

UNIVERSITY OF KWAZULU-NATAL



The effect of inclusion and exclusion of stocks from the JSE small cap index on stock performance.

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**A dissertation submitted in partial fulfilment of the requirements for the degree of
Master of Finance**

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2025

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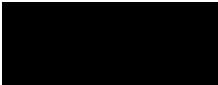
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DEDICATION

I dedicate this dissertation to my late parents, Sizwe and Nomthikazelo Mthimkhulu, whose love and guidance continue to inspire me every day. To my siblings, Ntokozo and Thabile Mthimkhulu, thank you for your unwavering support and encouragement throughout this journey.

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“The experience of defeat, or more particularly the manner in which a leader reacts to it, is an essential part of what makes a winner.”

- Sir Alex Ferguson

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ABSTRACT

Small-cap equities on the Johannesburg Stock Exchange (JSE) operate in a low-liquidity environment where pricing can be sensitive to index rebalancing activity. Despite the importance of these stocks for domestic capital formation, limited empirical work has examined how index revisions influence their performance. The study examined how the inclusion and exclusion of stocks from the FTSE/JSE Small Cap Index affects stock performance, focusing on both short- and long-term abnormal returns around index revision announcements. The study aimed to determine how inclusions and exclusions affect stock prices in the short and long term, and whether the two event types produce significantly different outcomes. A quantitative research design was employed, using secondary data from the Johannesburg Stock Exchange over the period 2013 to 2023. The event study methodology was applied, with a 125-day estimation window and event windows of $[-10,+10]$ and $[-20,+30]$, using the market model to estimate expected returns. Abnormal returns (AR), cumulative abnormal returns (CAR), and cumulative average abnormal returns (CAAR) were calculated and tested for statistical significance. The results showed that inclusions generated marginal and statistically insignificant positive returns, suggesting that market participants do not overreact to index additions. In contrast, exclusions led to significant negative abnormal performance in the short term, consistent with the price pressure and information hypotheses. Over longer horizons, inclusions exhibited gradual recovery and sustained positive cumulative returns, while exclusions continued to underperform, though the losses moderated over time. The findings indicate that the JSE Small Cap Index responds asymmetrically to index revisions, with stronger and more persistent effects for deletions than for additions. The study concludes that while index inclusions do not produce abnormal gains, exclusions trigger short-term inefficiencies that present both risks and opportunities for market participants. The study offers practical insight for investors and policymakers. Investors may treat exclusion announcements as actionable signals, as short-term selling pressure can create opportunities or highlight liquidity concerns. For regulators and the JSE, the results emphasise the vulnerability of small-cap stocks to order-flow shocks, reinforcing the need to monitor liquidity standards, index-review practices and rebalancing procedures.

Keywords: FTSE/JSE Small Cap Index; index effects; abnormal returns; event study; market efficiency

TABLE OF CONTENTS

DECLARATION	i
DEDICATION.....	iii
ACKNOWLEDGMENTS	iv
ABSTRACT	v
Chapter 1: Introduction	2
1.1. Background of the Study	2
1.2. Research Problem	4
1.3. Research Aim.....	6
1.4. Research Objectives	6
1.5. Research Questions	7
1.6. Hypothesis.....	7
1.7. Significance of the Study.....	7
1.8. Scope of the Study.....	9
1.9. Structure of the Study	11
Chapter 2: Literature Review	12
Introduction.....	12
2.1. Theoretical Review.....	12
2.1.1. Efficient market hypothesis.....	12
2.1.2. Price Pressure Hypothesis.....	12
2.1.3. Imperfect Substitutes Hypothesis	13
2.1.4. Liquidity Cost Hypothesis.....	14
2.1.5. Information Content Hypothesis	15
2.1.6. Investor Recognition Hypothesis	17
2.1.7. Comparative Evaluation.....	18
2.2. Empirical Review.....	19
2.2.1. Empirical Evidence on the Index Effects in Developed Markets.....	19
2.2.2. Empirical Evidence on the Index Effects in Emerging Markets	24
2.2.3. South African Market.....	27
2.3. Synthesis and Identified Gap	31
2.4. Summary	32
Introduction.....	33

3.1.	Research Design.....	33
3.2.	Data Description and Sources	34
3.3.	Data Scope and Period	35
3.4.	Data Sources.....	35
3.5.	Data Types and Sources	35
3.6.	Variables and Measurement.....	35
3.7.	Sample Selection Criteria	36
3.8.	Model Specification	37
3.9.	Assumptions and Limitations of the Event-Study Approach	40
3.10.	Significance Testing	42
Chapter 4: Results and Analysis.....		45
Introduction.....		45
4.1.	Inclusion	45
4.1.1.	Descriptive Statistics of Abnormal Returns	46
4.1.2.	Event-Day Effects	49
4.1.3.	Short-Term Windows for Inclusion.....	50
4.1.4.	Long-Term Windows for Inclusions	52
4.2.	Exclusion.....	54
4.2.1.	Daily Abnormal Return	56
4.2.2.	Event-Day Effects for Exclusions.....	58
4.2.3.	Short-Term Windows for Exclusion	60
4.2.4.	Long-Term Windows for Exclusions	62
4.3.	Comparative Analysis of Inclusions vs Exclusions	64
4.4.	Summary	67
Chapter 5: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS		68
Introduction.....		68
5.1.	Summary of the Study	69
5.2.	Conclusion.....	70
5.3.	Contribution of the Study to the Existing Body of Knowledge	71
5.4.	Recommendations	72
5.5.	Limitations of the Study	73
5.6.	Suggestions for Further Study.....	73

References	74
Appendices	74

LIST OF FIGURES

Figure 4.1: AAR and CAAR for Inclusions (−20 to +30)	53
Figure 4.2: AAR and CAAR in long term window for exclusion	63
Figure 4.3: comparison of AAR and CAAR for long term effect of exclusion	65

LIST OF TABLES

Table 3.1: Definition and Measurement of Key Variables.....	36
Table 3.2: Steps and Definitions of the Event Study Methodology	43
Table 4.1: Descriptive Statistics of Abnormal Returns for Inclusion.....	46
Table 4.2: Daily Summary of Abnormal Returns for Inclusion.....	47
Table 4.3: Event-Day Abnormal Returns for Inclusion.....	49
Table 4.4: Cumulative Average Abnormal Returns for Inclusions.....	50
Table 4.5: CAARs for Inclusions in Long-Term Window	52
Table 4.6: Descriptive Statistics of Abnormal Returns.....	55
Table 4.7: summarises daily abnormal returns across the full event window.....	56
Table 4.8: Event-Day Abnormal Returns (Day 0).....	58
Table 4.9: Cumulative Average Abnormal Returns for exclusion	60
Table 4.10: Cumulative Average Abnormal Returns (CAAR) in Long-Term Window...	62
Table 4.11: Comparative Summary of Abnormal Returns for Inclusions and Exclusions	64

Chapter 1: Introduction

1.1. Background of the Study

Stock market indices are essential tools for tracking and benchmarking equity market performance. They are periodically revised typically on a quarterly basis to reflect changes in market capitalisation, liquidity, and other eligibility criteria set by index providers (Pholohane, Ajuwon and Wesson, 2020). Index revisions lead to the inclusion of new constituents and the removal of others, compelling index-tracking vehicles such as exchange-traded funds (ETFs) and passive mutual funds to rebalance their portfolios accordingly. This mechanical trading can create temporary demand–supply imbalances and price movements that are unrelated to the firms’ underlying fundamentals, highlighting how passive flows may distort short-term market efficiency (Ahn and Patatoukas, 2022; Vijn and Wang, 2022). This raises important questions about market efficiency and investor behaviour.

These phenomena, commonly referred to as the index effect, challenge the assumptions of semi-strong form efficiency within the Efficient Market Hypothesis (EMH), which posits that stock prices fully and instantaneously incorporate all publicly available information (Fama, 1970). The index effect describes the abnormal returns, trading volume changes, and volatility observed when a stock is added to or removed from a major index (Harris & Gurel, 1986; Shleifer, 1986; Green & Jame, 2011). Inclusions often generate upward price movements due to mechanical buying by index-tracking funds, while exclusions tend to produce short-term selloffs. These price adjustments, if not fully justified by changes in fundamentals, imply that demand curves for stocks are not perfectly elastic, allowing temporary liquidity and attention-driven mispricing to persist (Wurgler & Zhuravskaya, 2002).

Several hypotheses have been advanced to explain the mechanics of these reactions. The price-pressure hypothesis attributes short-term price changes to temporary imbalances in demand and supply (Harris & Gurel, 1986); it predicts transient price increases for inclusions, as index funds buy newly added stocks, and temporary declines for exclusions, as they sell removed constituents. The information-signalling hypothesis views inclusion as a positive signal of firm quality, prompting investors to reassess valuations upward, whereas exclusion may signal deteriorating fundamentals and induce more persistent declines (Chen, Noronha & Singal, 2004). The liquidity hypothesis suggests that inclusion enhances liquidity, reduces trading costs, and increases participation yielding sustained value gains while exclusion reduces visibility and liquidity, causing wider spreads and short-term underperformance (Mikkelson & Partch, 1985). In contrast, the imperfect-substitutes hypothesis posits that securities are not

perfect substitutes, so demand shifts by index funds create enduring price effects in both directions, with inclusions gaining and exclusions losing as investors rebalance (Shleifer, 1986). Collectively, these explanations demonstrate that index revisions influence prices through both structural mechanisms such as passive fund rebalancing and liquidity shifts and behavioural mechanisms driven by investor sentiment and recognition. Recent evidence shows that these channels have intensified with the growth of passive investing, which amplifies mechanical flows and co-movement across indexed securities (Ahn & Patatoukas, 2021; Atmaz & Zhou, 2025).

The growing dominance of passive investing further intensifies the relevance of the index effect. Over the past two decades, the rapid expansion of exchange-traded funds (ETFs) and index-tracking mutual funds has transformed market structure, linking index revisions more directly to trading flows and short-term price movements. Because these funds replicate benchmark compositions mechanically, index changes now trigger large and predictable buy-and-sell orders that can amplify short-term demand imbalances (Atmaz & Zhou, 2025). In South Africa, this global shift is mirrored by the emergence of domestic passive products such as the Satrix Small Cap ETF, which replicates the performance of the FTSE/JSE Small Cap Index and must rebalance whenever the index composition changes (Naicker, 2022). While passive management improves diversification and lowers transaction costs, it can also generate non-fundamental trading pressures that distort prices, heighten co-movement across constituents, and temporarily weaken market efficiency (Baker & Wurgler, 2007; Elton & Gruber, 2013). These effects tend to be more pronounced in less liquid market segments, where limited depth and slower arbitrage allow rebalancing shocks to persist longer indicating why passive investment growth has renewed academic interest in the mechanisms underlying index effects.

Empirical findings on index effects vary widely across markets. In the United States, studies on the S&P 500 consistently report short-term price increases following inclusion, driven by liquidity improvements and index fund demand, though these gains often partially reverse over time (Shleifer, 1986; Jain, 1987; Höfler, Schlag & Schmeling, 2024). In Europe, evidence from indices such as the Financial Times Stock Exchange (FTSE) 100 and OMX Copenhagen 25 suggests that inclusion effects can be more persistent, indicating the presence of informational or reputational components alongside liquidity dynamics (Bechmann, 2004). In contrast, studies of Asian markets including Japan, China, and Singapore document smaller and shorter-lived effects, reflecting structural differences in market depth, institutional participation, and

passive fund penetration (Liu, 2000; Dong *et al.*, 2023). Across regions, the magnitude and persistence of the index effect appear to depend on liquidity conditions, investor composition, and the scale of passive investment activity (Afego, 2017; Atmaz & Zhou, 2025).

While the index effect has been extensively studied in developed markets, its dynamics in emerging markets remain less understood. Emerging exchanges often feature concentrated ownership structures, lower trading volumes, and limited institutional participation, which can magnify price adjustments to index revisions (Afego, 2017). In such environments, thinner liquidity and slower information diffusion reduce the capacity for arbitrage, allowing price distortions to persist longer than in more developed markets. Consequently, index inclusions in emerging markets often exhibit more pronounced and longer-lasting price increases, while exclusions tend to trigger deeper and more persistent declines. In South Africa, recent evidence from the FTSE/JSE Top 40 and Mid Cap indices shows short-term price increases following inclusion, accompanied by liquidity improvements and partial reversals over time, consistent with temporary price-pressure and liquidity effects (Naicker, 2022; Pholohane, Ajuwon & Wesson, 2020). However, smaller segments such as the FTSE/JSE Small Cap Index have received limited academic attention, despite representing a vital component of domestic economic diversification. Firms in this segment are typically characterised by low liquidity, wider bid–ask spreads and limited institutional participation conditions that heighten susceptibility to price-pressure and imperfect-substitute effects. These characteristics suggest that index revisions among small-cap stocks may generate larger and more persistent abnormal returns due to slower arbitrage and stronger liquidity constraints.

Despite growing interest in index effects, evidence from the South African market remains fragmented and largely confined to large-cap indices (Gangat, 2022). This study addresses that gap by examining how inclusions and exclusions in the FTSE/JSE Small Cap Index affect stock performance, both in the short and long term. Understanding these effects provides insight into how small-cap stocks respond to structural shifts in demand, contributes to the literature on market efficiency in emerging economies, and offers practical guidance for investors, fund managers, and policymakers navigating index-driven trading dynamics.

1.2. Research Problem

Most empirical studies on index effects have focused on large-cap and mid-cap indices, leaving limited understanding of how these effects play out in the smaller, less liquid segment of

emerging markets (Israeli, Lee and Sridharan, 2021; Chan & Howard, 2002; Hacibedel and van Bommel, 2006 Pholohane, Ajuwon and Wesson, 2020; Naicker 2022). On the Johannesburg Stock Exchange (JSE), market activity is dominated by a small number of large-cap firms, and both research and policy discussions have historically centred on these companies (Pholohane, Ajuwon & Wesson, 2020). As a result, small-cap firms which play an important role in domestic growth and diversification receive far less attention. This imbalance restricts the broader assessment of market efficiency, particularly in relation to how index revisions affect valuations, trading behaviour and investor responses within the small-cap segment. Recent structural changes in global and domestic markets make this research gap increasingly relevant for several reasons. The rapid growth of passive investment vehicles, such as exchange-traded funds (ETFs) and index-tracking products, has strengthened the mechanical link between index changes and trading behaviour (Naicker, 2022). Locally, the emergence of funds such as the Satrix Small Cap ETF has reinforced this connection within South Africa's small-cap universe. At the same time, heightened post-pandemic market volatility and a renewed focus on inclusive capital-market development have drawn policy attention toward improving liquidity and visibility for smaller listed firms. Understanding how small-cap stocks respond to index revisions has therefore become critical to assessing how modern investment structures influence price discovery and efficiency in emerging markets.

Small-cap stocks differ materially from their large-cap counterparts. They are characterised by lower liquidity, wider bid–ask spreads, and higher sensitivity to liquidity shocks conditions that make them more vulnerable to price-pressure and imperfect-substitute effects during index revisions. When such stocks are added to or removed from an index, the resulting rebalancing activity by index-tracking funds can generate abnormal returns and volatility that are not fully explained by changes in fundamentals. These price adjustments may persist longer in illiquid environments, reflecting the slower diffusion of information and weaker arbitrage capacity typical of smaller market segments (Ahn & Patatoukas, 2021; Metghalchi, Kagochi, and Hayes, 2021).

Despite this, the FTSE/JSE Small Cap Index remains largely unexplored in academic literature. Existing South African research has focused primarily on larger indices such as the FTSE/JSE Top 40 and Mid Cap, documenting temporary price reactions and liquidity effects following inclusions and exclusions (Naicker, 2022; Pholohane, Ajuwon & Wesson, 2020). A more recent study by Gangat (2022) examined small-cap performance and found no consistent size premium or sustained outperformance, suggesting that small-cap dynamics may deviate from

conventional expectations of persistent abnormal returns. Yet, no event-study analysis has systematically tested whether index revisions within the Small Cap Index produce short-term or long-term price and liquidity effects.

Addressing this research problem is essential to evaluating whether the JSE's small-cap segment aligns with the predictions of the semi-strong form of the Efficient Market Hypothesis (EMH) or whether structural features such as thin liquidity and concentrated ownership result in sustained inefficiencies. This study therefore examines how the inclusion and exclusion of stocks from the FTSE/JSE Small Cap Index affect share-price performance, specifically investigating whether these events generate abnormal returns around index revisions and whether such effects differ across short- and long-term horizons. Small-cap stocks differ materially from their large-cap counterparts. They exhibit thinner trading volumes, wider bid-ask spreads, and higher sensitivity to liquidity shocks (Gangat, 2022). When such stocks are added to or removed from a benchmark index, the associated buying or selling pressure from index-tracking funds can trigger pronounced price adjustments that are not fully explained by changes in fundamentals. The resulting abnormal returns and volatility may persist longer in illiquid environments, signalling market inefficiency (Agarwal et al., 2021). Yet, the magnitude and persistence of these effects within the FTSE/JSE Small Cap Index have not been empirically established.

A clear understanding of how small-cap stocks respond to index revisions is therefore crucial for evaluating whether pricing in this segment reflects efficient information processing or whether structural frictions generate persistent distortions. This study addresses that gap through a detailed event-study assessment of abnormal and cumulative abnormal returns surrounding FTSE/JSE Small Cap Index inclusions and exclusions, enabling both short-term and longer-horizon market adjustments to be measured directly.

1.3. Research Aim

The primary aim of this research is to investigate the impact of inclusions and exclusions from the FTSE/JSE Small Cap index on the abnormal returns of the affected stocks.

1.4. Research Objectives

To achieve the research aim, the following specific objectives will be pursued:

- To investigate the short-term and long-term performance of stocks included in the small-cap index, focusing on abnormal and cumulative abnormal returns.

- To investigate the short-term and long-term performance of stocks excluded from the small-cap index, focusing on abnormal and cumulative abnormal returns.
- To compare the short-term and long-term performance of stocks included and excluded from the small-cap index, to determine if there are significant differences in abnormal and cumulative abnormal returns.

1.5. Research Questions

The study will address the following research questions:

- What are the short-term and long-term stock performance for stocks included in the Small Cap index, as measured by abnormal and cumulative abnormal returns?
- What are the short-term and long-term stock performance for stocks excluded from the Small Cap index, as measured by abnormal and cumulative abnormal returns?
- Are there significant differences in the short-term and long-term performance of stocks included and excluded from the small-cap index, as measured by abnormal and cumulative abnormal returns?

1.6. Hypothesis

- **H1 (Price-Pressure Hypothesis):** *Index inclusions and exclusions in the FTSE/JSE Small Cap Index generate short-term abnormal returns consistent with temporary demand imbalances.*
- **H2 (Imperfect-Substitutes Hypothesis):** *If small-cap stocks are poor substitutes for more liquid equities, index revisions will produce cumulative abnormal returns that persist beyond the immediate announcement window.*
- **H3 (Liquidity-Cost Hypothesis):** *Index inclusions are followed by positive medium-term abnormal performance consistent with improvements in liquidity conditions, whereas exclusions exhibit the opposite pattern.*

1.7. Significance of the Study

This study is relevant for investors, fund managers, regulators and scholars interested in how index revisions affect price formation and market efficiency in the South African equity market. Focusing on the FTSE/JSE Small Cap Index sheds light on a neglected segment where lower

liquidity and limited analyst coverage may cause index changes to have outsized effects on prices.

For investors and portfolio managers, the findings provide evidence on how inclusion and exclusion events influence share performance over both short and longer horizons. Understanding whether abnormal returns around index revisions are temporary or persistent can help investors avoid overreacting to mechanical index changes or, alternatively, exploit predictable patterns where they exist. Portfolio managers who track benchmarks or run small-cap mandates can also use the results to refine rebalancing strategies, manage liquidity risk during index review periods, and assess whether index-related trades are likely to generate price slippage or create entry and exit points.

For regulators and policymakers, the study offers empirical input on how well the market serves smaller issuers and investors in the presence of index-tracking activity. If the results show that index inclusions and exclusions lead to sizeable price moves that are not justified by fundamentals, this will signal that mechanical trading and thin liquidity are affecting price formation in ways that may disadvantage some investors. Such evidence can assist the Johannesburg Stock Exchange (JSE) in reviewing index-construction rules, disclosure around index changes and the timing of rebalancing to limit unnecessary volatility in small-cap counters. It can also support the Financial Sector Conduct Authority (FSCA) in assessing whether current market-structure and conduct standards are sufficient to promote fair treatment of investors, orderly trading, and equitable access to capital for smaller firms.

From an academic perspective, the study adds to the relatively limited literature on index effects in emerging markets, and in South Africa in particular. Most prior research has focused on large-cap benchmarks, leaving small-cap stocks and their index behaviour underexplored. Examining the FTSE/JSE Small Cap Index extends empirical tests of the Efficient Market Hypothesis (EMH) to a part of the market where frictions such as illiquidity and information asymmetry are more pronounced. The findings create a base for future work on liquidity, information diffusion and behavioural aspects of pricing in the South African market and other developing economies and may inform comparative studies across indices by size or sector.

Ultimately, the study's findings enhance understanding of how passive investment trends and index-tracking behaviour shape market outcomes in emerging contexts. The evidence generated has practical relevance for decision-making in investment management and policy

formulation while also advancing scholarly discourse on the dynamics of index revisions in less mature market segments.

1.8. Scope of the Study

This study focuses exclusively on companies listed on the FTSE/JSE Small Cap Index in South Africa. The scope is deliberately confined to this segment to capture the distinctive characteristics of small-capitalisation stock such as limited liquidity, higher volatility, and lower institutional coverage which may amplify the effects of index revisions compared to larger, more liquid firms. By concentrating on this under-researched index, the study seeks to generate insights into how inclusion and exclusion events influence price behaviour, investor sentiment, and market efficiency within a relatively thinly traded environment.

The analysis covers a ten-year period from January 2013 to December 2023, selected to ensure sufficient data availability and to capture major structural and behavioural developments in the South African equity market. This starting point is justified by evidence showing that the Johannesburg Stock Exchange (JSE) entered a period of stabilisation and renewed liquidity following the disruptions of the 2008–2009 Global Financial Crisis (GFC). From 2010 onwards, trading activity and volatility gradually normalised, supported by improved investor confidence and more stable macroeconomic conditions (De Beer, Keyser & Van der Merwe, 2015; Mukandi, 2018). The period also coincides with the measured expansion of exchange-traded funds (ETFs) and other index-tracking products on the JSE, reflecting a broader global trend toward passive investing. Studies confirm that after 2010, the number of ETF listings and total assets under management grew steadily, deepening the mechanical link between index revisions and trading activity (Sixpence, 2020; Steyn, 2025; Shenjere, Ferreira-Schenk & Moodley, 2025).

South Africa provides an especially valuable case study for analysing index effects in an emerging-market context. The JSE is Africa's largest and most sophisticated exchange, yet it retains many features typical of developing markets such as high ownership concentration, low analyst coverage, uneven liquidity distribution, and relatively limited passive investment penetration. These characteristics heighten the sensitivity of small-cap stocks to liquidity shocks and investor attention, making South Africa an ideal empirical setting to investigate how index revisions interact with market structure and behavioural factors. The findings derived from this market can therefore offer broader insights into the efficiency of emerging exchanges where institutional depth and passive-fund activity are still evolving.

This ten-year timeframe provides a sufficient horizon to assess both short-term and long-term effects of index revisions while incorporating multiple quarterly rebalancing cycles of the FTSE/JSE indices. It offers a balanced perspective on how post-crisis market recovery, and the rise of passive investing have shaped price dynamics and efficiency in South Africa's small-cap segment.

The study employs a quantitative event-study methodology, which isolates the impact of index inclusions and exclusions on stock performance. The estimation window spans 125 trading days preceding each event to establish normal return behaviour, while event windows of $[-10, +10]$ and $[-20, +30]$ are used to evaluate short- and long-term abnormal performance, respectively. Data on daily stock prices and market returns are sourced from Bloomberg and IRESS McGregor BFA, ensuring reliability and consistency. The variables examined include abnormal returns (AR), average abnormal returns (AAR), and cumulative abnormal returns (CAR), all derived from the market model framework. Descriptive statistics supplement these measures to examine distributional characteristics and test for differences between inclusion and exclusion events.

The study focuses primarily on price effects and does not explicitly analyse changes in trading volume, liquidity ratios, or firm-specific fundamentals such as earnings or leverage, although these factors are recognised as potential contributors to observed market reactions. Geographically, the research is limited to the South African equity market, with specific attention to the JSE's small-cap segment. The findings should therefore be interpreted within this context. The study excludes other FTSE/JSE indices such as the All Share, Mid Cap, and Top 40 indices—which differ in composition, liquidity, and investor base. Furthermore, to ensure analytical integrity, firms undergoing mergers, delistings, or corporate restructuring during the event period were excluded to minimise confounding effects.

Overall, this defined scope allows for a focused and methodologically rigorous examination of how index revisions influence price dynamics in small-cap equities, providing results that are both empirically robust and contextually relevant to South Africa's emerging-market environment.

Assumptions of the Study

This study is based on three assumptions, each supported by prior research and necessary for the event study design:

- **Market Efficiency:** The South African equity market is assumed to exhibit semi-strong form efficiency, where prices respond rapidly to public information such as index inclusions and exclusions (Fama, 1970; MacKinlay, 1997). Empirical evidence from the JSE supports this assumption, although efficiency appears weaker for small-cap stocks due to limited liquidity and slower information diffusion (Mondlane, 2024).
- **Event Isolation:** It is assumed that no major firm-specific or market-wide announcements coincide with the event window. To ensure this, all event dates will be cross-checked against Bloomberg data, and firms affected by mergers, earnings releases, or restructurings will be excluded (Hegde & McDermott, 2004).
- **Model Validity:** The market model is assumed to adequately represent normal return behaviour during the estimation window, allowing reliable identification of abnormal returns attributable to index revisions (MacKinlay, 1997).

1.9. Structure of the Study

This study is organised into five chapters:

Chapter 1: Introduction

- The introduction provides an overview of the study's objectives, significance, and research questions.

Chapter 2: Literature Review

- This chapter examines existing empirical literature on index effects and identifies gaps in the literature, particularly related to the Small Cap Index.

Chapter 3: Methodology

- This chapter describes the research design, including the event study approach and the sample period from 2013 to 2023.

Chapter 4: Data Analysis and Results

- This chapter presents the findings of the empirical analysis, including abnormal returns.

Chapter 5: Conclusion

- This chapter summarises the key findings, discusses their implications, and suggests recommendations for future research.

Chapter 2: Literature Review

Introduction

This chapter critically reviews the literature on the index effect, providing a comprehensive foundation for understanding its theoretical basis and supporting empirical evidence. It begins with a theoretical review, exploring key frameworks that explain the index effect, including hypotheses related to price pressures, liquidity, investor recognition, and information signalling. The subsequent empirical review evaluates studies across developed and emerging markets, highlighting variations in the index effect's magnitude and persistence. Through comparison and synthesis of these perspectives, the chapter highlights gaps in the literature related to South Africa's smaller indices and lays the conceptual and methodological groundwork for the study's investigation of the FTSE/JSE Small Cap Index.

2.1. Theoretical Review

2.1.1. Efficient market hypothesis

The Efficient Market Hypothesis (EMH), formalised by Fama (1970), has been a cornerstone of financial economics since the 1960s, shaping how markets are understood and how investment strategies are designed. The hypothesis exists in three forms: the weak form (prices reflect past price data), the semi-strong form (prices reflect all public information), and the strong form (prices reflect all information, including insider data). This framework has driven a paradigm shift in investing, with many investors abandoning active strategies in favour of passive approaches such as index funds, which aim to replicate market performance at lower costs.

2.1.2. Price Pressure Hypothesis

The Price Pressure Hypothesis (PPH) provides one of the earliest and most influential explanations for the index effect. Scholes (1972) first suggested that abnormal returns following index revisions arise from temporary demand and supply imbalances created by index-tracking funds. When a stock is added to an index, funds must purchase it to replicate the benchmark, creating short-term upward pressure on its price. Conversely, deletions trigger selling pressure and downward price movements. Harris and Gurel (1986) provided seminal empirical evidence in support of this view, showing that additions to the S&P 500 experienced immediate price increases which subsequently reversed, consistent with mechanical trading effects rather than changes in fundamentals. Similarly, Mitchell, Pulvino and Stafford (2004)

found that arbitrageurs often step in to exploit mispricing, hastening the reversion of prices to equilibrium.

The key implication of the PPH is that price effects are transient. As arbitrageurs anticipate the flows of index funds, they position themselves to trade ahead of rebalancing, profiting from short-term distortions. Once index fund buying or selling subsides, prices should converge back to their pre-event fundamentals. The assumption of efficient arbitrage is central to this view. However, this assumption may not hold in contexts where stocks are thinly traded or where transaction costs are high. Small-cap stocks often face wider bid–ask spreads and higher price impact costs, which can inhibit arbitrageurs’ ability to fully offset demand shocks (Kilbert and Subramanian, 2010). Biktimirov (2004) extended this line of reasoning by analysing Russell 2000 inclusions and exclusions, finding that smaller, less liquid firms experienced more persistent effects than larger firms. This evidence suggests that in less liquid markets, the PPH may underestimate the duration of abnormal returns.

The strength of the PPH lies in its ability to explain short-term spikes in prices and trading volumes, which are among the most consistent features of index revisions worldwide. Its limitation, however, is its inability to account for the persistence of effects documented in many studies. If arbitrage were fully effective, no long-term abnormal returns should remain. Yet empirical work in Europe (Bechmann, 2004) and Asia (Yun and Kim, 2011) has found durable effects, raising questions about whether other mechanisms are at play (Chang, Hong & Liskovich, 2015).

In the South African small-cap environment, the price-pressure channel is especially relevant. The FTSE/JSE Small Cap Index contains firms with thinner liquidity and limited market depth, meaning that even modest rebalancing flows from index-tracking funds can exert noticeable pressure on prices. Evidence from emerging markets shows that such flows have larger short-term effects when order books are shallow and trading activity is uneven, a pattern already observed in parts of the JSE (Afego, 2017; Naicker, 2022). These conditions suggest that price pressure may play a meaningful role when firms move into or out of the Small Cap Index.

2.1.3. Imperfect-Substitutes Hypothesis

Shleifer’s (1986) Imperfect-Substitutes Hypothesis (ISH) emerged partly as a critique of the PPH. While PPH assumes temporary imbalances, the ISH argues that securities are not perfect substitutes for one another, implying that demand shifts caused by index inclusions can permanently alter equilibrium prices. Under this framework, the demand curve for individual

stocks is downward sloping. When passive funds increase their holdings of a stock following index inclusion, the price rises permanently because no other stock can perfectly substitute for the increased demand. Conversely, deletions reduce demand, producing lasting declines in value.

Wurgler and Zhuravskaya (2002) in their investigation showed that stocks added to indices experienced sustained increases in demand, as measured by institutional holdings, and corresponding permanent price changes. They interpreted these results as evidence that index membership alters the investor base, thereby reshaping equilibrium demand. Afego (2017), studying African equity markets, extended the ISH to thinly traded environments, arguing that low liquidity and higher trading costs exacerbate imperfect substitutability, thereby linking persistence directly to market frictions rather than temporary order-flow effects.

The ISH offers a compelling explanation for long-run abnormal returns following inclusions, but it is not universally supported. Bechmann (2004) found mixed evidence in Denmark, where some inclusions produced lasting effects while others reversed, suggesting that substitutability varies across stocks and markets. Moreover, the ISH does not fully address liquidity improvements or investor recognition, both of which may also underpin persistent changes. Nonetheless, the ISH has been particularly influential in shifting attention from temporary to permanent price effects (Wurgler, 2010).

The imperfect-substitutes mechanism also carries relevance for the South African small-cap segment. Small-cap firms on the JSE tend to differ materially from mid-cap and large-cap counterparts in terms of liquidity, institutional ownership and risk characteristics, making them poor substitutes for larger, more established firms. Where substitutes are limited, shifts in passive-fund demand can create valuation effects that persist beyond the announcement window. Studies of South African index changes, particularly in the Mid Cap and Top 40 indices, show evidence of lasting adjustments consistent with imperfect substitutability (Pholohane, Ajuwon & Wesson, 2020; Baruch & Zhang, 2022). These findings indicate that similar effects may arise in the Small Cap Index.

2.1.4. Liquidity Cost Hypothesis

The Liquidity Cost Hypothesis (LCH) argues that index membership enhances stock liquidity by increasing trading activity, reducing transaction costs, and improving market depth. As a result, investors demand a lower liquidity premium, leading to a permanent upward adjustment

in the stock's price (Mikkelsen and Partch, 1985). Inclusion therefore has structural effects on trading conditions, while exclusions reduce liquidity and increase costs, depressing valuations.

Edmister, Graham and Pirie (1996) and Erwin and Miller (1998) observed permanent declines in bid-ask spreads and higher turnover following S&P 500 inclusions, linking these improvements to higher valuations, suggesting that liquidity changes can support price effects beyond temporary order-flow pressure. Madhavan and Ming (2002) noted that trading volumes surge around inclusion announcements, consistent with an influx of new participants, and that these liquidity improvements persist beyond the initial event. More recently, Naicker (2022) confirmed similar patterns in the South African context, finding that Top 40 inclusions significantly improved liquidity as measured by turnover ratios and bid-ask spreads.

While the LCH convincingly explains improvements in liquidity-sensitive valuations, its limitation is the difficulty of isolating liquidity effects from other mechanisms. For instance, greater analyst coverage or enhanced investor recognition may simultaneously occur alongside liquidity changes. Moreover, in highly efficient markets, liquidity improvements may already be priced in, limiting observable permanent effects. Nonetheless, in emerging or small-cap contexts where liquidity constraints are binding, the LCH offers a powerful lens for understanding why index membership matters, particularly where arbitrage is limited and liquidity premia are economically significant (Hegde & McDermott, 2004).

Liquidity considerations are central to understanding index effects in South Africa's small-cap market. Firms in the FTSE/JSE Small Cap Index often trade infrequently and exhibit wide bid-ask spreads, making any improvement in visibility or trading activity meaningful. Index inclusion can attract additional trading interest from benchmark-constrained investors, which can narrow spreads and lower transaction costs over time. Research on emerging markets shows that these liquidity improvements can generate incremental valuation gains, especially where pre-inclusion trading was limited (Hearn & Piesse, 2010). The JSE's small-cap conditions therefore make the liquidity-cost channel a plausible explanation for post-inclusion price performance, especially when price effects unfold gradually rather than on the announcement date.

2.1.5. Information Content Hypothesis

Unlike the mechanical trading-based explanations of PPH and ISH, the Information Content Hypothesis (ICH) argues that index membership conveys positive information about a company's fundamentals and prospects implying that price adjustments reflect reassessment of

firm quality rather than demand-driven order flow. Inclusion can be interpreted as a signal of quality, stability, or growth potential, leading to increased analyst coverage, upward earnings revisions, and heightened investor interest (Miller and Rock, 1985). Deletions, conversely, may be seen as negative signals, implying deteriorating fundamentals.

Denis, McConnell, Ovtchinnikov and Yu (2003) provided empirical support by showing that analysts revise earnings forecasts upward for firms added to the S&P 500, and that these firms subsequently exhibit stronger earnings growth. Platikanova (2008) extended this by demonstrating that earnings quality improved for firms following inclusion, suggesting that the information conveyed was not merely symbolic. In Korea, Yun and Kim (2011) found similar results for the KOSPI 200, where inclusions were associated with improved analyst coverage and forecasts. Collectively, this evidence suggests that information-based effects are more likely to emerge in indices where inclusion criteria are selective and interpreted as certification, rather than where membership changes are purely mechanical. The ICH is particularly persuasive in markets where index membership is selective and tied to firm size, liquidity, or governance standards. In such contexts, inclusion signals that a firm has achieved a certain level of prominence, which may attract new investors. However, the hypothesis is less compelling for indices where membership is mechanically determined, where index changes convey little incremental information beyond what is already public, such as the Russell indices. Critics also note that it is difficult to disentangle pure informational effects from coincidental fundamentals. Still, in markets like South Africa, where analyst coverage is relatively thin, index membership may indeed provide a valuable informational signal (Pholohane, Ajuwon and Wesson, 2020).

South African small-cap firms generally receive low levels of analyst coverage and institutional monitoring, which increases information asymmetry relative to larger listed companies. Under such circumstances, index membership may act as an information event by signalling that a firm meets certain transparency and governance standards. This can reduce the perceived cost of acquiring information for investors and make the stock more accessible to professional asset managers. Recent empirical studies indicate that firms with higher information frictions experience stronger index effects when moved into widely followed benchmarks. These features suggest that the information-cost hypothesis may be particularly relevant for the Small Cap Index especially where liquidity improvements alone cannot fully explain gradual post-inclusion revaluation.

2.1.6. Investor Recognition Hypothesis

The Investor Recognition Hypothesis (IRH), developed by Merton (1987), emphasises the role of awareness and visibility in shaping investor demand. Under this framework, index membership broadens the investor base by alerting previously uninformed investors to a stock's existence, without necessarily conveying new fundamental information or altering cash-flow expectations. This reduces perceived risk, increases demand, and lowers the firm's cost of capital. The IRH therefore predicts permanent price increases following inclusions, particularly in markets where information asymmetry is high and retail or institutional investors rely heavily on index benchmarks.

Chen, Noronha and Singal (2004) found that S&P 500 inclusions led to persistent valuation increases, which they attributed to enhanced visibility and analyst coverage. Merton (1987) himself theorised that firms actively seek investor recognition because it lowers financing costs and facilitates growth. This has been confirmed by subsequent research showing that index membership improves marketability, thereby reducing the required return on equity (Beneish and Gardner, 1995). Collectively, these studies suggest that recognition-driven price effects arise not from reassessment of firm fundamentals but from expansion of the investor base, which lowers required returns through diversification rather than improved information. The IRH overlaps with the ICH but focuses more on investor awareness than on perceived fundamental quality. Its strength lies in explaining why even mechanically determined inclusions, which are information-neutral, can still produce lasting price effects through expanded recognition. Its limitation, however, is that empirical evidence is mixed: in highly liquid markets, most investors are already aware of major firms, limiting the incremental recognition effect, once baseline investor awareness is already high. By contrast, in smaller or less liquid markets, the IRH may be particularly relevant.

Recognition effects are especially pertinent in the Small Cap Index, where visibility among institutional investors is limited. Index inclusion can attract new attention from market participants who previously overlooked the firm, prompting a gradual revaluation as the investor base widens. International evidence shows that small-cap firms with limited visibility tend to exhibit stronger recognition effects following index membership changes (Merton, 1987). Given the JSE's lower levels of passive ownership and concentrated analyst coverage, recognition effects are likely to influence how the market interprets small-cap index revisions, particularly where liquidity improvements and information signals alone cannot fully account for gradual post-inclusion revaluation.

2.1.7. Comparative Evaluation

Taken together, the five hypotheses offer complementary explanations for how prices adjust around index inclusions and exclusions, differing mainly in the source, timing, and persistence of valuation effects. The Price-Pressure Hypothesis (PPH) and Imperfect-Substitutes Hypothesis (ISH) both emphasise demand shocks arising from index-tracking activity but diverge in their predictions: the PPH views price movements as temporary distortions driven by mechanical trading, whereas the ISH allows for more persistent valuation changes when securities are not perfect substitutes. The Liquidity-Cost Hypothesis (LCH) shifts the focus from demand shocks to changes in trading conditions, arguing that index membership alters equilibrium prices by reducing transaction costs and improving market depth. In contrast, the Information Content Hypothesis (ICH) and Investor Recognition Hypothesis (IRH) emphasise informational and visibility channels, suggesting that index membership may influence prices by reducing information frictions and expanding the investor base rather than through trading flows alone. Although each framework is supported by empirical evidence, none is sufficient in isolation to explain the wide variation in index effects observed across markets and index types (Afego, 2017).

For South Africa, and particularly for the FTSE/JSE Small Cap Index, these theoretical mechanisms are likely to operate jointly rather than independently. Small-cap shares tend to trade in thin markets, with wide bid–ask spreads and high transaction costs, conditions that weaken arbitrage and heighten sensitivity to even moderate shifts in order flow. This environment increases the relevance of the PPH, as mechanical rebalancing trades may exert disproportionate short-term price pressure. At the same time, small-cap stocks are not close substitutes for more liquid mid- or large-cap firms, implying that demand shifts associated with index membership may translate into more persistent valuation changes consistent with the ISH and LCH. Limited analyst coverage and low institutional monitoring further elevate the importance of the ICH and IRH, as index inclusion may reduce information barriers and enhance investor visibility, while exclusions may have the opposite effect by diminishing attention and confidence (Naicker, 2022).

In this study, only a subset of these hypotheses can be tested directly. Because the analysis focuses on abnormal and cumulative abnormal returns, the empirical tests relate primarily to the PPH, ISH, and LCH, which generate clear and testable predictions regarding the direction, timing, and persistence of return patterns around index events. The ICH and IRH, by contrast, operate through informational and recognition channels that influence longer-term price

formation but cannot be isolated using price-based event-study methods alone. These frameworks are therefore employed interpretively when discussing the results, particularly where observed return behaviour suggests gradual adjustment consistent with changes in investor attention or market frictions rather than purely mechanical trading effects

Drawing on these theoretical foundations, the study proposes the following testable hypotheses:

- **H1 (Price-Pressure Hypothesis):** *Index inclusions and exclusions in the FTSE/JSE Small Cap Index generate short-term abnormal returns consistent with temporary demand imbalances.*
- **H2 (Imperfect-Substitutes Hypothesis):** *If small-cap stocks are poor substitutes for more liquid equities, index revisions will produce cumulative abnormal returns that persist beyond the immediate announcement window.*
- **H3 (Liquidity-Cost Hypothesis):** *Index inclusions are followed by positive medium-term abnormal performance consistent with improvements in liquidity conditions, whereas exclusions exhibit the opposite pattern.*

These hypotheses guide the empirical analysis in Chapters 4 and 5 and provide the basis for interpreting whether pricing patterns around index changes align with temporary mechanical effects or more sustained valuation adjustments.

2.2. Empirical Review

This section reviews empirical studies on the index effect, focusing on evidence from developed markets, emerging markets, and South Africa. It highlights key findings on abnormal returns, trading volumes, and liquidity changes, while explaining variations across regions. The purpose is to synthesize global patterns, identify asymmetries between inclusions and exclusions, and underscore the gap in small-cap research, particularly in emerging contexts like South Africa.

2.2.1. Empirical Evidence on the Index Effects in Developed Markets

Evidence from the United States has improved our understanding of how index inclusions and exclusions affect liquidity and investor behaviour, particularly in markets characterised by deep liquidity and high institutional participation. Early work by Harris and Gurel (1986) documents short-term price pressure and abnormal trading volume surrounding S&P 500 inclusions, consistent with temporary demand shocks rather than permanent revaluation. Building on this

foundation, Hegde and McDermott (2004) examine liquidity effects surrounding S&P 500 index revisions and document statistically significant changes in market microstructure following index reconstitutions. Specifically, index inclusions are associated with narrower bid-ask spreads and increased market depth, while deletions exhibit deterioration in these liquidity measures. These findings are consistent with the liquidity hypothesis, indicating that in an already deep and liquid market such as the S&P 500, index membership is primarily associated with improved trading conditions rather than permanent price effects. Elliott, Van Ness, Walker and Warr (2006) extend this analysis by decomposing the inclusion effect into trading cost, information, and investor recognition components, concluding that liquidity improvements explain a substantial portion of abnormal returns, while shifts in the shareholder base also contribute to longer-lasting valuation effects. The U.S. evidence establishes a benchmark in which index effects are economically meaningful but constrained by high baseline liquidity and rapid arbitrage, with price effects that are largely transitory rather than permanent.

Against this benchmark of economically meaningful but liquidity-constrained index effects, subsequent U.S. research has focused on the role of institutional investors in transmitting and redistributing these effects across market participants. Green, Jame, Markov and Subasi (2011) examine hedge fund trading around S&P 500 index revisions and show that hedge funds systematically accumulate positions ahead of anticipated inclusions, contributing to pronounced pre-effective date price increases. Their evidence indicates that informed investors exploit the predictable component of index committee decisions, thereby accelerating the incorporation of information into prices and compressing the window over which abnormal returns are realised. This suggests that while index effects continue to manifest in developed markets, the associated gains accrue disproportionately to sophisticated investors, reinforcing the interpretation that high institutional participation facilitates faster price adjustment rather than greater persistence in mispricing.

The emphasis on predictability and arbitrage efficiency in these settings motivates the examination of rule-based indices, where mechanical demand effects can be more cleanly separated from informational and discretionary channels. The Russell indices provide a useful testing ground because of their transparent, reconstitution process. Chang, Hong and Liskovich (2015) examined returns around reconstitution for the Russell 1000 and Russell 2000 and found that firms crossing the index assignment cutoff between the indices experienced large abnormal returns and changes in liquidity, even though their fundamentals were similar. Their study

confirmed that mechanical rebalancing rules can generate sizeable non-informational demand shocks even in the absence of fundamental differences, reinforcing the price pressure mechanism rather than information-based explanations. Using a regression discontinuity design, Chang, Hong and Liskovich (2015) demonstrated that these effects largely reverted toward pre-event levels, consistent with temporary price pressure and inconsistent with theories predicting permanent demand- or information-driven revaluation. These findings provide evidence of a defining characteristic of developed market in that even pronounced index-induced distortions tend to unwind quickly when arbitrage is effective and rebalancing rules are transparent.

While evidence from rule-based U.S. indices highlights the role of predictability and arbitrage efficiency in limiting the persistence of index effects, European evidence provides a useful contrast in markets characterised by lower passive-fund penetration and more fragmented ownership structures. Evidence from Europe indicates that while index inclusions and exclusions generate observable price and liquidity effects, these effects are generally more muted than in the United States. Studies of major European indices consistently show that liquidity responses dominate price effects. Becht, Franks, Mayer and Rossi (2011), analysing inclusions in France's CAC 40, document significant post-inclusion reductions in bid-ask spreads and increases in trading volume, but relatively modest price responses relative to the S&P 500. Similar conclusions emerge from Tsenev (2015) in a study of the Euro STOXX 50, which finds temporary price and volume reactions around index revisions without corresponding changes in profitability or earnings expectations. Evidence from Southern Europe reinforces this pattern. Singh, Mehta and Hoolani (2010) report positive announcement effects and elevated trading activity for additions to Spain's IBEX 35, alongside negative reactions for deletions, yet most effects revert within a year. Collectively, European studies indicate that index effects operate primarily through liquidity channels rather than information-driven revaluation, with lower passive adoption and selective index criteria limiting the magnitude and persistence of mechanical demand shocks relative to the United States.

A comparable but institutionally distinct pattern is observed in other developed economies, including Japan, Canada, and Australia. In Japan, Sun (2020) and Liu (2009) document significant short-term abnormal returns and trading turnover around TOPIX and Nikkei 225 revisions, followed by rapid reversals. These transitory price effects are commonly attributed to high baseline liquidity and cross-shareholding arrangements that dampen demand pressure and facilitate rapid price adjustment. Smaller developed markets exhibit similar dynamics.

Shams (2015) finds that inclusions in Canada's S&P/TSX Composite generate temporary price gains and liquidity improvements that dissipate after rebalancing, placing Canada closer to the European than the U.S. pattern. Chan and Howard (2002) report analogous results for the ASX 200 in Australia, where announcement effects and increased trading activity are followed by price reversion once index-tracking demand subsides. Studies of European blue-chip indices, including the FTSE 100 and DAX, further confirm that while index revisions consistently improve liquidity, return effects are small and short-lived (Hacibedel and van Bommel, 2006; Böhmer and Wu, 2019). Across these markets, deep liquidity and institutional maturity constrain persistent mispricing, reinforcing the view that outside the United States, developed-market index effects are predominantly transient and liquidity-driven rather than permanent revaluation.

Building on evidence that developed-market index effects are largely transitory and liquidity-driven, more recent studies indicate that these effects have further weakened in highly mature equity markets due to structural changes in trading technology and information processing. Greenwood and Sammon (2024) show that the magnitude of the S&P 500 index effect has declined substantially over time, attributing this reduction to improvements in market microstructure, increased algorithmic arbitrage, and greater transparency in index construction methodologies. Advances in automated trading, together with the expansion of derivative and exchange-traded fund markets, have altered the transmission of index-related order flow by dispersing demand shocks across multiple correlated instruments and reducing their direct price impact on underlying equities (Oyeniyi, Ugochukwu, and Mhlongo, 2024). Evidence from futures and ETF microstructure analyses further supports this interpretation, documenting enhanced pricing efficiency and a decline in the persistence of index-related anomalies in both United States and global markets (Taylor, 2025). Collectively, this evidence suggests that increased arbitrage capacity not only shortens the duration of index effects but also weakens their ability to generate economically meaningful pricing distortions.

Evidence from global market integration reinforces the conclusion that the attenuation of index effects reflects not only domestic improvements in market microstructure but also increasingly integrated cross-market trading and information transmission. Studies examining international equity return dynamics show that higher levels of cross-market integration accelerate information diffusion and reduce the scope for isolated pricing anomalies. Using cross-country equity return regressions, Das et al. (2019) demonstrate that stronger global correlations diminish abnormal returns associated with index inclusions by enabling price discovery

through correlated securities and cross-border trading channels. As a result, index revisions in highly integrated markets are absorbed more rapidly, limiting both the magnitude and persistence of abnormal returns. This mechanism is consistent with observed declines in index effects across major global benchmarks, including the S&P 500 and FTSE 100, where improved transparency, algorithmic arbitrage, and interconnected trading venues jointly constrain sustained price pressure (Soe and Dash, 2008; Greenwood and Sammon, 2025; Taylor, 2025).

Despite this broad weakening trend, the expression of index effects continues to vary systematically across developed markets due to differences in institutional structure, passive-fund penetration, and ownership composition. In the United States, where passive ownership is relatively high, shifts in index-tracking flows can still generate pronounced short-term price pressure, although these effects typically reverse quickly as arbitrageurs absorb order imbalances (Chinco and Sammon, 2024). European markets, characterised by more selective index criteria and lower passive adoption, tend to exhibit smaller and more liquidity-focused effects, with limited evidence of lasting valuation changes (Bongiorno, 2022). In Asian developed markets, strong liquidity responses coexist with muted price movements, reflecting cross-shareholding arrangements and concentrated ownership structures that dampen non-informational demand shocks (Thi Bich, Ha, and Minh, 2025). These patterns define a developed-market benchmark in which deep liquidity, broad analyst coverage, and high institutional participation constrain the persistence of index-related mispricing.

The developed-market benchmark established in the preceding literature provides a critical point of reference for interpreting the behaviour of the FTSE/JSE Small Cap Index. Developed exchanges are characterised by deep liquidity, extensive analyst coverage, and substantial institutional participation, conditions that facilitate rapid absorption of index-related order flow and limit the persistence of price distortions. By contrast, the small-cap segment of the Johannesburg Stock Exchange operates under materially different institutional conditions, including thinner trading, lower passive-investor presence, and weaker arbitrage capacity. Under such conditions, price adjustments associated with index inclusions and exclusions are expected to be larger in magnitude and slower to unwind than those documented for large-cap indices in developed markets (Baruch and Zhang, 2021; Agarwal, Hanouna, and Moussawi, 2023). These structural differences motivate the examination of the Small Cap Index within its own market context rather than extrapolating conclusions from large-cap or developed-market evidence.

2.2.2. Empirical Evidence on the Index Effects in Emerging Markets

Relative to the developed-market benchmark, evidence from emerging economies documents systematically larger abnormal returns and sharper liquidity responses around index inclusions and exclusions, reflecting weaker arbitrage capacity and more constrained market structures. Whereas developed markets are characterised by deep liquidity, high institutional participation, and rapid absorption of index-related order flow, emerging markets typically operate with thinner trading, lower passive-fund penetration, and narrower investor bases. Under these conditions, index revisions tend to generate more pronounced short-term price reactions, although the persistence of such effects is less uniform and reversals are frequently observed (de Carvalho, Suen, and Gallo, 2016). Emerging-market studies therefore exhibit amplified asymmetries, with exclusions experiencing deeper and more persistent losses due to the joint effects of price pressure and liquidity withdrawal, while inclusions often produce larger initial gains as delayed arbitrage and gradual investor recognition slow the price adjustment process.

Within the emerging-market literature, Brazil has attracted particular attention due to the central role of the Bovespa index as the primary benchmark for both domestic and foreign portfolio investment. As the most liquid segment of the Brazilian equity market, index composition exerts a strong influence on trading activity, passive-fund allocation, and capital flows. de Carvalho, Suen, and Gallo (2016) examine index reconstitutions and document statistically significant abnormal returns around inclusions and exclusions, with inclusion events generating cumulative abnormal returns exceeding 5% over the month following reconstitution. These effects are substantially larger than those typically observed in developed markets, consistent with thinner liquidity amplifying non-informational demand shocks. The authors also report pronounced price reversals, indicating that price pressure rather than permanent revaluation dominates index effects in this setting. Although liquidity improves following inclusion, as reflected in higher trading turnover and narrower bid–ask spreads, these gains do not translate into persistent abnormal performance. Rocha Filho and Rocha (2020) corroborate these findings and further show that foreign institutional investors play a decisive role in amplifying order flow and return volatility around index changes, reinforcing the transitory nature of index-induced price distortions in the Brazilian market.

Empirical evidence from India indicates that index revisions within the NSE Nifty 50 generate economically meaningful but short-lived market reactions consistent with transitory price pressure rather than lasting revaluation. Using an event-study framework, Marisetty (2025) finds that inclusions produce modest positive abnormal returns and elevated trading volumes

around announcement dates, while deletions trigger negative price responses that partially reverse within weeks. Chhatwani (2020) reports similar findings, documenting brief price appreciation and liquidity improvements following index reconstitutions. These results imply that while index events stimulate short-horizon trading activity and capital reallocation, arbitrage activity and improving baseline liquidity limit the persistence of abnormal returns. Relative to Brazil, Indian equity markets exhibit faster price reversals, reflecting a more advanced stage of market integration, although short-term reactions remain stronger than those observed in developed markets due to residual liquidity frictions and expanding foreign institutional participation.

Beyond immediate price responses, related evidence suggests that index-related shocks in India manifest primarily through short-term volatility dynamics rather than sustained valuation changes. Mitra and Changle (2020) show that Nifty 50 returns display volatility clustering captured by GARCH specifications, implying that shocks associated with index rebalancing and macroeconomic news exert temporary but mean-reverting effects on return dynamics. Similarly, Katoch and Sidhu (2019) find that equity returns respond to macroeconomic variables such as exchange rates, money supply, and industrial production, indicating that index revisions are absorbed within a broader system of systematic risk factors. This body of evidence positions India as a transitional emerging market in which index revisions generate short-term distortions and liquidity shifts, while strengthening arbitrage capacity and information diffusion constrain the persistence of index-induced mispricing.

Across the less prominent Asian markets, a broadly consistent pattern emerges in which index inclusions generate short-term positive abnormal returns and higher trading activity, while exclusions produce negative price reactions and liquidity deterioration. Evidence from Malaysia shows that inclusions in indices such as the FTSE Bursa Malaysia EMAS Shariah Index led to temporary price increases and volume spikes, though long-term valuation effects remain weak due to limited analyst coverage and lower investor familiarity with smaller firms (Ng and Zhu, 2016). Further Malaysian evidence indicates that repeated exclusions intensify negative price and liquidity effects, suggesting that cumulative removals erode investor confidence over time (Kassim et al., 2017). In contrast, Thailand and Indonesia display somewhat stronger reactions to inclusions, particularly where index membership attracts international capital flows. For example, inclusions in Thailand's SET50 generate significant abnormal returns, especially for high-beta and technology firms, while Indonesian MSCI inclusions produce pronounced gains and trading-volume increases driven by global investor

participation (Sakunwanit, 2021; Widyawati and Wibowo, 2020). Although all these markets exhibit asymmetry between inclusions and exclusions consistent with the price pressure hypothesis, the persistence and magnitude of the effects differ. Malaysian evidence emphasises investor recognition and signalling mechanisms such as ESG inclusion, whereas Thai and Indonesian results highlight the role of foreign investor attention and global index integration in amplifying price responses.

Extending the emerging-market evidence to a larger but more segmented setting, China provides an instructive case illustrating how index effects interact with liquidity constraints and global capital flows. Li and Sadeghi (2009) analyse 69 inclusions and exclusions from the S&P/CITIC 300 and document significant post-inclusion price increases and narrower bid–ask spreads, alongside widening spreads and reduced trading turnover for deletions. Their results reveal pronounced asymmetry, with liquidity deterioration associated with deletions exceeding the liquidity gains observed following inclusions, consistent with heightened sensitivity to negative non-informational demand shocks. More recent evidence from Dong et al. (2023) shows that the inclusion of China A-shares into MSCI indices generated abnormal returns and sharp increases in trading volume, with these effects strongly amplified during periods of elevated global policy uncertainty, including the United States–China trade conflict. This interaction indicates that partial capital controls, episodic foreign investor access, and exposure to global risk sentiment condition index effects in China, producing large but highly state-contingent price reactions that are more characteristic of emerging than developed markets.

Transitioning from Asia to Europe, evidence from emerging and less liquid European equity markets indicates comparable price pressure dynamics shaped by thinner trading and lower institutional depth than in developed European exchanges. Bankoviča (2007) documents abnormal returns exceeding 5% following inclusions in Central and Eastern European blue-chip indices, magnitudes substantially larger than those typically observed in Western Europe. Adjustments using the Scholes–Williams thin-trading correction indicate that illiquidity materially inflates estimated returns around index events. In contrast, evidence from developed European indices highlights the moderating role of market depth. Vellechová (2021) shows that inclusions in France’s CAC 40 generate positive abnormal returns consistent with liquidity improvement and investor recognition effects, whereas the DAX exhibits muted price responses consistent with rapid price adjustment. The analysis indicates that even within Europe, variation in liquidity conditions and institutional structure materially influences both the magnitude and stability of index effects.

Synthesising across emerging markets reveals several recurring themes. Abnormal returns surrounding index revisions are consistently larger than those observed in developed markets, reflecting thinner liquidity and heightened sensitivity to non-informational portfolio flows (de Carvalho, Suen, and Gallo, 2016). Persistence, however, is generally limited, as price reversals are common and long-run valuation changes are rare (Chen et al., 2019). Liquidity improvements tend to be pronounced in the short term but frequently dissipate over longer horizons, while investor-recognition effects remain constrained except in markets with substantial foreign institutional participation. A pronounced asymmetry also emerges, with exclusions generating sharper and more persistent declines than inclusions generate gains, reflecting the disproportionate impact of forced selling and reduced visibility in thinly traded environments (Madhavan, 2014).

Overall, the emerging-market literature confirms the presence of index effects but shows that their expression differs materially from developed-market benchmarks. Short-run abnormal returns are larger, liquidity responses are more volatile, and exclusion penalties are more severe, yet price adjustments typically reverse as arbitrage activity and information diffusion gradually restore equilibrium. These patterns highlight the role of institutional characteristics, particularly liquidity depth, international investor participation, and index design, in shaping index-related price dynamics. This body of evidence provides a critical reference for examining South Africa, which shares several emerging-market features as a relatively thin and segmented market, but for which empirical evidence remains limited, particularly with respect to the FTSE/JSE Small Cap Index (Cheng et al., 2021).

2.2.3. South African Market

Compared to developed and other emerging markets, empirical evidence on index effects in South Africa remains limited. Nonetheless, a growing body of research has examined how stock inclusions and exclusions influence price dynamics and liquidity on the Johannesburg Stock Exchange (JSE). This literature has focused predominantly on the FTSE/JSE Top 40 and, to a lesser extent, the Mid Cap indices, with little direct evidence relating to the Small Cap segment. Existing findings indicate that while the South African equity market exhibits index-related price and liquidity effects like those documented internationally, the magnitude and persistence of these effects differ, reflecting structural features of the JSE such as low passive-fund penetration, concentrated institutional ownership, and thin liquidity in certain market segments (Heymans and Santana, 2018).

Early evidence suggests that index revisions on the JSE generate price and liquidity responses consistent with price pressure and downward-sloping demand curve hypotheses. Botha (2011), among the first South African dissertations to examine this issue, analyses inclusions and exclusions across JSE indices and documents statistically significant short-term abnormal returns around announcement dates. The results indicate that passive-fund rebalancing and anticipatory trading generate temporary distortions, with prices largely reverting in the post-event period, limiting evidence of permanent valuation effects. Strydom, Charteris and McCullough (2015) report similar patterns in a published study covering a broader set of JSE indices, finding abnormal returns and increased trading volumes around index revisions but little persistence beyond the event window. These studies establish the presence of index effects in South Africa while suggesting that they are generally weaker and shorter-lived than those observed in large developed markets.

More evidence is provided by Kruger and Toerien (2013), who examine quarterly rebalancing events in the FTSE/JSE Top 40 index over the period 2002 to 2013. Using an event-study framework, they document pronounced anticipatory trading effects for deletions, with negative abnormal returns emerging prior to official announcements and peaking around the rebalancing date. Additions, by contrast, exhibit more muted pre-event price responses. Post-event analysis indicates that these price movements tend to reverse, consistent with temporary price pressure rather than lasting revaluation. They attribute these dynamics to the predictability of index rebalancing, which allows informed traders to position ahead of announcements, amplifying short-term distortions. This evidence highlights a key feature of the JSE, namely that index effects are present but strongly shaped by anticipatory trading behaviour and limited arbitrage capacity.

Miller and Ward (2015) extend the South African literature by examining index effects across multiple JSE indices, including the Top 40, RAFI 40, Resources 20, and Financial and Industrial 30 over the period 2002 to 2011. Using the market model, CAPM, and a control-portfolio approach to estimate abnormal returns over extended pre- and post-event windows, they find that index additions experience price increases prior to rebalancing but subsequently underperform, while deletions exhibit the opposite pattern. This reversal behaviour indicates that anticipatory trading generates temporary price pressure that is partially offset once index rebalancing is completed. Although statistical significance varies across indices, the results suggest that mean reversion plays an important role in limiting the persistence of index-related price effects on the JSE.

Building on this evidence, Katzke and van Tiddens (2019) explicitly examine whether predictable rebalancing trades create exploitable arbitrage opportunities. Analysing Top 40 rebalancing events between 2002 and 2018, they document significant pre-event price increases for additions and price declines for deletions, followed by post-event underperformance relative to the index for both groups. These dynamics are consistent with demand-driven price effects rather than information-based revaluation. Trading volumes increase sharply around rebalancing dates, with volumes for additions rising to between four and six times their 60-day moving averages. The authors conclude that while arbitrage opportunities exist, they are highly timing-dependent due to rapid reversals. Their findings highlight that passive-fund flows, although smaller in South Africa than in developed markets, are economically meaningful and sufficient to generate short-lived distortions.

Evidence from Pholohane, Ajuwon and Wesson (2020) introduces a partial departure from the price-pressure interpretation. Analysing 88 Top 40 inclusion and exclusion events between 2002 and 2016 using the market model and alternative CAPM specifications with levered and unlevered betas, they find statistically significant negative abnormal returns for deletions prior to announcements, consistent with anticipatory trading, while additions show weaker immediate effects. Over longer horizons, cumulative abnormal returns increase for additions and decline for deletions, suggesting gradual adjustment rather than instantaneous repricing. The authors interpret this pattern as evidence of information content, arguing that index changes may convey signals regarding firm quality and prospects. This interpretation contrasts with earlier findings and indicates that, in the South African context, index revisions may reflect a combination of mechanical demand effects and limited informational updating.

Differences in interpretation across South African studies largely reflect variation in index composition, event windows, and liquidity conditions, with price pressure dominating short-horizon dynamics and information content effects emerging only over longer horizons and primarily for large-cap constituents. Shifting attention from price dynamics to trading conditions, Naicker (2022) examines liquidity effects associated with index inclusions and exclusions in the Top 40 and Mid Cap indices over the period 2010 to 2020. Using multiple liquidity measures, including turnover, bid–ask spreads, and the Amihud illiquidity ratio, the study finds that inclusions into the Top 40 are associated with significant liquidity improvements, while exclusions result in reduced liquidity. These effects are more pronounced for Top 40 constituents than for Mid Cap stocks, reflecting greater investor attention and trading activity in the larger index. Firm size further conditions outcomes, with larger firms

benefiting more from inclusion. While the results support the liquidity hypothesis, evidence of short-term reversals indicates that improvements in trading conditions are not always sustained.

More recent evidence has begun to extend the South African literature to smaller indices. Mondlane (2023) examines inclusions and exclusions in the JSE Mid Cap and Small Cap indices and finds that inclusions are associated with improvements in liquidity and investor recognition, while exclusions generate negative abnormal returns and persistent underperformance. The analysis indicates that in thinner and less liquid segments of the JSE, index membership plays a more pronounced role in shaping trading activity and market visibility than in the large-cap segment. The results further reinforce the asymmetry between inclusions and exclusions, with deletions producing more persistent negative effects than inclusions generate positive gains.

The South African literature exhibits several recurring patterns. Index revisions on the JSE are consistently associated with abnormal returns and trading volume responses, with a substantial portion of price adjustment occurring prior to the effective date, particularly for deletions (Kruger and Toerien, 2013; Katzke and van Tiddens, 2019). These dynamics are consistent with price pressure and downward-sloping demand curve mechanisms driven by anticipatory trading. Liquidity responses are robust for Top 40 inclusions but less uniform for Mid Cap and Small Cap constituents, where thinner trading conditions constrain sustained improvements (Naicker, 2022). Asymmetry is a defining feature, with exclusions generating sharper and more persistent declines than inclusions generate gains (Pholohane et al., 2020). Although passive-fund penetration in South Africa is lower than in developed markets, index-related effects remain economically meaningful and may be amplified in less liquid segments due to limited arbitrage capacity and weaker investor recognition (Katzke and van Tiddens, 2019).

Despite these insights, the FTSE/JSE Small Cap Index remains comparatively underexplored. Existing evidence is concentrated on the Top 40 and, to a lesser extent, the Mid Cap indices, leaving limited direct analysis of small-cap constituents, which are typically the least liquid and most exposed to rebalancing flows. The literature indicates that under such conditions, liquidity and investor-recognition channels are likely to dominate index effects, with inclusions conferring visibility benefits and exclusions imposing more durable penalties. Examining the Small Cap Index therefore addresses a substantive gap by extending South African evidence beyond well-studied large- and mid-cap segments and by testing whether mechanisms

identified in global, emerging-market, and domestic studies operate with greater intensity in a thinner and less liquid market segment (Khoza and Auret, 2023).

2.3. Synthesis and Identified Gap

The empirical literature on index inclusions and exclusions establishes the index effect as a pervasive phenomenon, while demonstrating that its magnitude, persistence, and underlying mechanisms vary systematically across market environments. In developed markets such as the United States and the United Kingdom, index revisions reliably generate abnormal returns and trading volume responses, but these effects have become increasingly short-lived as market liquidity has deepened, arbitrage capacity has expanded, and passive investment has matured (Chen et al., 2004; Petajisto, 2011). Liquidity and investor-recognition channels remain operative, yet abnormal returns tend to dissipate rapidly, with deletions consistently exhibiting stronger and more persistent price effects than inclusions.

Emerging markets exhibit a distinct pattern. Evidence from Brazil, India, China, and other emerging economies documents substantially larger and more volatile price and volume reactions to index revisions, frequently exceeding 5% around event dates (de Carvalho, Suen, and Gallo, 2016). These reactions are predominantly driven by short-term price pressure arising from thin liquidity, limited arbitrage, and concentrated ownership structures, with reversals occurring once rebalancing flows are absorbed. Information-based revaluation plays a limited role, although markets with higher foreign institutional participation, such as India, display somewhat more durable liquidity improvements without corresponding evidence of permanent valuation changes.

South African evidence occupies an intermediate position between these two regimes. Studies focusing on the FTSE/JSE Top 40 and Mid Cap indices confirm the presence of abnormal returns, elevated trading activity, and temporary liquidity improvements around index revisions (Kruger and Toerien, 2013; Miller and Ward, 2015; Katzke and van Tiddens, 2019; Pholohane et al., 2020). Price effects are largely anticipatory, with a significant portion of adjustment occurring prior to effective dates and mean reversion evident thereafter. Liquidity enhancements are more pronounced for Top 40 inclusions than for Mid Cap constituents, while exclusions generate sharper and more persistent penalties (Naicker, 2022). Although the overall magnitude of index effects is smaller than in highly developed markets due to lower passive-

fund penetration, thinner trading conditions in mid- and small-cap segments increase susceptibility to demand-driven distortions.

Despite this extensive body of evidence, the FTSE/JSE Small Cap Index remains largely unexplored. Existing South African studies concentrate on large- and mid-cap indices, leaving limited direct evidence on small-cap constituents, which are characterised by the lowest liquidity, weakest analyst coverage, and most constrained arbitrage capacity on the JSE. In such an environment, liquidity and investor-recognition mechanisms are expected to play a dominant role, with inclusions conferring visibility benefits and exclusions imposing more persistent costs. Examining index revisions within the FTSE/JSE Small Cap Index therefore addresses a substantive gap in the literature by extending South African evidence beyond well-studied segments and by testing whether mechanisms identified in global, emerging-market, and domestic studies operate with greater intensity in a thinner and more segmented market context.

2.4. Summary

The literature on index effects identifies a range of mechanisms through which inclusions and exclusions influence asset prices, spanning short-term mechanical demand pressures and more persistent channels related to liquidity, information, and investor recognition. Evidence across markets indicates that the price pressure hypothesis provides a robust explanation for short-horizon abnormal returns, particularly around predictable rebalancing events, while alternative frameworks account for asymmetries and, in some contexts, limited persistence beyond the event window. In the South African setting, where liquidity constraints, concentrated ownership, and information frictions are more pronounced than in developed markets, multiple mechanisms may operate simultaneously, with their relative importance varying across index segments. The FTSE/JSE Small Cap Index, characterised by thin trading, limited analyst coverage, and weaker arbitrage capacity, offers a distinct empirical setting in which to assess whether index revisions generate primarily transitory price distortions or whether they also give rise to more durable effects through sustained liquidity improvements and enhanced investor recognition.

Chapter 3: Methodology

Introduction

This chapter outlines and discuss the methodological framework adopted to examine the effect of inclusions and exclusions from the FTSE/JSE Small Cap Index on stock performance. The purpose is to describe the research design, data sources, model specification, and estimation procedures used to answer the study's three research questions:

1. What are the short-term and long-term abnormal and cumulative abnormal returns for stocks included in the Small Cap Index?
2. What are the short-term and long-term abnormal and cumulative abnormal returns for stocks excluded from the Small Cap Index?
3. Are there significant differences in the performance of stocks included and excluded from the index?

The study applies an event study methodology, which is widely used in finance to isolate market reactions to identifiable corporate events such as earnings announcements, mergers, or index rebalancing. In this context, the relevant events are the announcements of index inclusions and exclusions. The event study approach is suitable because it separates company-specific effects from overall market movements, thereby allowing a direct assessment of whether index membership changes influence stock returns (MacKinlay, 1997).

3.1. Research Design

A research design provides the overall framework that guides the process of data collection, measurement, and analysis to address specific research questions and objectives (Creswell, 2014). It represents the logical structure that links theory to empirical testing, ensuring that the chosen methods align with the study's purpose and produce valid, reliable, and replicable findings. In financial research, an appropriate research design helps to identify the causal relationships between market events and price behaviour while accounting for external factors that may influence results (Sekaran & Bougie, 2016).

This study adopts a quantitative, explanatory research design, which is suited to identifying and analysing cause–effect relationships using numerical data. A quantitative approach focuses on measurable evidence and statistical analysis to test hypotheses objectively, while an explanatory orientation seeks to determine why or how certain phenomena occur (Bryman & Bell, 2022; Cooper & Schindler, 2014). In this case, the study investigates whether index

inclusions and exclusions within the FTSE/JSE Small Cap Index cause statistically significant changes in share-price performance. By measuring abnormal and cumulative abnormal returns (CARs), the design facilitates a causal assessment of how these events influence stock prices, thus moving beyond description to explanation.

Within this design framework, the event-study methodology is employed as the analytical technique. Event studies are well established in empirical finance for testing the semi-strong form of market efficiency by examining how quickly and accurately markets incorporate new information into security prices (Fama, Fisher, Jensen & Roll, 1969; MacKinlay, 1997). The method isolates abnormal stock price movements around specific events, such as index revision announcements, by comparing actual returns to expected returns derived from a market model. This approach is appropriate because it provides a statistically rigorous means of evaluating whether index changes lead to significant short-term and long-term market reactions, and whether those reactions are consistent with theoretical expectations under efficient or inefficient market conditions.

3.2. Data Description and Sources

FTSE/JSE Small Cap Index (J202) is part of the size-segmented index family maintained jointly by FTSE Russell and the Johannesburg Stock Exchange. It includes firms ranked below the Top 100 by free-float market capitalisation, subject to meeting liquidity and investability requirements set out in the FTSE/JSE Ground Rules (FTSE Russell, 2025). The index is reviewed quarterly, and changes to its constituents follow a transparent and rules-based process driven mainly by shifts in market capitalisation.

These attributes align closely with the objectives of this study. The research examines whether index inclusions and exclusions generate short-term and long-term abnormal returns, and the Small Cap Index provides an environment where such effects are more likely to be visible. Lower liquidity and reduced analyst attention can accentuate the impact of index rebalancing, making any pricing effects easier to detect and interpret. Focusing on this index also helps to assess whether price adjustments around index changes reflect temporary trading pressures or more gradual revaluation as investors reassess firms that gain or lose index membership.

The characteristics of the Small Cap segment therefore support the aim of evaluating how index revisions affect performance in a part of the market where inefficiencies are more likely to surface and where inclusion or exclusion may influence investor behaviour more noticeably than in larger, more liquid indices.

3.3. Data Scope and Period

The dataset covers the ten-year period from January 2013 to December 2023, aligning with the period identified in Chapter 1. This timeframe captures the post-Global Financial Crisis recovery of the Johannesburg Stock Exchange (JSE) and coincides with the growth of passive investment instruments such as exchange-traded funds (ETFs), which increased the sensitivity of local markets to index rebalancing (Sixpence, 2020; Steyn, 2025). The sample includes all firms added to or removed from the FTSE/JSE Small Cap Index during this period. Each event is treated as distinct and non-overlapping, with event dates corresponding to official index revision announcements published by the FTSE Russell Group and confirmed via JSE Notices.

3.4. Data Sources

Daily closing prices, market index values, and corporate-action information for all firms included in and excluded from the FTSE/JSE Small Cap Index during the sample period are extracted from Bloomberg Professional Service and IRESS McGregor BFA, which are widely used in financial research for their data accuracy and historical completeness (Naicker, 2022; Mukandi, 2018). The FTSE/JSE All Share Index (ALSI) serves as the proxy for market returns, as it reflects aggregate equity-market movements in South Africa and ensures consistency with prior index-effect studies (Pholohane, Ajuwon & Wesson, 2020). All share prices were adjusted for dividends, stock splits, and other corporate actions to avoid distortion in return calculations.

3.5. Data Types and Sources

The study relies exclusively on secondary data, comprising daily stock prices and index levels obtained primarily from Bloomberg, with gaps cross-checked using IRESS McGregor BFA. Event announcement dates for inclusions and exclusions were extracted from official Johannesburg Stock Exchange (JSE) notices.

Daily returns are used because they provide sufficient resolution to capture market reactions while avoiding intraday volatility. This frequency aligns with prior JSE event studies (Naicker, 2022). The dataset covers January 2013 to December 2023, encompassing all inclusion and exclusion events during this period. After applying selection criteria, 37 events were retained for analysis.

3.6. Variables and Measurement

The primary variables used in this study are derived from daily price data and computed as follows:

Table 3.1: Definition and Measurement of Key Variables

Variable	Symbol	Description / Measurement
Stock Return	R_{it}	Daily logarithmic return on stock i
Market Return	R_{mt}	Daily logarithmic return on the FTSE/JSE All Share Index
Expected Return	$E(R)_{it}$	Predicted return from market model using estimated α and β
Abnormal Return	AR_{it}	$R_{it} - E(R)_{it}$; deviation of actual from expected return
Average Abnormal Return	AAR_t	Mean abnormal return across all firms for each day t
Cumulative Abnormal Return	$CAAR_t$	Sum of AAR over event window $[t_1, t_2]$

All returns are calculated daily to match trading frequency on the JSE. Abnormal returns and their aggregates (AAR, CAR) are the dependent variables in subsequent analyses and represent the market's reaction to index revision announcements.

3.7. Sample Selection Criteria

The process of sample selection determines which events and firms are included in the analysis and ensures that the study's findings are representative, unbiased, and empirically valid (Saunders, Lewis & Thornhill, 2019). In event-study research, careful selection is essential to isolate the market's reaction to a specific event while eliminating confounding influences from other corporate or macroeconomic developments (Binder, 1998; MacKinlay, 1997).

This study's population comprises all companies listed on the Johannesburg Stock Exchange (JSE) that were added to or removed from the FTSE/JSE Small Cap Index between January 2013 and December 2023. The initial population of index revision events was obtained from the FTSE Russell Index Review Reports and verified using official JSE Notices. Each event corresponds to the effective date of an index rebalancing announcement.

To ensure accuracy and consistency, the following selection criteria were applied:

- Event independence: Only firms with clearly identifiable and non-overlapping inclusion or exclusion events within the sample period were retained. Where a firm was included and later excluded within a short period, only the first event was considered to avoid overlapping effects that might bias abnormal-return estimation (MacKinlay, 1997).
- Continuous trading and data availability: Companies were required to have continuous daily trading data for the entire estimation and event windows. Securities that were illiquid or suspended during these periods were excluded to ensure valid parameter estimation.
- Absence of confounding corporate actions: Events coinciding with significant firm-specific developments, such as mergers, acquisitions, rights issues, major restructuring announcements, or earnings releases, were removed from the sample. This step prevents price movements attributable to other information from contaminating the event effect (MacKinlay, 1997).
- Listing and survival: Only companies continuously listed on the JSE for at least 200 trading days before and 30 trading days after the event were included. Firms delisted during the event or estimation period were excluded.

The event dataset contains 166 unique index revision events, consisting of 90 inclusions and 76 exclusions into or out of the FTSE/JSE Small Cap Index between 2013 and 2023. These events were identified from the historic index reconstitution lists and filtered based on data availability, resulting in the final clean sample used for the event study. The resulting sample provides sufficient representation across sectors within the JSE's small-cap segment, capturing both cyclical and non-cyclical firms. It thus reflects the diversity of the index composition and ensures that the findings are generalisable to the broader behaviour of small-cap equities in South Africa.

3.8. Model Specification

Before testing for abnormal performance, an appropriate return-generating model must be specified to estimate the expected (normal) returns of each stock. Event studies in finance typically employ one of three models: the mean-adjusted model, the market-adjusted model, or the market model (Campbell, Lo & MacKinlay, 1997). The mean-adjusted model assumes that each stock's expected return is constant over time, while the market-adjusted model assumes a one-for-one relationship between stock and market returns. Although both are computationally

simple, they fail to account for individual securities' systematic risk and their differing sensitivities to market movements (Binder, 1998).

To address these limitations, this study employs the market model, which adjusts each stock's expected return based on its historical relationship with the overall market. The model provides more accurate abnormal-return estimates by controlling for market-wide movements and isolating firm-specific reactions to index revisions (MacKinlay, 1997; Afego, 2017; Naicker, 2022). It is widely used in empirical studies on index effects and market efficiency, particularly in emerging markets, because it balances statistical rigour with data feasibility (Kruger & Toerien, 2013; Pholohane, Ajuwon & Wesson, 2020).

The market model is expressed as:

$$(R)_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \dots\dots\dots(1)$$

Where:

- $E(R)_{it}$ = actual return on stock i on day t
- R_{mt} = return of the market index (proxied by FTSE/JSE All Share Index) on day t
- α_i = intercept term representing the average return of stock i independent of the market
- β_i = slope coefficient representing the stock's sensitivity to market movements (systematic risk)
- ε_{it} = random error term assumed to have zero mean and constant variance

Parameters α_i and β_i are estimated using Ordinary Least Squares (OLS) regression over a 125-day estimation window preceding the event date (Brown & Warner, 1985; MacKinlay, 1997).

The expected return for stock i on day t is therefore given by:

$$E(R)_{it} = \alpha_i + \beta_i R_{mt}$$

The abnormal return (AR) for each firm i at time t is computed as the deviation between the actual return and the expected return:

$$AR_i = R_{it} - E(R)_{it} \dots\dots\dots(2)$$

The average abnormal return (AAR) captures the mean daily abnormal performance across all firms in the sample on each trading day within the event window. It is calculated as the arithmetic average of the individual abnormal returns:

$$AAR_t = \frac{1}{N} \sum_{i=1}^N AR_{it} \dots\dots\dots(3)$$

Where AAR_t is the average abnormal return on day t , AR_{it} represents the abnormal return of firm i on day t , and N denotes the total number of firms included in the sample. The AAR provides a daily measure of aggregate market reaction to the index revision, indicating whether, on average, firms experience positive or negative excess returns on a given day. Persistent positive or negative AARs around the event date suggest systematic price adjustments attributable to the inclusion or exclusion announcement.

While AAR summarises daily market-wide behaviour, the cumulative abnormal return (CAR) aggregates the abnormal performance of an individual firm across a specified event window. It is defined as:

$$CAR_i(t_j, t_k) = \sum_{t=t_j}^{t_k} AR_{it} \dots\dots\dots(4)$$

Where $CAR_{i[t_1, t_2]}$ represents the total abnormal return earned by company i from day t_1 to day t_2 . CAR therefore captures the overall price impact of the event for each company, allowing the analysis to move beyond day-to-day fluctuations and assess whether the effects of inclusion or exclusion accumulate or dissipate over time.

To evaluate the aggregate market reaction over the event window, individual CAR are averaged across all companies to obtain the cumulative average abnormal return (CAAR). It is expressed as:

$$CAAR_t = \frac{1}{n} \sum_{i=1}^n CAR_{i[t_1, t_2]} \dots\dots\dots$$

The equality between the two expressions shows that CAAR can be derived either by averaging firm-level CARs or by summing the daily AARs across the same window. CAAR provides a clear measure of the total market-wide abnormal performance associated with index revisions and forms the basis for interpreting both short-term ($[-10, +10]$) and long-term ($[-20, +30]$) effects in the empirical analysis.

The market model was selected because it provides more reliable estimates of normal performance while requiring fewer data inputs than multifactor models such as the Fama–

French three-factor model or the Carhart four-factor model. These multifactor frameworks, though potentially more comprehensive, demand extensive firm-level accounting data that are not consistently available for smaller South African companies. Moreover, prior South African event studies examining index changes have demonstrated that the market model produces robust and interpretable results in contexts where market risk is the dominant driver of return variation (Naicker, 2022; Pholohane et al., 2020). Isolating event-related price movements from general market influences, ensures that any statistically significant deviations in returns can be attributed primarily to the index inclusion or exclusion event, rather than to unrelated macroeconomic factors or market-wide shocks.

3.9. Assumptions and Limitations of the Event-Study Approach

The event study methodology constitutes a joint test of the research hypothesis, the expected return model employed, and the methodological assumptions underpinning the analysis (Brown & Warner, 1980; Brown & Warner, 1985; Kothari & Warner, 2007). The interpretation of abnormal returns associated with index inclusions and exclusions therefore depends on the extent to which these assumptions hold in the market environment under investigation, a consideration that is particularly important in a small-cap context. Event studies measure the impact of a specific event by comparing observed stock returns with expected returns estimated from a statistical model, allowing researchers to evaluate whether the event produces statistically significant abnormal performance (MacKinlay, 1997; Kurek, 2020; Ren & Xiao, 2019).

A central assumption of the event study approach is that stock prices incorporate publicly available information within a relatively short period following an event, consistent with the semi-strong form of market efficiency (Fama et al., 1969; MacKinlay, 1997). Event study frameworks rely on the premise that price adjustments around event time reflect the market's response to new information (Miller, 2023). In the FTSE/JSE Small Cap Index, this assumption may be weaker than in larger market segments due to lower liquidity, wider bid–ask spreads, and reduced analyst coverage. These characteristics may slow information diffusion and result in more gradual price adjustment, causing abnormal returns to persist beyond the announcement date.

The methodology further assumes that index revision announcements are unanticipated and have not been fully incorporated into prices prior to the event window. Although FTSE/JSE index changes follow a transparent, rules-based process, market participants may form partial

expectations based on observable changes in market capitalisation rankings. To account for potential anticipation based on publicly available rebalancing information, the analysis employs event windows that capture both pre- and post-announcement price movements (MacKinlay, 1997). Event study designs commonly incorporate estimation and event windows to isolate the impact of the event and evaluate abnormal returns around the announcement date (Kurek, 2020).

Another key assumption is the absence of confounding events during the event window that could independently affect stock prices. This condition is particularly relevant in small-cap studies, where firm-specific announcements can exert pronounced price effects. Firms experiencing major corporate actions or overlapping announcements were therefore excluded from the sample, although it is acknowledged that minor or unobservable information releases may still influence returns (Brown & Warner, 1985). Prior methodological research highlights that violations of such assumptions, including residual dependence and heteroskedasticity, may affect statistical inference in event study tests (Ren & Xiao, 2019).

The use of the market model introduces additional assumptions regarding the stability of the relationship between individual stock returns and market returns over the estimation and event windows (MacKinlay, 1997). The market model is widely used because it controls for general market movements while isolating abnormal performance attributable to the event (Kothari & Warner, 2007). In small-cap markets, however, this relationship may be affected by episodic liquidity conditions, non-synchronous trading, and heightened sensitivity to market-wide shocks, potentially increasing estimation error in the alpha and beta parameters.

In addition to these assumptions, the application of the event study framework in a small-cap setting is subject to several limitations. Thin trading and non-synchronous price movements may introduce measurement error in daily return calculations and reduce the precision of abnormal return estimates (Brown & Warner, 1985). Partial anticipation of index revisions cannot be fully eliminated, even with extended event windows and sample screening. Furthermore, the analysis relies exclusively on price-based measures and does not explicitly incorporate liquidity or trading-volume indicators, limiting the ability to distinguish between information effects, liquidity changes, and temporary trading pressures. Methodological research further notes that statistical issues such as cross-sectional dependence and model specification can influence the reliability of event study results if not carefully addressed (Ren & Xiao, 2019).

These assumptions and limitations do not undermine the suitability of the event study methodology for the objectives of this study but should be considered when interpreting the magnitude, timing, and persistence of abnormal returns associated with FTSE/JSE Small Cap Index inclusions and exclusions.

3.10. Significance Testing

To determine whether abnormal performance around index revisions is statistically meaningful, both daily and window-level measures are subjected to standardised significance tests. Following Brown and Warner (1985) and MacKinlay (1997), the primary object of inference in an event study is the cross-sectional average of abnormal returns, rather than individual firm-level movements. Significance is therefore evaluated for the Average Abnormal Return (AAR) on each day of the event window and for the Cumulative Average Abnormal Return (CAAR) over the defined short- and long-term horizons.

The daily AAR is tested using the standard cross-sectional t-statistic:

$$t(AAR_t) = \frac{AAR_t}{S(AR_t)/\sqrt{N}}$$

Where $S(AR_t)$ is the cross-sectional standard deviation of firm-level abnormal returns on day t , and N is the number of firms in the sample.

To assess longer-horizon performance, the CAAR is tested using an analogous statistic:

$$t(CAR_{t1,t2}) = \frac{CAAR_{t1,t2}}{S(CAR_t)/\sqrt{N}}$$

where $S(CAR)$ represents the cross-sectional standard deviation of cumulative abnormal returns (CAR) across all firms within the event window.

These parametric tests assume that abnormal returns are independent across firms and identically distributed within each window, assumptions that are reasonable given that index events in the sample are non-overlapping and relate to different companies. However, because return distributions on the JSE may exhibit deviations from normality, the analysis is supplemented with the Wilcoxon signed-rank test, a non-parametric procedure widely used in event-study research to ensure robustness (Afego, 2017). Statistical significance is assessed at the 1%, 5%, and 10% levels.

3.11. Estimation Procedure

The event-study procedure follows the framework of MacKinlay (1997) and the implementation steps are summarised in Table 3.1. These steps outline how the event dates, windows, and parameters are defined and how abnormal returns are ultimately derived and evaluated.

The event study procedure follows the framework of MacKinlay (1997) and is summarised in Table 3.2.

Table 3.2: Steps and Definitions of the Event Study Methodology

Step	Description
1. Event Definition	Identify announcements of inclusions and exclusions from the JSE Small Cap Index. The announcement date (Day 0) marks when information becomes public and the market is expected to react.
2. Event Window	Two event windows are applied: $[-10, +10]$ and $[-20, +30]$. The shorter window captures immediate price reactions, while the longer window captures anticipatory and delayed adjustments.
3. Estimation Window	A 125-day period preceding the event window is used to estimate the market model parameters (α_i and β_i).
4. Sample Selection	Stocks with missing data, corporate actions (mergers, delisting, liquidations), or confounding events are excluded to ensure accuracy (Hegde & McDermott, 2004; Naicker, 2022).
5. Computation of Abnormal Returns	Abnormal returns (AR, AAR, CAR, CAAR) are calculated using the market model.
6. Significance Testing	Statistical tests (t-tests) assess whether AARs and CAARs differ significantly from zero.

Based on the steps above, the event-study estimation proceeds in several stages. First, event dates are identified from FTSE Russell's quarterly index review announcements, with Day 0 defined as the official publication date. The event windows selected $[-10, +10]$ and $[-20, +30]$ allow the analysis to capture both immediate reactions and delayed adjustments, consistent with prior studies on index effects in emerging markets (Afego, 2017; Naicker, 2022). Second, a 125-day estimation window preceding each event is used to estimate the parameters of the market model. This ensures that expected returns are derived from a period that is unaffected by the inclusion or exclusion announcement. Firm-level α and β coefficients are obtained using OLS, following the specification detailed in Section 3.3.

Third, abnormal returns are computed by comparing actual daily returns to expected returns generated by the market model. These firm-level abnormal returns are then aggregated cross-sectionally to obtain AAR and accumulated over time to produce CARs and CAARs for each event window. This step links the event-study design with the empirical measures used in Chapter 4. Finally, statistical significance is assessed using standard t-tests for both AAR and CAAR. Given the potential for non-normalities in emerging-market data, robustness is checked using non-parametric procedures (Corrado, 1989). Events are weighted equally and analysed separately for inclusions and exclusions to avoid distortions arising from firm size or asymmetry in market reactions. This procedure ensures that the estimated abnormal returns reflect genuine market responses to index changes rather than unrelated firm-level shocks or methodological artefacts.

This chapter detailed the methodological approach used to examine how index revisions in the JSE Small Cap Index affect stock performance. The study adopted a quantitative explanatory design within a positivist framework, using an event study methodology consistent with established financial research. Expected returns were estimated using the market model over a 125-day estimation window, and abnormal returns were derived through AR, AAR, CAR, and CAAR metrics. The analysis employed two event windows ($[-10, +10]$ and $[-20, +30]$) to capture short- and long-term effects. Statistical significance was tested using t-statistics for both daily and cumulative measures. Through this methodological framework, the study directly addresses its three research questions by quantifying and comparing the performance of included and excluded stocks around JSE Small Cap Index revision announcements. The next chapter presents the empirical results and discusses their implications for market efficiency and investor behaviour.

Chapter 4: Results and Analysis

Introduction

This chapter presents, interprets, and discusses the results of the study investigating the effect of stock inclusions and exclusions from the FTSE/JSE Small Cap Index on stock performance. The chapter follows the methodological framework outlined in Chapter 3, applying the event study approach to assess whether index revisions generate abnormal returns and, if so, whether these effects differ between inclusions and exclusions.

4.1. Inclusion

Before examining the abnormal return patterns around index revisions, it is necessary to describe the statistical characteristics of returns associated with index inclusions. This subsection focuses on firms added to the FTSE/JSE Small Cap Index between 2013 and 2023, a period marked by increased passive fund participation and growing awareness of small-cap investment opportunities in South Africa. Descriptive statistics provide an overview of the central tendency, dispersion, and distributional properties of abnormal returns following inclusion events. These metrics help determine whether returns are symmetrically distributed around zero, whether extreme values exist that could influence test results, and whether the inclusion events are generally associated with upward or downward price reactions (Brooks,

2019). Table 4.2.1 presents the summary statistics for stocks added to the index over the study period.

4.1.1. Descriptive Statistics of Abnormal Returns

Table 4.1: Descriptive Statistics of Abnormal Returns for Inclusion

Statistic	Inclusion
Mean	0.00037
Median	−0.00009
Standard Deviation	0.0545
Minimum	−2.3049
Maximum	2.3259
Skewness	−0.0661
Kurtosis	1154.09
N (Observations)	10,862

Source: STATA output

The descriptive statistics for stocks included in the FTSE/JSE Small Cap Index reveal distinct characteristics consistent with the behaviour of small, illiquid stocks in emerging markets. The mean abnormal return (0.00037) is close to zero, suggesting that, on average, inclusion events do not systematically generate positive or negative daily excess returns over the estimation window. The median value (−0.00009) reinforces this symmetry, indicating that gains and losses are distributed evenly across the sample. The standard deviation of 0.0545, however, points to substantial volatility in daily abnormal returns. Such a level of dispersion is typical of small-cap stocks, where thin trading and limited market depth can cause exaggerated price reactions to small order imbalances (Hearn & Piesse, 2010). The extreme minimum (−2.3049) and maximum (2.3259) abnormal returns are unusually large by developed-market standards and likely stem from low liquidity episodes, where a small number of transactions produce disproportionate price shifts (Lesmond, 2005; Hearn & Piesse, 2010).

The distribution is almost symmetric, with a skewness of −0.0661, implying that positive and negative outliers occur with roughly similar frequency. However, the kurtosis value of 1,154.09 indicates an extremely fat-tailed distribution. This suggests the presence of numerous extreme observations far from the mean, reflecting episodic bursts of volatility that are characteristic of small-cap and emerging market stocks (Cont, 2001; Harvey, 1995). The high kurtosis confirms that the abnormal returns deviate sharply from normality, meaning standard parametric tests

such as the t-test for average abnormal returns should be interpreted with caution. Overall, the inclusion sample shows stable average returns but highly volatile and non-normally distributed data, reflecting the structural characteristics of the JSE's small-cap segment.

Table 4.2: Daily Summary of Abnormal Returns for Inclusion

Day	Abnormal Returns	Std. Dev.	Minimum	Maximum
-20	-0,0034826	0,0388943	-0,2338800	0,1242540
-19	-0,0020153	0,0317293	-0,1301071	0,1220864
-18	0,0064586	0,0342050	-0,1180151	0,1029706
-17	0,0032688	0,0232971	-0,0457018	0,0903850
-15	0,0117593	0,0428311	-0,0266021	0,1243631
-14	0,0020453	0,0308314	-0,0894168	0,1860742
-13	0,0036183	0,0261953	-0,0957961	0,0720316
-12	-0,0001072	0,0334723	-0,1780966	0,0956656
-11	-0,0011073	0,0252345	-0,0964111	0,0762635
-10	-0,0058718	0,0445907	-0,3251708	0,0990293
-8	-0,0003445	0,0211607	-0,0446018	0,0306997
-7	-0,0030924	0,0329770	-0,2102196	0,0498774
-6	-0,0024985	0,0364178	-0,1726029	0,1173347
-5	0,0010669	0,0403794	-0,1370190	0,1836501
-4	0,0052698	0,0329944	-0,0886590	0,1138050
-3	0,0078147	0,0495734	-0,0798957	0,1527297
0	0,0000520	0,0313044	-0,0905692	0,0944090
1	-0,0033695	0,0340910	-0,1521605	0,1046015
2	-0,0034856	0,0290288	-0,1392105	0,0597050
3	-0,0015989	0,0186983	-0,0466089	0,0461239
4	-0,0001268	0,0332768	-0,1373202	0,0878768
6	0,0112161	0,0469758	-0,0364523	0,1196959
7	-0,0055402	0,0278680	-0,1051493	0,0530329
8	0,0041438	0,0310947	-0,0915605	0,1056241
9	0,0042972	0,0338845	-0,0916949	0,1144484
10	0,0016142	0,0292067	-0,0719344	0,0929378
11	0,0041512	0,0289670	-0,0764553	0,1337595
13	0,0294761	0,0359632	-0,0174443	0,0925925
14	0,0069444	0,0269184	-0,1101434	0,0810939

15	0,0033793	0,0311752	-0,0771120	0,1063186
16	0,0021885	0,0344828	-0,0829813	0,2123367
17	0,0038601	0,0310277	-0,0867221	0,1000974
18	0,0054114	0,0302636	-0,0838159	0,1071405
20	-0,0078100	0,0125051	-0,0264273	0,0126712
21	0,0035146	0,0254391	-0,0848887	0,0783698
22	0,0056816	0,0292801	-0,0478244	0,1127875
23	-0,0001712	0,0293411	-0,0976668	0,0624435
24	0,0001786	0,0267904	-0,1157280	0,0676934
25	-0,0023899	0,0328531	-0,1127732	0,0878274
27	-0,0039651	0,0224032	-0,0420201	0,0265233
28	0,0026308	0,0261269	-0,0942354	0,0965273
29	0,0009485	0,0238147	-0,0548673	0,0729662
30	-0,0011616	0,0231835	-0,0673569	0,0607030

Source: STATA output

Table 4.2 summarises the daily mean abnormal returns (AR) for firms added to the FTSE/JSE Small Cap Index over the event window $[-20, +30]$. Across this horizon, the data show that average abnormal returns are generally close to zero, with only a few isolated spikes. This suggests that, overall, index inclusions do not trigger large or persistent day-to-day deviations from normal performance. From Days -20 to -10 , the mean ARs fluctuate within a narrow range of about ± 0.006 , implying little systematic anticipation of inclusion. The presence of small positive values on Days -18 (0.0065) and -15 (0.0118) could reflect minor speculative trading or anticipation based on publicly available rebalancing information but given the accompanying standard deviations of 0.034 and 0.043, these movements are not statistically meaningful. The relatively small negative returns on Days -10 (-0.0059) and -7 (-0.0031) likewise appear random, consistent with normal volatility rather than pre-event correction. Volatility, measured by the standard deviation, averages around 3–4% per day and peaks at 4.7% on Day $+6$, which coincides with the largest positive mean return (0.0112). This pattern aligns with liquidity-driven adjustments immediately following index changes, when trading activity tends to increase as portfolios are rebalanced (Madhavan & Ming, 2002). Beyond Day 0, the series continues to fluctuate narrowly around zero, confirming the absence of strong post-announcement drift.

The minimum (-0.325) and maximum ($+0.212$) values demonstrate the presence of occasional large price swings within individual stocks, which is common in small-cap segments

characterised by low liquidity (Lesmond, 2005; Hearn & Piesse, 2010). Importantly, there is no sustained sequence of positive or negative abnormal returns before or after the event, suggesting that inclusion announcements do not generate persistent directional drift within the event window. Taken together, the inclusion results indicate a stable return pattern with moderate volatility and sporadic outliers. The near-zero mean ARs throughout the window support the earlier descriptive findings that inclusions into the Small Cap Index have limited short-term pricing impact and that price adjustments, where they occur, are temporary and dispersed.

4.1.2. Event-Day Effects

The first step in evaluating market responses to index revisions is to examine abnormal returns on the announcement day itself. Event-day analysis is critical because it provides insight into the immediacy and strength of investor reactions to new information. The results for inclusions and exclusions on Day 0 are presented in Table 4.3.

Table 4.3: Event-Day Abnormal Returns for Inclusion

Event Type	AAR (Day 0)	CAAR (Day 0)	t-stat	p-value	Significance
Inclusions	+0.00005	+0.0228	0.016	0.988	Not significant

Source: STATA output

Table 4.3 reports the abnormal and cumulative abnormal returns for firms added to the FTSE/JSE Small Cap Index on the announcement day (Day 0). The average abnormal return (AAR) for inclusions is +0.00005, and the cumulative average abnormal return (CAAR) is +0.0228. Both statistics are statistically insignificant ($t = 0.016$, $p = 0.988$), indicating that no measurable market reaction occurs on the day inclusion announcements are released. This absence of a significant Day 0 response implies that the inclusion event itself does not convey new information to investors. In efficient markets, index membership changes that are mechanical and predictable should not affect prices (Fama, 1970). The result therefore suggests that investors on the JSE Small Cap segment either anticipate index updates or regard them as routine administrative adjustments with little informational value.

In addition, the lack of immediate price adjustment is consistent with findings in other emerging markets where passive institutional participation is limited and index tracking activity is small (Mahata, 2018; Afego, 2017). Under such conditions, the liquidity-induced “price-pressure” effects seen in developed markets (Harris & Gurel, 1986; Shleifer, 1986) are muted. Rather than sharp event-day spikes, any liquidity or recognition benefits for newly

included firms tend to materialise gradually over subsequent trading sessions. Overall, the event-day analysis for inclusions confirms that the JSE Small Cap Index revisions do not trigger statistically significant abnormal returns on the announcement date. Event-day results indicate no statistically detectable immediate repricing, and any structural effects associated with inclusion are more likely to materialise gradually over longer horizons.

The absence of a significant Day 0 reaction implies that the inclusion event does not deliver the type of short-term buying pressure predicted by the Price Pressure Hypothesis (Harris & Gurel, 1986; Shleifer, 1986), nor does it convey new information strong enough to validate the Information Content Hypothesis (Jain, 1987). At the same time, the muted response does not contradict the Imperfect-Substitutes Hypothesis, which allows market adjustments to be gradual when stocks are thinly traded and costly to arbitrage. Overall, the event-day results indicate that the JSE Small Cap segment does not exhibit the immediate, high-frequency reactions observed in larger and more liquid markets, and that any effects of inclusion must instead be traced through the short- and long-term evidence.

4.1.3. Short-Term Windows for Inclusion

While the event-day results shed light on the market's immediate reaction, they do not fully capture how investors adjust in the days surrounding the index announcement. It is therefore useful to examine short-term cumulative movements to see whether the impact of inclusion unfolds gradually or fades quickly once the news is absorbed. Two windows are considered, the $[-5,+5]$ and $[-10,+10]$, which together encompass trading activity just before and shortly after the inclusion event.

Table 4.4 reports the cumulative average abnormal returns (CAARs) for these short-term horizons. In both windows, included firms exhibit modest gains that remain statistically insignificant. The CAAR over $[-5,+5]$ stands at roughly +0.83%, while the broader $[-10,+10]$ window shows a slightly larger value of +1.12%. Although these numbers are positive, the associated t-statistics are below conventional significance levels, suggesting that the changes are not large enough to reject the null of no abnormal performance.

Table 4.4: Cumulative Average Abnormal Returns for Inclusions

Window	CAAR	t-stat	p-value	Significance
$[-5,+5]$	+0.0083	0.94	0.35	Not significant
$[-10,+10]$	+0.0112	1.05	0.30	Not significant

Source: STATA

A closer look at the daily pattern of abnormal returns reinforces this picture. Gains appear to materialise slowly, with mild upticks after the announcement rather than an immediate price jump. This gradual rise may indicate that the JSE's Small Cap segment assimilates new information more slowly than highly liquid indices such as the FTSE/JSE Top 40, reflecting liquidity constraints and limited arbitrage capacity rather than short-lived pricing inefficiencies (Lesmond, 2005; Bekaert, Harvey & Lundblad, 2007). Limited analyst coverage and smaller passive-fund participation could also dampen any instant reaction, meaning investors adjust positions as liquidity improves rather than in a single trading session. From a theoretical perspective, these findings align most closely with liquidity-cost and investor-recognition mechanisms, where index inclusion improves visibility and trading conditions only incrementally (Mikkelson & Partch, 1985; Merton, 1987), rather than with the immediate mechanical buying implied by the Price Pressure Hypothesis (Harris & Gurel, 1986; Shleifer, 1986). Inclusion appears to enhance visibility and reduce transaction costs incrementally, but not enough to trigger statistically significant abnormal returns in the days surrounding the event. The absence of a sharp pre-announcement run-up further suggests that index changes are well anticipated, leaving little scope for speculative trading or information leakage.

The behaviour observed here mirrors results from several developed-market studies. For instance, Beneish and Whaley (1996) and Chen et al. (2004) found that additions to the S&P 500 generate small but mostly temporary gains once adjusted for liquidity and market-capitalisation effects. Similar muted reactions have been reported for emerging exchanges with thinner trading volumes (Afego, 2017). The JSE Small Cap outcome therefore fits within a broader pattern where inclusion effects are subdued in markets dominated by long-term institutional investors and constrained liquidity, limiting the scope for rapid arbitrage and short-term price distortions. The short-term analysis for inclusions portrays a market that reacts cautiously and gradually. Prices move upward in the expected direction but without statistical conviction, implying that the benefits of index entry such as improved visibility and modest increases in demand from index-tracking funds take time to translate into measurable price performance, consistent with gradual investor recognition rather than abrupt demand shocks (Robert C. Merton, 1987; Lawrence Harris & Eitan Gurel, 1986). Having established this moderate short-term dynamic, the next section examines whether these gains accumulate or dissipate over a longer horizon.

The insignificant short-term cumulative gains offer little support for the Price Pressure Hypothesis, as inclusions do not appear to induce meaningful temporary distortions (Harris &

Gurel, 1986; Shleifer, 1986). The gradual and modest upward drift is more compatible with the Imperfect-Substitutes Hypothesis (Shleifer, 1986), where frictions slow down portfolio adjustments, and with a subdued interpretation of the Information Content Hypothesis, where index membership may marginally strengthen investor attention but without a strong valuation signal. In aggregate, the short-term window suggests that inclusion effects in the JSE Small Cap Index unfold cautiously, shaped more by limited liquidity than by strong informational or mechanical forces.

4.1.4. Long-Term Windows for Inclusions

The short-term analysis revealed that inclusion effects in the short term are positive but statistically modest. To determine whether these gains persist or strengthen once market adjustments unfold, the analysis now extends to a broader window covering 20 trading days before and 30 days after the inclusion announcement. This horizon captures both anticipatory trading before rebalancing and the longer assimilation of new information as liquidity and investor awareness evolve, which is particularly relevant in small-cap markets characterised by slower adjustment processes (Lynch & Mendenhall, 1997; Chen, Noronha & Singal, 2004).

Table 4.5: CAARs for Inclusions in Long-Term Window

Inclusion	
Day	CAAR
-20	-0.0035
+30	+0.0829

Source: STATA output

As shown in Table 4.5, firms added to the FTSE/JSE Small Cap Index exhibit a marked upward trajectory over the event window. At Day -20, cumulative returns hover near zero (-0.35%), suggesting that the market had not yet priced in the coming inclusion. By Day +30, however, CAAR rises to approximately +8.29%, indicating that positive abnormal performance accumulates gradually during the post-event period. This sustained improvement implies that investors continue to revalue newly included firms even after the immediate rebalancing period ends, suggesting that inclusion effects extend beyond mechanical index trading (Dong, Zheng, Jia & Zhang, 2023).

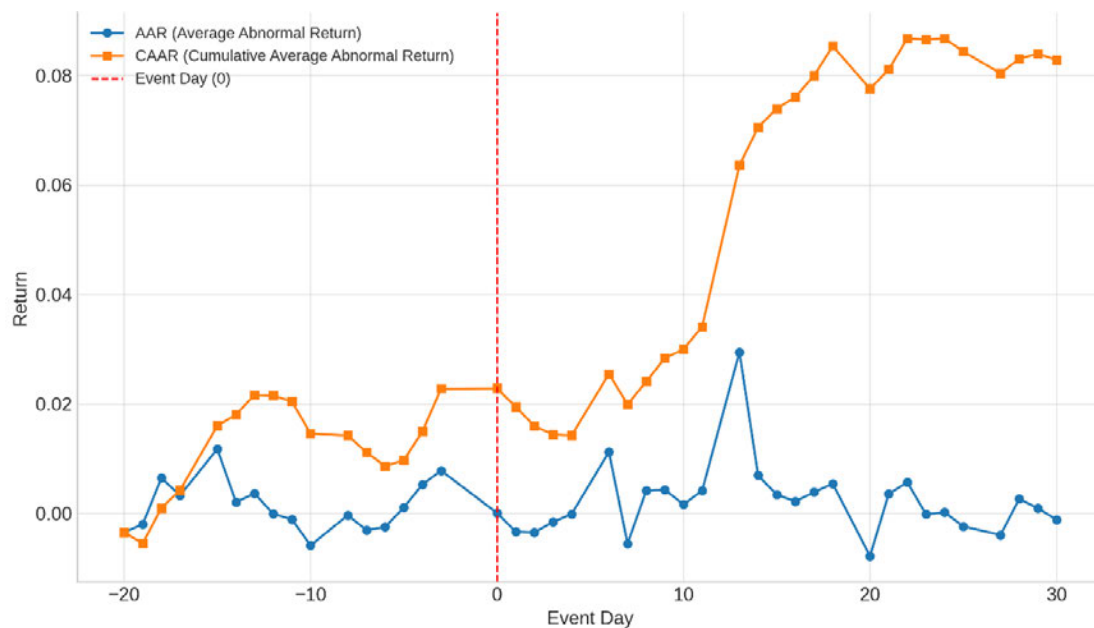


Figure 4.1: AAR and CAAR for Inclusions (–20 to +30).

Source: STATA output

The CAAR curve slopes steadily upward from the event day onwards, while average abnormal returns (AAR) fluctuate mildly around zero. The absence of sharp spikes reinforces the interpretation of a slow, confidence-building adjustment rather than speculative overreaction or short-lived demand shocks. A closer look at the shape of the curve suggests that much of the appreciation occurs between Day +5 and Day +25, after which the gains stabilise. This timing corresponds to when index-tracking funds complete portfolio adjustments and when small-cap liquidity improves due to broader investor participation, allowing valuation effects to materialise gradually rather than instantaneously (Hegde & McDermott, 2003; Bekaert, Harvey & Lundblad, 2007).

These results align closely with the liquidity-cost and investor-recognition hypotheses (Mikkelson & Partch, 1985; Merton, 1987). Inclusion enhances visibility among institutional investors and lowers transaction costs as trading volumes expand. Over time, this encourages a gradual repricing that raises valuations beyond what would be expected under purely temporary price-pressure models. The findings echo observations from developed exchanges such as Madhavan (2003) and Chen et al. (2004) where liquidity improvements, not mechanical index buying, explain most of the medium-term drift following inclusions. Comparable trends have been reported in emerging markets by Afego (2017) and Naicker (2022), both of whom find that small-cap inclusions generate slow-burning but persistent positive returns as investor

attention widens. The magnitude of the +8% CAAR over 50 trading days also implies that the JSE Small Cap Index conveys a form of certification to investors. Being listed signals compliance with transparency and governance standards, which may reduce perceived risk among investors (Shrestha, 2025). This reputational effect complements liquidity gains, providing a plausible explanation for why returns continue to rise even after mechanical buying pressure subsides. Together, the long-term evidence suggests that inclusion in the JSE Small Cap Index delivers a lasting improvement in shareholder value. The price adjustment is neither immediate nor explosive but unfolds steadily as the market reassesses firm prospects considering increased visibility and trading depth. Having established the enduring nature of inclusion effects, the analysis now turns to the corresponding behaviour of excluded firms to determine whether deletions mirror or diverge from this pattern.

The sustained but moderate rise in cumulative abnormal returns over the long window points away from short-term price pressure and toward more structural interpretations rooted in liquidity conditions and gradual information assimilation (Bekaert, Harvey & Lundblad, 2007; Hou & Moskowitz, 2005). These patterns partly align with the Imperfect-Substitutes Hypothesis, where frictions cause valuation effects to materialise slowly, and with the Information Content Hypothesis, which posits that improved visibility and index-related certification gradually strengthen investor perceptions. The findings therefore suggest that inclusion benefits in the JSE Small Cap environment are not driven by immediate flows but by incrementally improving liquidity and recognition, consistent with the theoretical expectations most relevant to this market segment.

4.2. Exclusion

Having established the price and return behaviour of firms added to the JSE Small Cap Index, this section turns to the performance of excluded stocks. Deletions from an index often evoke a different market response compared to additions, as they are typically associated with negative sentiment, index fund selling, and diminished investor visibility. The analysis that follows mirrors the structure applied to inclusions and examines how stocks removed from the index perform across different time horizons.

The discussion begins with the descriptive statistics of abnormal returns for excluded firms, providing an overview of their distributional characteristics and volatility. This is followed by analyses of event-day, short-term, and long-term performance patterns to determine whether

exclusions lead to statistically significant declines in stock value and whether these effects persist beyond the announcement period.

Table 4.6: Descriptive Statistics of Abnormal Returns

Statistic	Exclusions
Mean	−0.00007
Median	−0.00027
Standard Deviation	0.0416
Minimum	−0.7530
Maximum	0.7753
Skewness	−0.0263
Kurtosis	50.00
N (Observations)	9,270

Source: STATA output

For excluded stocks, the descriptive statistics also show near-zero average daily abnormal returns, with a mean of −0.00007 and a median of −0.00027. These figures suggest that, in general, exclusions do not lead to consistent one-directional return patterns during the broader estimation period. The smaller standard deviation (0.0416) compared to inclusions indicates somewhat lower volatility, but the magnitude remains high for daily returns, again reflecting the inherent instability of small-cap stocks with limited liquidity and irregular trading patterns. The minimum and maximum values (−0.7530 and 0.7753, respectively) are well within plausible ranges for individual small-cap price reactions, yet they still point to considerable variation. This is consistent with temporary price dislocations that can occur when stocks are removed from index-tracking portfolios or experience lower investor attention following exclusion.

The skewness statistic (−0.0263) is close to zero, indicating a roughly symmetric distribution of positive and negative deviations from the mean. The kurtosis value of 50.00, while far smaller than that of the inclusion sample, still signals a pronounced leptokurtic distribution significantly more peaked and heavy-tailed than a normal distribution (kurtosis = 3). This again reflects the persistence of extreme observations and infrequent large price changes associated with illiquid stocks in emerging markets (Bekaert, Harvey & Lundblad, 2007). Overall, the exclusion sample displays moderate volatility and strong evidence of fat tails, confirming that abnormal returns are not normally distributed. This reinforces the need for caution when

applying parametric significance tests and suggests that non-parametric or bootstrapped tests could provide more reliable inference.

4.2.1. Daily Abnormal Return

Table 4.7 summarises daily abnormal returns across the full event window

Day	Abnormal Returns	Std. Dev.	Minimum	Maximum
-20	0,0128831	0,0957864	-0,1494907	0,7753016
-19	-0,0059397	0,0313595	-0,0884205	0,0545275
-18	-0,0019876	0,0540940	-0,2717226	0,1922925
-17	-0,0051404	0,0348444	-0,0878722	0,1388889
-15	-0,0216623	0,0419027	-0,1028675	0,0323722
-14	-0,0046915	0,0404561	-0,1396652	0,1240231
-13	0,0002241	0,0370581	-0,1152060	0,0853795
-12	-0,0078507	0,0347002	-0,1165974	0,1029599
-11	0,0011378	0,0301504	-0,0688891	0,0826740
-10	-0,0039075	0,0374083	-0,0879168	0,1771906
-8	0,0148386	0,0417397	-0,0258987	0,1028675
-7	-0,0120088	0,0404581	-0,1300307	0,0764290
-6	-0,0147600	0,0612821	-0,3647621	0,1165343
-5	-0,0114456	0,0426973	-0,1816274	0,1014438
-4	-0,0061652	0,0571057	-0,1764871	0,3102530
-3	-0,0249042	0,0673519	-0,3182787	0,0648581
0	0,0102344	0,0569017	-0,1079463	0,2168660
1	0,0041144	0,0334457	-0,0775788	0,1627183
2	0,0109056	0,0547015	-0,1662544	0,2232324
3	0,0085500	0,0469619	-0,1125878	0,1079418
4	0,0040324	0,0409535	-0,1626368	0,1125591
6	-0,0047237	0,0191635	-0,0319090	0,0293505
7	-0,0052933	0,0432207	-0,2301671	0,1317845
8	0,0050263	0,0381901	-0,1119573	0,1623818
9	0,0176529	0,0815717	-0,1007905	0,3928449
10	0,0122075	0,0587028	-0,1045610	0,4070751

11	0,0014864	0,0383477	-0,1089613	0,1333392
13	-0,0422104	0,0676783	-0,1586246	0,0343250
14	0,0016555	0,0443419	-0,1357214	0,1527049
15	0,0042699	0,0332514	-0,0789402	0,1295347
16	-0,0025950	0,0310471	-0,0910818	0,0890692
17	0,0033670	0,0311276	-0,0922224	0,1204644
18	0,0047690	0,0452143	-0,0805386	0,2340272
20	0,0018967	0,0478416	-0,0816516	0,0812052
21	-0,0041145	0,0614402	-0,3714854	0,1225389
22	0,0030908	0,0584965	-0,1134858	0,3676800
23	-0,0057880	0,0309067	-0,0987385	0,1283509
24	-0,0004932	0,0275569	-0,0698571	0,0649485
25	0,0028210	0,0397349	-0,1388450	0,1367222
27	-0,0023224	0,0194086	-0,0236655	0,0388697
28	0,0063214	0,0296842	-0,0693836	0,1032166
29	-0,0016917	0,0362290	-0,0653641	0,1681087
30	0,0023406	0,0422835	-0,1041119	0,1783682

Source: STATA output

Table 4.7 presents the daily abnormal returns for firms removed from the FTSE/JSE Small Cap Index across the same event window $[-20, +30]$. The exclusion sample displays a slightly wider range of fluctuations, reflecting occasional sharp one-day corrections but no sustained negative trend. Before the event (Days -20 to -10), mean ARs alternate between small gains and losses, with values typically within ± 0.01 . An isolated positive outlier appears on Day -20 (0.0129), likely driven by noise in thinly traded stocks rather than any systematic pattern of pre-event speculation. The brief negative sequence from Days -7 to -3 , culminating in a -0.0249 mean AR on Day -3 , could indicate mild portfolio repositioning as investors anticipate index reshuffling, although the large standard deviations (0.04–0.07) suggest high idiosyncratic volatility rather than uniform market reaction.

On the event day (Day 0), the mean AR is $+0.0102$, contrary to expectations of a sharp decline at deletion. However, the dispersion is considerable with a standard deviation of 0.0569, and this temporary uptick may simply reflect order-flow imbalances or noise trading. The days immediately following the event show continued small positive averages (Days $+1$ to $+3 \approx$

0.004–0.011), again within normal variation. From Day +6 onwards, daily abnormal returns revert toward zero, punctuated by occasional jumps such as +0.0177 on Day +9 and +0.0122 on Day +10. These one-day surges, accompanied by large standard deviations (0.08 and 0.06), are symptomatic of low-liquidity environments where a few trades can cause outsized price changes (Bekaert, Harvey & Lundblad, 2007). The tails of the distribution, with minima reaching –0.37 and maxima exceeding +0.40, further confirm this behaviour. Overall, the exclusion data reveal irregular and short-lived movements in abnormal returns around index rebalancing dates. There is no evidence of sustained post-event under-performance, which would be expected if index deletions signalled negative fundamentals. Instead, the results indicate transitory volatility spikes consistent with mechanical trading effects and limited market depth in the Small Cap segment.

4.2.2. Event-Day Effects for Exclusions

Event-day analysis provides a view of how the market reacts to the immediate news of a firm’s removal from the FTSE/JSE Small Cap Index. Because deletions typically force index-tracking funds to sell affected stocks, event-day returns are expected to be negative if such rebalancing exerts selling pressure. The abnormal return (AAR) and cumulative average abnormal return (CAAR) for Day 0 are therefore key indicators of the market’s initial response to exclusion.

Table 4.8: Event-Day Abnormal Returns (Day 0)

Event Type	AAR (Day 0)	CAAR (Day 0)	t-stat	p-value	Significance
Exclusions	+0.0102	–0.0811	1.568	0.121	Not significant

Source: STATA output

As shown in Table 4.8, the mean abnormal return on the event day for excluded firms is +1.02%, while the corresponding cumulative abnormal return is –8.11%. Although the positive AAR might initially appear counterintuitive, the t-statistic of 1.57 and a p-value above 0.10 indicate that neither the daily nor the cumulative effects are statistically significant. This suggests that the market does not react instantaneously with large price declines upon announcement, despite the mechanical selling implied by index deletion (Afego, 2017). Instead, the adjustment process seems to be more gradual.

This muted event-day response may seem inconsistent with the price-pressure hypothesis, which predicts an immediate drop in prices as index funds execute forced sales (Harris & Gurel, 1986; Shleifer, 1986). However, several structural factors in the JSE Small Cap segment likely moderate this effect and delay the manifestation of selling pressure (Hegde & McDermott,

2003; Afego, 2017). Liquidity in many of these stocks is thin, meaning that institutional investors often stagger their trades over several sessions to avoid large price swings. Additionally, rebalancing announcements are made in advance, allowing the market to incorporate the information progressively rather than all at once. This anticipation dilutes the magnitude of the event-day shock by distributing selling pressure across multiple trading sessions. The pattern of abnormal returns observed here resonates with findings from earlier studies on emerging markets, where trading constraints and slower information diffusion temper instantaneous price reactions. For example, Elayan et al. (2006) and Afego (2017) both found that deletions from mid- and small cap indices in less liquid environments exhibit delayed declines rather than sharp announcement-day drops. Similarly, Hacibedel (2008) observed that emerging-market deletions show weak or statistically insignificant event-day effects, which later intensify in short-term cumulative windows.

These results imply that, for the JSE, exclusion shocks are not fully capitalised into prices on the announcement day but instead unfold over a sequence of trading sessions. This behaviour is consistent with markets characterised by limited arbitrage capacity, fragmented investor attention, and imperfect substitutability among small-cap stocks (Shleifer, 1986). Moreover, the marginally positive AAR on Day 0 may simply reflect temporary price stabilisation efforts by market makers or investors closing short-term positions, masking the underlying negative drift that emerges subsequently. The event-day findings for exclusions suggest that the JSE's response to deletions is more subdued than the instantaneous reactions observed in developed exchanges such as the S&P 500 (Shleifer, 1986; Lynch & Mendenhall, 1997).

Overall, the event-day evidence does not indicate a statistically significant immediate price reaction to index exclusions. Rather than contradicting the Price Pressure Hypothesis, this finding suggests that selling pressure associated with deletions in the JSE Small Cap segment materialises gradually rather than instantaneously (Afego, 2017). Limited liquidity, trade staggering by institutional investors, and anticipatory adjustment in advance of official announcements delay the full price impact of exclusion. Consequently, the effects of index removal are more clearly reflected in cumulative abnormal returns over subsequent trading sessions, where liquidity constraints, imperfect substitutability, and reduced investor recognition combine to generate economically meaningful losses.

4.2.3. Short-Term Windows for Exclusion

While the event-day analysis revealed only a mild and statistically insignificant response, it is possible that the market's reaction to deletions unfolds over several trading sessions as investors and index-tracking funds complete their rebalancing. The short-term window analysis therefore focuses on cumulative movements in abnormal returns over the $[-5,+5]$ and $[-10,+10]$ periods, which together capture both anticipatory selling before the announcement and continued adjustment in the days that follow.

Table 4.9: Cumulative Average Abnormal Returns for exclusion

Table 4.10: Window	CAAR	t-stat	P-value	Significance
$[-5,+5]$	-0.0891	-2.71	0.01	Significant at 1%
$[-10,+10]$	-0.0944	-2.88	0.01	Significant at 1%

Source: STATA output

The results in Table 4.9 show that firms removed from the FTSE/JSE Small Cap Index experience large and statistically significant price declines over both short-term windows. The cumulative abnormal return of -8.91% in the $[-5,+5]$ window demonstrates that selling pressure intensifies around the event, and the further decline to -9.44% over $[-10,+10]$ suggests that the losses persist beyond the immediate announcement period. In both cases, the t-statistics exceed the critical values at the 1% level, confirming that these effects are not random fluctuations but reflect systematic downward adjustment driven by concentrated selling pressure (Chen, Noronha & Singal, 2004).

A closer examination of the pattern of abnormal returns across these windows suggests that most of the decline occurs shortly before and immediately after the event day. This timing indicates that anticipatory trading play an important role. Institutional investors aware of forthcoming deletions through publicly available rebalancing schedules appear to start selling positions in advance, thereby depressing prices even before official confirmation. Once the announcement is made, further selling by index-tracking funds compounds the pressure, leading to persistent short-term losses.

These findings lend strong support to the price-pressure hypothesis, which argues that forced selling by passive funds and limited arbitrage opportunities create temporary demand–supply imbalances. In thinly traded segments such as the JSE Small Cap Index, these imbalances are amplified by low liquidity and wide bid–ask spreads, making it difficult for prices to recover quickly. Similar patterns have been documented in other markets with limited liquidity: Lynch

and Mendenhall (1997) found that deletions from the S&P 500 suffer immediate drops of 5-10%, while Hacibedel (2008) and Afego (2017) observed comparable declines for deletions from emerging-market indices, albeit with slower recovery. However, while the direction of the effect is consistent with global evidence, the persistence of losses on the JSE appears more pronounced. The negative drift over 10 trading days after the announcement suggests that arbitrageurs either lack the capital or the incentive to counteract the temporary mispricing. Transaction costs, low analyst coverage, and the relatively small pool of liquidity providers in the small-cap segment likely delay the price correction. As a result, the market gradually absorbs the excess supply over several sessions rather than in a single trading day.

Beyond liquidity considerations, the magnitude of these declines may also reflect an information-content effect. Investors may interpret exclusion as a negative signal about firm quality or growth prospects, particularly in an index that serves as a benchmark for emerging companies. Once a firm exits the index, it may lose visibility among institutional investors and suffer from reduced research coverage, which in turn elevates its cost of capital. This interpretation aligns with Merton's (1987) investor-recognition hypothesis, suggesting that the loss of visibility can have valuation consequences even in the absence of fundamental deterioration. Taken together, the short-term results for exclusions reveal a pronounced and statistically significant deterioration in share performance. The combination of anticipatory selling, liquidity constraints, and reduced investor recognition explains why deletions experience deeper and more persistent losses than inclusions. The evidence therefore indicates that, in the JSE Small Cap segment, the costs of exclusion are immediate and tangible, reflecting both mechanical and behavioural adjustments.

The strongly negative and statistically significant CAAR values within the short-term window represent some of the clearest support for the Price Pressure Hypothesis. Selling pressure associated with deletion not only depresses prices immediately but continues to exert influence over the subsequent days, suggesting that liquidity constraints delay the absorption of sell orders. This persistence is consistent with the Imperfect-Substitutes Hypothesis, as low substitutability limits arbitrage activity. The depth of the decline also indicates that deletions may carry informational content in small-cap settings, reinforcing the perception of heightened risk or diminished visibility. Together, these patterns affirm the theoretical expectation that exclusions should exert larger effects than inclusions.

4.2.4. Long-Term Windows for Exclusions

The preceding short-term analysis showed that deletions from the FTSE/JSE Small Cap Index are followed by sharp, statistically significant price declines concentrated within a few trading days around the announcement. However, it remains uncertain whether these losses represent temporary price distortions or a more sustained deterioration in valuation beyond the immediate rebalancing period. To address this, the analysis extends to a longer event window covering 20 trading days before and 30 days after the deletion date, thereby capturing both anticipatory and post-announcement adjustments in abnormal returns.

Table 4.10: Cumulative Average Abnormal Returns (CAAR) in Long-Term Window

Day	CAAR
-20	+0.0129
+30	-0.0559

Source: STATA output

As reported in Table 4.10, firms excluded from the Small Cap Index exhibit a notable downward drift over the 50-day window. At Day -20, cumulative abnormal returns are slightly positive (+1.29%), suggesting that, prior to the announcement, these stocks were not significantly underperforming the broader market. By Day +30, however, the CAAR declines to -5.59%, confirming that the negative reaction extends well beyond the short-term period. The persistence of this downward movement implies that the market does not quickly reverse or fully compensate for the losses observed immediately after deletion.

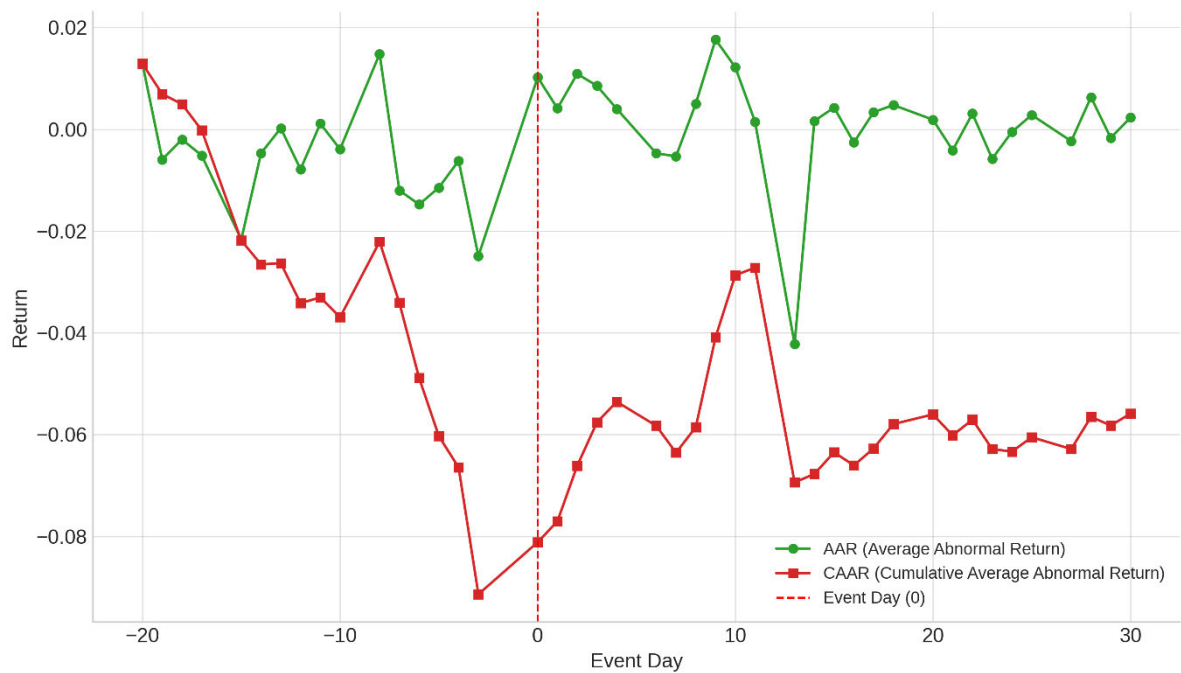


Figure 4.2: AAR and CAAR in long term window for exclusion

Source: STATA Output

Figure 4.2 illustrates the evolution of both average abnormal returns (AAR) and cumulative average abnormal returns (CAAR) for excluded firms across the $[-20, +30]$ window. The figure shows that the CAAR curve begins to decline several days before the event date, steepens sharply around Day 0, and continues to trend downward for roughly 10 sessions thereafter before flattening. The lack of recovery in the later part of the window highlights the enduring nature of the price impact in the post-deletion period.

This prolonged decline suggests that deletions from the index carry information that investors interpret negatively, rather than representing a purely mechanical liquidity effect alone. Although the initial price fall may be triggered by forced selling from index-tracking funds, the absence of a rebound indicates that broader market participants reassess the firm's prospects and risk profile considering its removal. Once excluded, companies often face reduced analyst coverage, less visibility among institutional investors, and smaller trading volumes, all of which can raise their cost of capital and depress valuations. These effects align with the investor recognition hypothesis (Merton, 1987), which posits that reduced market attention can lead to permanent price discounts.

The magnitude of the observed CAAR also supports the idea that small-cap stocks are especially vulnerable to sustained liquidity shocks. In a relatively illiquid market such as the

JSE's small-cap segment, temporary selling pressure may have long-lasting consequences because prices take longer to recover once buyers withdraw. This dynamic echoes findings by Hacibedel (2008) and Beneish and Whaley (1996), who noted that deletions from smaller indices in emerging markets tend to exhibit slower post-event recoveries than deletions from highly liquid developed-market benchmarks. The structural constraints of the JSE such as limited arbitrage capacity and wider bid–ask spreads likely exacerbate these effects.

A further consideration is that the post-event trajectory of abnormal returns does not show the symmetrical recovery often observed in inclusion cases. While inclusions benefit from gradual valuation gains that accumulate over several weeks, exclusions appear to stabilise at a persistently lower level. The asymmetry reinforces the notion that the market perceives deletions as negative signals about firm quality or growth prospects, a perception that persists even after the forced selling pressure dissipates.

The partial recovery but continued underperformance observed in the long-term window suggests that while price pressure dissipates gradually, it is not fully offset. This pattern supports a hybrid interpretation of the underlying theories: initial sharp declines reflect price pressure (Harris and Gurel, 1986), the slow corrective trajectory aligns with imperfect substitutability and illiquid market conditions (Shleifer, 1986), and the lasting negative CAAR hints at some informational component tied to the loss of index status (Chen et al., 2004). The long-term evidence therefore indicates that deletion from the JSE Small Cap Index carries enduring implications for valuation, consistent with the broader literature's finding that negative events tend to have more persistent effects than positive ones.

4.3. Comparative Analysis of Inclusions vs Exclusions

The preceding sections have analysed inclusion and exclusion events separately, revealing distinct behavioural patterns in abnormal returns. This section compares the two event types directly to assess whether the market's reaction to index revisions is symmetric or asymmetric. By examining differences in both magnitude and persistence, the analysis provides deeper insight into how the JSE Small Cap Index responds to changes in its composition.

Table 4.11: Comparative Summary of Abnormal Returns for Inclusions and Exclusions

Measure	Inclusions	Exclusions	Direction of Effect
Event-Day AAR	+0.00005	+0.0102	Minimal for both, non-significant
CAAR [−5,+5]	+0.0083	−0.0891	Strongly asymmetric

CAAR [-10,+10]	+0.0112	-0.0944	Strongly asymmetric
CAAR [-20,+30]	+0.0829	-0.0559	Persistent divergence

Source: STATA output

The evidence in Table 4.11 clearly demonstrates that index inclusions and exclusions do not elicit mirror-image reactions. While both events represent information-neutral rebalancing in theory, their market outcomes are asymmetric in both sign and persistence. Inclusions tend to produce small and statistically insignificant gains that accumulate slowly over time, whereas exclusions generate sharp and lasting losses that occur shortly after announcement and show limited recovery even weeks later.

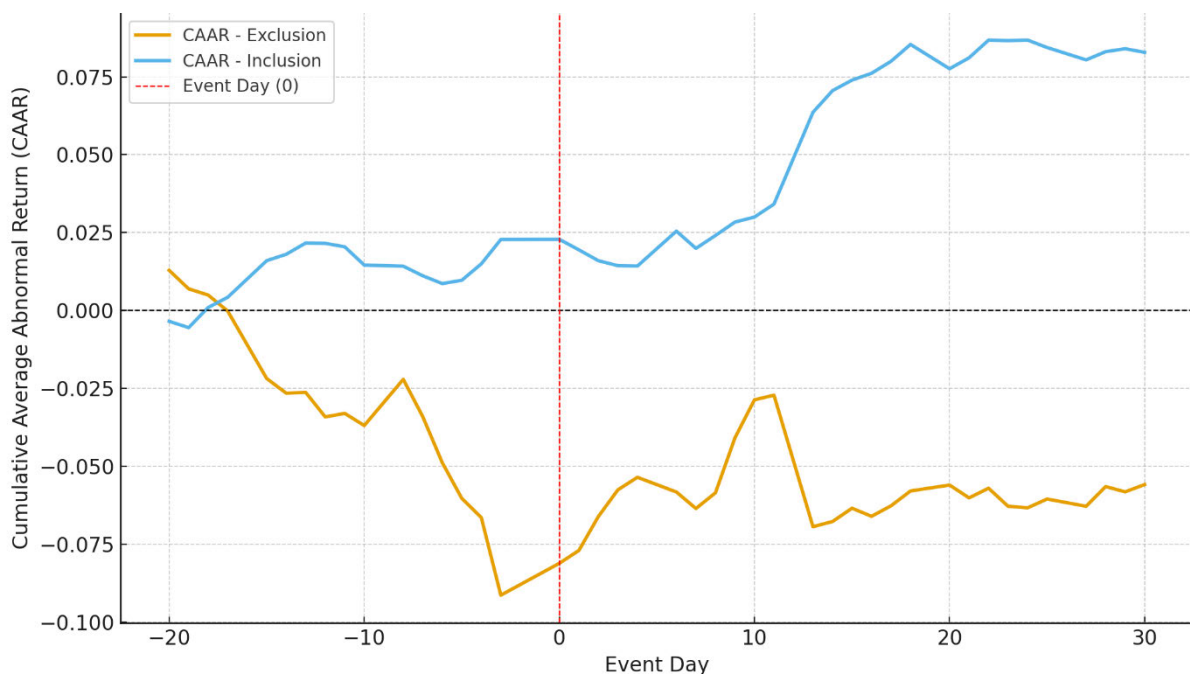


Figure 4.3: comparison of AAR and CAAR for long term effect of exclusion

Source: STATA Output

Figure 4.3 visualises these contrasting trajectories. The CAAR curve for inclusions slopes gently upward throughout the post-event period, consistent with a slow but sustained revaluation process. By contrast, the CAAR for exclusions plunges immediately after the event and remains negative until the end of the window.

This asymmetry highlights important structural features of the JSE Small Cap Index. The limited liquidity of small-cap stocks magnifies the effects of forced selling to a greater extent than it does forced buying. When firms are deleted, index funds must liquidate their holdings,

often in markets with thin order books, causing significant downward pressure. Conversely, when firms are added, the resulting purchases are dispersed across fewer investors and are absorbed more easily, resulting in smaller price adjustments. This interpretation aligns primarily with the price-pressure hypothesis (Scholes, 1972) but also incorporates elements of the liquidity-cost framework (Mikkelson & Partch, 1985), in which liquidity withdrawal from deletions imposes longer-lasting valuation penalties than liquidity additions from inclusions provide benefits.

The timing of the reactions further underscores this asymmetry. For inclusions, abnormal returns remain flat before the announcement and rise gradually afterward, suggesting that anticipatory trading are limited. For exclusions, however, abnormal returns begin declining several days before Day 0, implying that active investors anticipate the deletions and begin selling early based on publicly available index rebalancing information. The persistence of negative cumulative returns long after the event also indicates that these stocks face sustained disinvestment from the institutional segment, leading to depressed valuations even beyond the initial adjustment period.

Comparing these patterns with international evidence reinforces the notion that deletions have more severe consequences than additions. Studies on developed markets such as Beneish and Whaley (1996), Lynch and Mendenhall (1997), and Chen et al. (2004) consistently show similar asymmetry, though the magnitude of effects is smaller in highly liquid indices like the S&P 500. In contrast, research on emerging exchanges, including Afego (2017) for Nigeria and Naicker (2022) for South Africa, finds that lower liquidity and greater information frictions amplify the price impact of exclusions, often causing losses that persist for several weeks. The results from the JSE Small Cap Index therefore fit closely within the emerging-market pattern of sustained deletions effects and muted inclusions. Another noteworthy feature is the differing volatility profiles surrounding inclusions and exclusions. The standard deviations of abnormal returns are consistently higher for exclusions, reflecting greater uncertainty and trading dispersion. This behaviour is consistent with the hypothesis that deletions not only remove a firm from a benchmark but may also increase its perceived risk and reduce its investor base. Inclusions, by contrast, may slightly lower volatility as the firm gains legitimacy and attracts a more stable shareholder mix.

Overall, the comparative analysis reveals that the JSE Small Cap Index exhibits a clear asymmetric index effect, characterised by modest, slow-building benefits for inclusions and

sharp, persistent penalties for exclusions. These differences arise from structural market features such as liquidity constraints, investor composition, and trading depth, rather than from differences in firm fundamentals. The market's adjustment process is thus directional: it rewards additions modestly but punishes deletions heavily, underscoring the asymmetric consequences of index revision events in a developing-market context.

4.4. Summary

This chapter presented and analysed the empirical results of the study, beginning with descriptive statistics of abnormal returns and progressing through event-day, short-term, and long-term windows for both inclusions and exclusions in the JSE Small Cap Index. Diagnostic tests confirmed that the data were suitable for event-study analysis, with abnormal returns centred around zero but displaying high dispersion and fat-tailed distributions typical of thinly traded emerging-market shares.

The descriptive analysis showed that average abnormal returns for the full sample were close to zero, although the wide range between minimum and maximum values reflected significant cross-sectional volatility among the constituent firms. When disaggregated by event type, inclusion observations exhibited slightly higher variance than exclusions, reflecting heterogeneous price reactions associated with stocks entering the index. These preliminary findings provided the basis for examining cumulative effects around key event windows.

Event-day analysis revealed muted and statistically insignificant reactions to index additions and deletions. On the announcement day, both inclusions and exclusions recorded abnormal returns that were statistically insignificant, indicating that investors did not immediately re-price the affected securities. The short-term assessment, however, showed a distinct divergence between the two groups. Firms added to the index experienced small, positive cumulative abnormal returns within both the $[-5,+5]$ and $[-10,+10]$ windows, suggesting limited and delayed optimism among market participants. In contrast, firms removed from the index registered sharp and statistically significant losses across the same windows implying that deletions triggered concentrated selling pressure and liquidity withdrawal over the short-term event window.

Extending the window to $[-20,+30]$ revealed that these patterns persisted beyond the immediate announcement period. Inclusions followed a steady upward trajectory, with cumulative abnormal returns turning strongly positive by Day +30, reflecting gradual adjustment consistent with incremental liquidity improvement and investor recognition effects.

Exclusions, on the other hand, displayed sustained negative cumulative returns, confirming that the adverse effects of deletions extended well after the event without evidence of recovery. This long-term divergence underscores the asymmetric market response to index revisions, additions generate mild and gradually accumulating gains, whereas deletions inflict larger and more persistent losses. The comparative analysis consolidated these results through both tabular and graphical evidence. Figure 4.3 illustrated the persistent gap between inclusion and exclusion CAAR paths, reinforcing that the market penalises removals more severely than it rewards additions. The asymmetry aligns with liquidity-based and price-pressure explanations found in prior research on emerging markets, where thin trading and limited institutional depth amplify downward adjustments.

Overall, Chapter 4 demonstrated that changes to the JSE Small Cap Index produce measurable but uneven valuation effects. While inclusions benefit gradually from increased investor recognition, exclusions face immediate and persistent declines linked to forced selling and diminished investor visibility.

Chapter 5: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter concludes the study by presenting a concise summary of the research, the main conclusions derived from the analysis, and recommendations arising from the findings. It also suggests areas where further investigation would be valuable. The chapter ties together the objectives, methodology, and empirical evidence, thereby closing the loop between the problem identified at the beginning of the study and the outcomes derived from the analysis.

These are the objectives of the study:

- To investigate the short-term and long-term performance of stocks included in the small-cap index, focusing on abnormal and cumulative returns, trading volumes, and liquidity changes.
- To investigate the short-term and long-term performance of stocks excluded from the small-cap index, focusing on abnormal and cumulative abnormal returns, trading volumes, and liquidity changes.
- To compare the short-term and long-term performance of stocks included and excluded from the small-cap index, to determine if there are significant differences in abnormal and cumulative abnormal returns, trading volumes, and liquidity changes.

5.1. Summary of the Study

The study investigated how the inclusion and exclusion of stocks from the FTSE/JSE Small Cap Index influence share price performance around index revision announcements. The motivation stemmed from mixed global evidence on index effects while some studies in developed markets such as the United States, United Kingdom and Japan report strong positive abnormal returns for index additions and negative returns for deletions, others find only temporary or insignificant impacts. In the South African context, limited research has examined these dynamics within smaller capitalisation segments of the market, even though index rebalancing can influence liquidity, investor visibility, and valuation for firms of this size.

The study aimed to achieve three specific objectives: first, to determine the short- and long-term performance of stocks included in the Small Cap Index; second, to assess the corresponding performance of excluded stocks; and third, to compare whether there are statistically significant differences between the two groups. These objectives were addressed through a quantitative explanatory design grounded in the positivist paradigm. Data were obtained from Bloomberg and IRESS McGregor for a ten-year period (January 2013 – December 2023). The event study methodology was applied using a 125-day estimation window and two event windows ($[-10,+10]$ and $[-20,+30]$). The market model was employed to estimate expected returns, and abnormal returns were calculated as deviations from expected performance. These were aggregated to obtain Average Abnormal Returns (AAR), Cumulative Abnormal Returns (CAR), and Cumulative Average Abnormal Returns (CAAR). Statistical significance was tested using t-statistics to determine whether observed deviations were different from zero.

Descriptive analysis showed that abnormal returns for both inclusions and exclusions were highly volatile, with extreme kurtosis values indicating the presence of outliers typical of thinly traded small-cap stocks. For inclusions, mean abnormal returns were marginally positive but statistically insignificant, suggesting that being added to the index did not immediately enhance firm value. In contrast, exclusions displayed slightly negative average returns and higher volatility, implying stronger market sensitivity to deletions. Event-day analysis revealed that neither inclusions nor exclusions produced statistically significant immediate price reactions on the announcement date. However, short-term window analysis ($[-10,+10]$) showed clear asymmetry: while inclusions recorded small, insignificant gains, exclusions experienced pronounced and statistically significant cumulative losses of about -9% . These results indicate that index deletions trigger short-term selling pressure, likely due to passive fund rebalancing and diminished investor confidence.

Over longer horizons ($[-20,+30]$), inclusions demonstrated a gradual upward trend in cumulative abnormal returns, suggesting that investors may adjust portfolios progressively, and that valuation benefits of index membership materialise over time. Conversely, exclusions continued to exhibit negative cumulative performance, though the magnitude of the decline moderated beyond the immediate event window. Overall, the findings confirm that market responses to index changes in the JSE Small Cap segment are asymmetric and more severe for deletions than for additions.

5.2. Conclusion

The conclusions are drawn directly from the study's results and address each research question in turn:

- **Short- and long-term performance of inclusions:**
Stocks added to the JSE Small Cap Index recorded marginally positive abnormal and cumulative abnormal returns. These effects were statistically insignificant in both the short-term ($[-10,+10]$) and long-term ($[-20,+30]$) windows, indicating that inclusion does not create substantial or immediate value for shareholders. Over longer periods, modest positive trends suggest improved investor visibility and liquidity rather than speculative overreaction.
- **Short- and long-term performance of exclusions:**
Stocks removed from the index experienced significant negative abnormal performance around the announcement date. Short-term cumulative abnormal returns were strongly

negative and statistically significant, reflecting selling pressure following deletion. Although losses persisted into the long-term window, they diminished in magnitude, implying partial market correction as prices stabilised.

- **Comparison between inclusions and exclusions:**

The results show a clear asymmetry between the two event types. Market reactions to exclusions are sharper and more significant than to inclusions, supporting the notion that investors penalise deletions more than they reward additions. This pattern aligns with the information and price-pressure hypotheses observed in other emerging markets.

Collectively, the results indicate that inclusion announcements are not associated with strong immediate price responses, whereas deletions generate larger and more persistent negative adjustments. This asymmetry is consistent with liquidity withdrawal and investor-recognition mechanisms, where index membership supports trading conditions while deletion concentrates selling pressure and reduces visibility.

5.3. Contribution of the Study to the Existing Body of Knowledge

This study contributes to the existing literature on index effects in several important ways. Theoretically, it extends understanding of how the mechanisms underlying index revisions operate within an emerging-market environment characterised by thin liquidity and limited passive-fund penetration. The results provide empirical support for both the price-pressure hypothesis and the imperfect-substitutes hypothesis in explaining short-term losses following exclusions, while offering evidence that modest longer-term gains among inclusions are more consistent with liquidity-related effects. In doing so, the study clarifies how classical index-effect theories manifest in small-cap settings, where structural constraints weaken arbitrage and heighten order-flow sensitivity.

From an empirical perspective, the study adds new evidence on the FTSE/JSE Small Cap Index an area that has received far less scholarly attention than the Top 40 or Mid Cap segments. The findings document the presence of asymmetric responses, with exclusions generating pronounced and statistically significant negative abnormal returns, whereas inclusions display muted or insignificant effects. These results provide the first comprehensive multi-year evidence spanning a decade of index revisions in this segment, thereby filling a gap in South African finance research and offering a benchmark for future analysis of small-cap dynamics.

Methodologically, the use of a dual-window event-study framework over both short- and longer-horizons demonstrates how different phases of adjustment can be isolated within a market where liquidity constraints cause delayed price reactions. By employing a consistent market-model specification across all events and separating inclusions from exclusions, the study enhances the comparability of index-effect outcomes across time and mitigates the distortions common in emerging-market event studies that rely on thin datasets. The approach provides a replicable blueprint for subsequent research examining event-driven price behaviour in illiquid or thinly traded segments.

In practical and policy terms, the study offers insights relevant to investors, fund managers, and regulators. The evidence that exclusions trigger sharper and more persistent price adjustments suggests that market participants should monitor deletion events more closely, particularly when evaluating short-term liquidity risk or mispricing opportunities. For index providers, the results highlight the sensitivity of small-cap counters to order-flow shocks during rebalancing, underscoring the importance of clear communication regarding index methodology and review schedules. For regulators and the Johannesburg Stock Exchange, the findings point to the value of strengthening transparency and liquidity-support mechanisms in the small-cap market, particularly given the vulnerability of these firms to valuation swings unrelated to fundamentals. Collectively, these contributions advance understanding of index effects in South Africa and provide an evidence base that can inform both academic debate and market-structure policy.

5.4. Recommendations

Based on the above conclusions, several recommendations are advanced for different market participants. Investors should be cautious in interpreting index changes as long-term value signals. While additions do not consistently generate excess returns, deletions often create short-term undervaluation opportunities once selling pressure subsides. Value-oriented investors could exploit such temporary mispricing by acquiring fundamentally sound stocks after index removal. Passive and semi-active managers tracking the JSE Small Cap Index should anticipate liquidity shifts around rebalancing periods. Implementing staggered reallocation strategies may reduce transaction costs and mitigate market impact. Enhanced disclosure of rebalancing methodologies by index providers would further assist portfolio planning. Companies targeting index inclusion as part of capital-market visibility strategies should recognise that the benefits may accrue gradually rather than immediately. Regulators

and the JSE could also consider improving information dissemination regarding index changes to reduce speculative volatility and enhance market transparency.

5.5. Limitations of the Study

Although the study provides meaningful insights into the price effects of index revisions within the FTSE/JSE Small Cap Index, several limitations should be acknowledged. First, the analysis focuses exclusively on price-based measures of abnormal performance and does not incorporate liquidity or trading-volume metrics. As a result, the study cannot disentangle whether observed patterns are driven primarily by changes in demand elasticity, liquidity adjustments, or shifts in investor attention. Second, the use of the single-factor market model while appropriate for an event-study framework and consistent with prior South African research does not account for other risk factors such as size, value, profitability, or investment effects. Multifactor models may provide a more granular assessment of risk-adjusted performance. Third, the study examines only official index-review announcements and excludes intraday market reactions due to the use of daily data. High-frequency data could capture more immediate price adjustments, especially in the hours following index announcements. Fourth, while firms with confounding events were excluded, it is not possible to eliminate all sources of noise in an emerging-market environment characterised by episodic volatility and information asymmetry. Finally, the findings are specific to the JSE's Small Cap segment and may not generalise to larger or more liquid indices, nor to other emerging markets with different institutional structures. These limitations do not undermine the study's findings but highlight important considerations for interpreting the results and for designing future research.

5.6. Suggestions for Further Study

Future research could extend the analysis in several directions. First, incorporating trading-volume and liquidity measures could clarify whether price effects are driven by changes in demand elasticity or information flow. Second, applying multi-factor models such as the Fama–French five-factor framework could test whether size and value characteristics amplify or dampen the observed effects. Third, a sector-specific investigation could reveal whether index changes affect industries differently, particularly in sectors with varying institutional ownership levels. Finally, comparing JSE Small Cap, Mid Cap and Top 40 Indices could offer insights into how market depth and visibility influence index-related anomalies across firm sizes.

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Appendices

APPENDIX A

Table A-1: Catalogue of FTSE/JSE Small Cap Index Inclusion and Exclusion Events (2013-2023)

Number #	Company Name	Company Ticker	Event Date	Event Type
1.	Master Drilling Grp Ltd	MDI	23 Sep 2013	Inclusion
2.	Attacq Limited	ATT	23 Dec 2013	Inclusion
3.	Curro Holdings Limited	COH	23 Dec 2013	Inclusion
4.	JD Group Ltd	JDG	23 Dec 2013	Inclusion
5.	Lewis Group Ltd	LEW	23 Dec 2013	Inclusion
6.	Net 1 UEPS Tech Inc	NT1	23 Dec 2013	Inclusion
7.	Clientele Ltd	CLI	23 Dec 2013	Inclusion
8.	Niveus Investments Ltd	NIV	23 Dec 2013	Inclusion
9.	Ascension Prop Ltd A	AIA	23 Dec 2013	Inclusion
10.	Ascension Prop Ltd B	AIB	23 Dec 2013	Inclusion
11.	Afrimat Limited	AFT	23 Dec 2013	Inclusion
12.	Combined Motor Hldgs Ltd	CMH	23 Dec 2013	Exclusion
13.	DRD Gold Ltd	DRD	23 Dec 2013	Exclusion
14.	Merafe Resources Ltd	MRF	23 Dec 2013	Exclusion
15.	Litha Healthcare Grp Ltd	LHG	23 Dec 2013	Exclusion
16.	Master Drilling Grp Ltd	MDI	23 Dec 2013	Exclusion
17.	York Timber Holdings Ltd	YRK	23 Dec 2013	Exclusion
18.	Emira Property Fund	EMI	24 March 2014	Inclusion
19.	African Oxygen Limited	AFX	24 March 2014	Inclusion
20.	Sibanye Gold Limited	SGL	24 March 2014	Exclusion
21.	Acucap Properties Ltd	ACP	23 June 2014	Inclusion
22.	JD Group Ltd	JDG	23 June 2014	Exclusion
23.	Redefine International P.L.C	RPL	23 June 2014	Exclusion
24.	Vukile Property Fund Ltd	VKE	22 Sep 2014	Inclusion
25.	SA Corp Real Estate Fund	SAC	22 Sep 2014	Inclusion
26.	Aveng Group Limited	AEG	22 Dec 2014	Inclusion
27.	Allied Electronics Corp A	AEL	22 Dec 2014	Inclusion
28.	Caxton CTP Publish Print	CAT	22 Dec 2014	Inclusion
29.	Accelerate Prop Fund Ltd	APF	22 Dec 2014	Inclusion
30.	Mix Telematics Ltd	MIX	22 Dec 2014	Inclusion
31.	Rhodes Food Grp Hldg Ltd	RFG	22 Dec 2014	Inclusion
32.	AfroCentric Inv Corp Ltd	ACT	22 Dec 2014	Inclusion
33.	Merafe Resources Ltd	MRF	22 Dec 2014	Inclusion
34.	Trustco Group Hldgs Ltd	TTO	22 Dec 2014	Inclusion
35.	Hulamin Ltd	HLM	22 Dec 2014	Inclusion
36.	Super Group Ltd	SPG	22 Dec 2014	Exclusion
37.	Hospitality Prop Fund B	HPB	22 Dec 2014	Exclusion
38.	Metrofile Holdings Ltd	MFL	22 Dec 2014	Exclusion

39.	Finbond Group Ltd	FGL	22 Dec 2014	Exclusion
40.	Bell Equipment Ltd	BEL	22 Dec 2014	Exclusion
41.	Stefanuti Stck Hldgs Ltd	SSK	22 Dec 2014	Exclusion
42.	Murray & Roberts Hldgs	MUR	23 March 2015	Inclusion
43.	Wilson Bayly Hlm-Ovc Ltd	WBO	23 March 2015	Inclusion
44.	Dipula Income Fund B	DIB	23 March 2015	Inclusion
45.	Harmony GM Co Ltd	HAR	22 June 2015	Inclusion
46.	ArcelorMittal SA Limited	ACL	22 June 2015	Inclusion
47.	Zeder Inv Ltd	ZED	22 June 2015	Exclusion
48.	Vukile Property Fund Ltd	VKE	22 June 2015	Exclusion
49.	Royal Bafokeng Platinum Ltd	RBP	21 Sep 2015	Inclusion
50.	Illovo Sugar Ltd	ILV	21 Sep 2015	Inclusion
51.	Tradehold Ltd	CPP	21 Sep 2015	Inclusion
52.	Net 1 UEPS Tech Inc	NT1	21 Sep 2015	Exclusion
53.	JSE Ltd	JSE	21 Sep 2015	Exclusion
54.	PSG Konsult Limited	KST	21 Sep 2015	Exclusion
55.	Trencor Ltd	TRE	21 Dec 2015	Inclusion
56.	MAS Real Estate Inc.	MSP	21 Dec 2015	Inclusion
57.	Calgro M3 Hldgs Ltd	CGR	21 Dec 2015	Inclusion
58.	Finbond Group Ltd	FGL	21 Dec 2015	Inclusion
59.	Dipula Income Fund B	DIB	21 Dec 2015	Exclusion
60.	Mix Telematics Ltd	MIX	21 Dec 2015	Exclusion
61.	Allied Electronics Corp A	AEL	21 Dec 2015	Exclusion
62.	Hulamin Ltd	HLM	21 Dec 2015	Exclusion
63.	ArcelorMittal SA Limited	ACL	21 Dec 2015	Exclusion
64.	Merafe Resources Ltd	MRF	21 Dec 2015	Exclusion
65.	Ascension Prop Ltd A	AIA	21 Dec 2015	Exclusion
66.	Aveng Group Limited	AEG	21 Dec 2015	Exclusion
67.	Grindrod Ltd	GND	22 March 2016	Inclusion
68.	Adcock Ingram Hldgs Ltd	AIP	22 March 2016	Inclusion
69.	Harmony GM Co Ltd	HAR	22 March 2016	Exclusion
70.	Illovo Sugar Ltd	ILV	22 March 2016	Exclusion
71.	Sun International Ltd	SUI	20 June 2016	Inclusion
72.	ArcelorMittal SA Limited	ACL	19 Sep 2016	Inclusion
73.	Capital & Regional Plc	CRP	19 Sep 2016	Inclusion
74.	Net 1 UEPS Tech Inc	NT1	19 Sep 2016	Inclusion
75.	Indluplace Properties Ltd	ILU	19 Sep 2016	Exclusion
76.	Finbond Group Ltd	FGL	19 Sep 2016	Exclusion
77.	Grand Parade Inv Ltd	GPL	19 Sep 2016	Exclusion
78.	Adcorp Holdings Limited	ADR	19 Sep 2016	Exclusion
79.	Clientele Ltd	CLI	19 Dec 2016	Inclusion
80.	Equites Prop Fund Ltd	EQU	20 March 2017	Inclusion
81.	ArcelorMittal SA Limited	ACL	20 March 2017	Exclusion
82.	Schroder Eur REIT plc	SCD	20 March 2017	Exclusion
83.	Sirius Real Estate Ltd	SRE	19 June 2017	Inclusion
84.	ArcelorMittal SA Limited	ACL	18 Sep 2017	Inclusion

85.	Allied Electronics Corp A	AEL	18 Sep 2017	Inclusion
86.	Echo Polska Prop N.V.	EPP	18 Sep 2017	Exclusion
87.	Calgro M3 Hldgs Ltd	CGR	18 Sep 2017	Exclusion
88.	Clientele Ltd	CLI	18 Dec 2017	Inclusion
89.	African Rainbow Cap Inv	AIL	18 Dec 2017	Inclusion
90.	Hospitality Prop Fund B	HPB	19 March 2018	Inclusion
91.	Datatec Ltd	DTC	19 March 2018	Inclusion
92.	Choppies Enterprises Ltd	CHP	19 March 2018	Exclusion
93.	Novus Holdings Ltd	NVS	19 March 2018	Exclusion
94.	Niveus Investments Ltd	NIV	19 March 2018	Exclusion
95.	Omnia Holdings Ltd	OMN	25 Sep 2018	Inclusion
96.	Zeder Inv Ltd	ZED	25 Sep 2018	Inclusion
97.	Alexander Forbes Grp Hldgs	AFH	25 Sep 2018	Inclusion
98.	Blue Label Telecoms Ltd	BLU	25 Sep 2018	Inclusion
99.	EOH Holdings Ltd	EOH	25 Sep 2018	Inclusion
100.	Mix Telematics Ltd	MIX	25 Sep 2018	Inclusion
101.	Trustco Group Hldgs Ltd	TTO	25 Sep 2018	Exclusion
102.	Clientele Ltd	CLI	25 Sep 2018	Exclusion
103.	Caxton CTP Publish Print	CAT	25 Sep 2018	Exclusion
104.	Balwin Properties Ltd	BWN	25 Sep 2018	Exclusion
105.	Capital & Regional Plc	CRP	24 Dec 2018	Exclusion
106.	Net 1 UEPS Tech Inc	NT1	24 Dec 2018	Exclusion
107.	Tongaat Hulett Ltd	TON	18 March 2019	Inclusion
108.	Stor-Age Prop REIT Ltd	SSS	18 March 2019	Inclusion
109.	Lighthouse Capital Ltd	LTE	18 March 2019	Inclusion
110.	MAS Real Estate Inc.	MSP	18 March 2019	Exclusion
111.	Texton Property Fund Ltd	TEX	18 March 2019	Exclusion
112.	RDI REIT P.L.C	RPL	23 Sep 2019	Inclusion
113.	Nampak Ltd	NPK	23 Sep 2019	Inclusion
114.	Tsogo Sun Hotels LTD	TGO	23 Sep 2019	Inclusion
115.	DRD Gold Ltd	DRD	23 Sep 2019	Inclusion
116.	AfroCentric Inv Corp Ltd	ACT	23 Sep 2019	Exclusion
117.	Rebosis Property Fund Ltd	REB	23 Sep 2019	Exclusion
118.	Mix Telematics Ltd	MIX	23 Sep 2019	Exclusion
119.	Delta Property Fund Ltd	DLT	23 Sep 2019	Exclusion
120.	PSG Konsult Limited	KST	21 Sep 2020	Inclusion
121.	Hammerson plc	HMN	21 Sep 2020	Inclusion
122.	MAS Real Estate Inc.	MSP	21 Sep 2020	Inclusion
123.	KAP Industrial Hldgs Ltd	KAP	21 Sep 2020	Inclusion
124.	Imperial Logistics Ltd	RLO	21 Sep 2020	Inclusion
125.	Reunert Ltd	MTH	21 Sep 2020	Inclusion
126.	Motus Holdings Lt	VKE	21 Sep 2020	Inclusion
127.	Vukile Property Fund Ltd	MSM	21 Sep 2020	Inclusion
128.	Massmart Holdings Ltd	HYP	21 Sep 2020	Inclusion
129.	Hyprop Inv Ltd	BAT	21 Sep 2020	Inclusion

130.	Brait SE	TSG	21 Sep 2020	Inclusion
131.	Tsogo Sun Gaming Ltd	RMH	21 Sep 2020	Inclusion
132.	RMB Holdings Ltd	RLO	21 Sep 2020	Inclusion
133.	DRD Gold Ltd	DRD	21 Sep 2020	Exclusion
134.	Mpact Limited	MPT	21 Sep 2020	Exclusion
135.	Octodec Invest Ltd*	135 OCT	21 Sep 2020	Exclusion
136.	Hospitality Prop Fund B	HPB	21 Sep 2020	Exclusion
137.	Spur Corporation Ltd	SUR	21 Sep 2020	Exclusion
138.	PPC Limited	PPC	21 Sep 2020	Exclusion
139.	Lewis Group Ltd	LEW	21 Sep 2020	Exclusion
140.	Nampak Ltd	NPK	21 Sep 2020	Exclusion
141.	AECI Limited	AFE	23 March 2021	Inclusion
142.	JSE Ltd	JSE	23 March 2021	Inclusion
143.	Royal Bafokeng Platinum Ltd	RBP	23 March 2021	Exclusion
144.	Textainer Group Hldgs Ltd	TXT	23 March 2021	Exclusion
145.	RMB Holdings Ltd	RMH	23 March 2021	Exclusion
146.	ArcelorMittal SA Limited	ACL	20 Sep 2021	Inclusion
147.	Tharisa plc	THA	20 Sep 2021	Inclusion
148.	PPC Limited	PPC	20 Sep 2021	Inclusion
149.	Hammerson plc	HMN	20 Sep 2021	Exclusion
150.	Transaction Capital Ltd	TCP	20 Sep 2021	Exclusion
151.	Bytes Technology Group	BYI	20 Sep 2021	Exclusion
152.	DRD Gold Ltd	DRD	22 March 2022	Inclusion
153.	Coronation Fund Managers Ltd	CML	19 Sep 2022	Inclusion
154.	Thungela Resources Ltd	TGA	19 Sep 2022	Exclusion
155.	Zeder Investments Ltd	ZED	19 Sep 2022	Exclusion
156.	City Lodge Hotels Ltd	CLH	19 Sep 2022	Exclusion
157.	Fortress Real Est Inv B	FFB	20 March 2023	Inclusion
158.	Barloworld Ltd	BAW	20 March 2023	Inclusion
159.	RCL Foods Limited	RCL	20 March 2023	Inclusion
160.	RFG Holdings Limited	RFG	20 March 2023	Exclusion
161.	Murray & Roberts Hldgs	MUR	20 March 2023	Exclusion
162.	Resilient REIT Limited	RES	18 Sep 2023	Inclusion
163.	Telkom SA SOC Ltd	TKG	18 Sep 2023	Inclusion
164.	Transaction Capital Ltd	TCP	18 Sep 2023	Inclusion
165.	ArcelorMittal SA Limited	ACL	18 Sep 2023	Exclusion
166.	Libstar Holdings Ltd	166 LBR	18 Sep 2023	Exclusion

APPENDIX B

Table B-2: List of Companies Excluded from the Event Study Sample

Number #	Company Name	Company ticker	Event Date	Excluded from the sample
1.	Sibanye Gold Limited	SGL	24 June 2013	Excluded
2.	Alex Forbes Eq Hldgs Ltd	AFP	23 Sep 2013	Excluded
3.	Coal of Africa Ltd	CZA	23 Dec 2013	Excluded
4.	Petmin Ltd	PET	23 Dec 2013	Excluded
5.	PSG Konsult Limited	KST	22 Sep 2014	Excluded
6.	Allied Elec Corp N	AEN	22 Dec 2014	Excluded
7.	Eqstra Holdings Ltd	EQS	22 Dec 2014	Excluded
8.	Quantum Foods Hldgs Ltd	QFH	22 Dec 2014	Excluded
9.	The Pivotal Fund Ltd	PIV	23 March 2015	Excluded
10.	Novus Holdings Limited	NVS	22 June 2015	Excluded
11.	Choppies Enterprises Ltd	CHP	21 Sep 2015	Excluded
12.	Lonmin plc	LON	21 Sep 2015	Excluded
13.	Indluplace Properties Ltd	ILU	21 Sep 2015	Excluded
14.	Stenprop Limited	STP	21 Dec 2015	Excluded
15.	Balwin Properties Ltd	BWN	21 Dec 2015	Excluded
16.	Hospitality Prop Fund A	HPA	21 Dec 2015	Excluded
17.	Howden Africa Hldgs Ltd	HWN	21 Dec 2015	Excluded
18.	Montauk Holdings Ltd	MKR	21 Dec 2015	Excluded
19.	Allied Elec Corp N	AEN	21 Dec 2015	Excluded
20.	Schroder Eur REIT plc	SCD	22 March 2016	Excluded
21.	Echo Polska Prop N.V.	EPP	19 Dec 2016	Excluded
22.	Liberty Two Degrees	L2D	20 March 2017	Excluded
23.	Greenbay Properties Ltd	GRP	19 June 2017	Excluded
24.	Pallinghurst Res Ltd	PGL	18 Sep 2017	Excluded
25.	Group Five Ltd	GRF	18 Sep 2017	Excluded
26.	Cartrack Holdings Ltd	CTK	19 March 2018	Excluded
27.	Long 4 Life Ltd	L4L	19 March 2018	Excluded
28.	Stadio Holdings Ltd	SDO	19 March 2018	Excluded
29.	Cons Infrastructure Group Ltd	CIL	19 March 2018	Excluded
30.	Sandown Capital Ltd	SDC	19 March 2018	Excluded
31.	Libstar Holdings Ltd	LBR	25 Sep 2018	Excluded
32.	Montauk Holdings Ltd	MNK	18 March 2019	Excluded
33.	Steinhoff Int Hldgs N.V.	SNH	23 Sep 2019	Excluded
34.	Tradehold Ltd	TDH	23 Sep 2019	Excluded
35.	Karoo0000 Ltd	KRO	21 June 2021	Excluded
36.	Thungela Resources Ltd	TGA	20 Sep 2021	Excluded
37.	Fortress Real Est Inv A	FFA	20 March 2023	Excluded

ETHICAL CLEARANCE



04 April 2025

Mr Thabani Fortune Mthimkhulu (214525763)
School Of Acc Economics&Fin
Westville

Dear Mr Thabani Fortune Mthimkhulu,

Original application number: 00027215

Project title: The effect of inclusion and exclusion of stocks from the JSE small cap index on stock performance

Exemption from Ethics Review

In response to your application received on 1 August 2024, your school has indicated that the protocol has been granted **EXEMPTION FROM ETHICS REVIEW**.

Any alteration/s to the exempted research protocol, e.g., Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through an amendment/modification prior to its implementation. The original exemption number must be cited.

For any changes that could result in potential risk, an ethics application including the proposed amendments must be submitted to the relevant UKZN Research Ethics Committee. The original exemption number must be cited.

In case you have further queries, please quote the above reference number.

PLEASE NOTE:

Research data should be securely stored in the discipline/department for a period of 5 years.

I take this opportunity of wishing you everything of the best with your study.

Yours sincerely,

Prof Claire Lauren Vermaak
Academic Leader Research
School Of Acc Economics&Fin

UKZN Research Ethics Office
Westville Campus, Govan Mbeki Building
Postal Address: Private Bag X54001, Durban 4000
Website: <http://research.ukzn.ac.za/Research-Ethics/>

Founding Campuses: Edgewood Howard College Medical School Pietermaritzburg Westville

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