EXR + 20.8384)$$

Null Hypothesis: No levels relationship

F-Bounds Test

| Test Statistic | Value | Signif. | I(0) | I(1) |
|--------------------|----------|---------|------|------|
| Asymptotic: | | | | |
| n=1000 | | | | |
| F-statistic | 2.860067 | 10% | 2.08 | 3 |
| K | 5 | 5% | 2.39 | 3.38 |
| | | 2.5% | 2.7 | 3.73 |
| | | 1% | 3.06 | 4.15 |
| Finite | | | | |
| Sample: | | | | |
| Actual Sample Size | 34 | | n=35 | |

| | | |
|-----|-------|-------|
| 10% | 2.331 | 3.417 |
| 5% | 2.804 | 4.013 |
| 1% | 3.9 | 5.419 |

Finite

Sample:

n=30

| | | |
|-----|-------|-------|
| 10% | 2.407 | 3.517 |
| 5% | 2.91 | 4.193 |
| 1% | 4.134 | 5.761 |

Dependent Variable: MCAP

Method: Robust Least Squares

Date: 10/11/25 Time: 09:51

Sample: 1990 2024

Included observations: 35

Method: M-estimation

M settings: weight=Bisquare, tuning=4.685, scale=MAD (median centered)

Huber Type I Standard Errors & Covariance

| Variable | Coefficient | Std. Error | z-Statistic | Prob. |
|-----------------------|-------------|------------------------|-------------|--------|
| LQS | -0.373897 | 0.299009 | -1.250452 | 0.2111 |
| TC | 0.069448 | 0.089524 | 0.775751 | 0.4379 |
| IAS | -10.84890 | 1.194749 | -9.080481 | 0.0000 |
| RQI | -0.026227 | 0.138605 | -0.189220 | 0.8499 |
| EXR | -0.053915 | 0.012933 | -4.168889 | 0.0000 |
| C | 19.99460 | 0.941369 | 21.23991 | 0.0000 |
| Robust Statistics | | | | |
| R-squared | 0.747096 | Adjusted R-squared | 0.703491 | |
| Rw-squared | 0.921706 | Adjust Rw-squared | 0.921706 | |
| Akaike info criterion | 42.09761 | Schwarz criterion | 53.34827 | |
| Deviance | 0.295298 | Scale | 0.096039 | |
| Rn-squared statistic | 242.9070 | Prob(Rn-squared stat.) | 0.000000 | |
| Non-robust Statistics | | | | |
| Mean dependent var | 11.68317 | S.D. dependent var | 0.327647 | |
| S.E. of regression | 0.107634 | Sum squared resid | 0.335966 | |