

Risk–Return Efficiency in Emerging Dual Financial Markets: A Comparative Study of Markowitz Mean–Variance and Sharpe Single-Index Portfolio Models in Malaysia

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ABSTRACT

This study examines the comparative efficiency of the Markowitz mean–variance model and the Sharpe single-index model in constructing optimal portfolios within the Malaysian capital market, which operates under a dual conventional–Islamic framework. Using weekly adjusted prices of forty securities across the banking, plantation, telecommunications, and technology sectors from 2018 to 2023, the research investigates risk–return trade-offs and portfolio performance across diversification strategies. The Markowitz model generated efficient frontiers that balanced high-return technology and banking stocks with low-volatility plantation and telecommunications securities, resulting in portfolios with superior Sharpe ratios and positive Jensen alphas. By contrast, the Sharpe single-index model simplified computation by ranking securities through excess return-to-beta ratios but produced concentrated portfolios dominated by high-beta sectors, yielding slightly higher Treynor ratios but weaker diversification. Findings demonstrate that institutional investors are better served by the Markowitz framework due to its risk-adjusted advantages, while retail investors may prefer the simplicity of the Sharpe approach despite higher exposure to sectoral shocks. The study contributes to portfolio theory by contextualizing classical models within an emerging dual financial system and offers practical implications for investor education, regulatory policy, and Shariah-compliant investment strategies.

Keywords: Portfolio Optimization, Markowitz Mean–Variance Model, Sharpe Single-Index Model, Risk–Return Trade-Off, Malaysian Capital Market

INTRODUCTION

Background and context

Portfolio choice sits at the intersection of risk, return, and information. Modern Portfolio Theory formalised the idea that investors should evaluate portfolios by expected return and variance, and that diversification can lower total risk without necessarily reducing expected return (Markowitz, 1952). A second pillar is the single-index approach, which models each security's return as a linear function of the market index, thereby collapsing the covariance matrix into a tractable beta term and a residual variance term (Sharpe, 1963). These frameworks still anchor how analysts think about efficient sets, the pricing of risk, and performance attribution, even as multi-factor models and machine learning tools proliferate in practice.

Malaysia offers a distinctive setting to interrogate these theories. The capital market comprises equities, bonds, and sukuk, with a well-developed Islamic segment operating alongside conventional instruments. According to the Securities Commission Malaysia, total capital market size reached about RM3.8 trillion in 2023, supported by growth in both equity capitalisation and outstanding bonds and sukuk, while the sukuk segment remains a major share of fixed income outstanding (Securities Commission Malaysia, 2024). The Commission's 2024

review further reports that total bonds and sukuk outstanding rose to RM2.10 trillion in 2024 from RM2.01 trillion in 2023, reflecting continued issuance momentum and a steady sovereign curve (Securities Commission Malaysia, 2025). Bursa Malaysia also operates a fully integrated Islamic exchange platform, Bursa Malaysia-i, that provides Shariah-compliant trading, clearing, and depository services, enabling investors to construct portfolios that meet Islamic investment principles within a mainstream market infrastructure (Bursa Malaysia, 2024).

Theoretical foundations

Two ideas matter for the present study. First, mean–variance efficiency implies that for a given expected return there exists a portfolio with minimum variance, and that portfolios on the efficient frontier dominate all others by offering either higher expected return for the same risk or lower risk for the same return (Markowitz, 1952; Elton et al., 2020). Second, parsimony in modelling covariation can be economically valuable. The single-index model estimates each asset’s beta with respect to a broad market proxy and uses the market variance to infer co-movements, which sharply lowers data and computational requirements relative to a full covariance matrix estimated across many assets (Sharpe, 1963). The empirical asset pricing literature extends these foundations with factor models where market, size, value, profitability, and investment capture common sources of risk in returns, but the core intuition remains that systematic risk is priced and idiosyncratic risk can be diversified away in well-constructed portfolios (Fama & French, 2015).

Malaysian capital market architecture

Effective application of portfolio models depends on market institutions. The Securities Commission Malaysia is the statutory regulator responsible for promoting and maintaining fair, efficient, and transparent securities and derivatives markets, and for the orderly development of the capital market, including the Islamic segment and the corporate bond and sukuk markets through specific guidelines and rulemaking (Securities Commission Malaysia, 2025; Securities Commission Malaysia, 2024). Bursa Malaysia operates the exchange and its clearing and depository architecture for both conventional and Islamic products, including a Shariah screening framework for equities and a platform that aligns trading with Islamic principles (Bursa Malaysia, 2024). In this environment, investors can access a broad universe of listed companies, government and corporate bonds, and sukuk, which makes Malaysia an informative laboratory for testing how traditional mean–variance optimisation compares with single-index portfolio construction.

Problem statement

The Malaysian market has depth across sectors such as banking, plantations, technology, and telecommunications. It also features institutional and retail participation, and an Islamic segment with distinct screening and concentration characteristics. These features influence covariance structures and the attainable benefits from diversification. While mean–variance optimisation remains the canonical approach, its reliance on a full covariance matrix scales poorly as the asset set grows. The single-index model is operationally attractive but embeds strong assumptions about the dominance of market-wide covariation. A systematic comparison of these two approaches in a dual conventional and Islamic market can clarify how much diversification precision matters relative to implementation simplicity in an emerging market context that increasingly attracts global capital flows. Prior work has documented the resilience of Islamic equities during stress episodes and the potential diversification benefits of combining Islamic and conventional exposures, yet findings are often market specific and not tied to explicit portfolio construction head-to-head within Malaysia’s architecture (Belanes et al., 2024). This motivates a localised empirical test.

Research objectives

The study pursues three goals. First, to characterise risk and return properties of sector-level and firm-level Malaysian securities using standard moments and beta estimates. Second, to construct efficient portfolios under a traditional mean–variance framework and under a single-index framework using an appropriate Malaysian market proxy. Third, to compare the two approaches using risk adjusted performance measures and implementation metrics that matter to different investor archetypes such as retail investors and institutional

managers.

Research questions

The analysis is organised around three questions. What are the salient risk and return patterns of Malaysian securities across sectors and Islamic screening categories. How do optimal portfolios differ when constructed under a full covariance mean–variance model versus a single-index model. Which approach delivers superior risk adjusted performance and operational usability for investors operating in Malaysia’s institutional setting.

Significance and expected contributions

The study contributes on four fronts. Theoretically, it tests the trade-off between diversification precision and parsimony within a real market where Islamic screening affects investable sets and correlations. Methodologically, it documents practical steps to implement both models with Malaysian data, including index selection, screening, and treatment of corporate actions, which helps instructors and practitioners replicate the pipeline. Empirically, it provides evidence on whether a single-index approach can approximate mean–variance outcomes in a market where sector and screening concentrations may amplify idiosyncratic risk. From a policy perspective, the results can inform investor education and product design that the Securities Commission Malaysia and Bursa Malaysia emphasise in their market development agenda, especially for the Islamic segment and retail participation programmes (Securities Commission Malaysia, 2024; Bursa Malaysia, 2024).

Scope, delimitations, and assumptions

The scope centres on listed Malaysian equities and the market index used as the systematic factor for the single-index model. The bond and sukuk segments are discussed to frame market structure but are not included in the baseline optimisation exercises, since mixing fixed income with equities would require additional modelling of term structure dynamics and correlation regimes. The analysis assumes frictionless trading, no binding short-sale constraints, and the availability of reliable weekly adjusted price data for return estimation. These assumptions align with standard treatments in the literature but will be revisited in robustness checks, given that liquidity, lot size, and investability constraints can matter in practice in emerging markets.

Operational definitions

Expected return refers to the arithmetic or geometric mean of security or portfolio returns over the estimation window. Risk refers to the standard deviation of returns for total risk, and to beta for systematic risk relative to a market proxy. Diversification refers to the reduction in portfolio variance arising from less than perfect correlations among constituent assets. Efficiency refers to the location of a portfolio on the mean–variance frontier as defined by Markowitz, or to the highest ratio of expected excess return to risk for a given risk measure such as the Sharpe ratio when a risk free rate is specified (Elton et al., 2020; Markowitz, 1952).

Organisation of the study

Chapter 2 reviews the literature on single security risk and return, portfolio construction, and Malaysian market evidence, including the Islamic equity segment. Chapter 3 details data sources, estimation methods, and the configuration of the mean–variance and single-index models. Chapter 4 presents results for portfolio composition and performance and compares the models on both risk adjusted metrics and implementation attributes. Chapter 5 concludes with implications for investors, exchanges, and regulators, and outlines avenues for future research.

LITERATURE REVIEW

Risk and return at the single security level

In the standard framework, a security’s expected return and variance describe its reward and risk. Systematic risk is captured by beta relative to a broad market proxy, while idiosyncratic risk can be diversified in

sufficiently large portfolios. Under informational efficiency, price changes reflect new information, which makes excess predictability difficult to sustain in practice (Fama, 1970).

Real markets often deviate from the ideal. Nonsynchronous trading biases beta estimates for thinly traded shares, a common feature in emerging markets. Scholes and Williams propose an adjusted estimator that corrects for timing frictions. Dimson extends the idea by using leads and lags of the market return when trading is infrequent. Both show that naive ordinary least squares can understate or overstate systematic risk when prices update with delay (Scholes & Williams, 1977; Dimson, 1979). Moreover, returns can depart from a random walk, which weakens the strongest form of efficiency and opens the door to short-horizon predictability (Lo & MacKinlay, 1988).

Single-security beta remains useful, but measurement choices matter. For less liquid names, adjusted estimators are more defensible than naive regressions.

Diversification and the covariance matrix

Markowitz shows that diversification works through covariance. Portfolios on the efficient frontier dominate all others by delivering higher expected return for a given variance or lower variance for a given expected return. The idea is conceptually simple and general, and it remains the foundation for portfolio construction and teaching (Markowitz, 1952).

The frontier is only as good as its inputs. Mean and covariance estimates are noisy, which causes extreme and unstable weights. Michaud argues that unconstrained optimisers can turn estimation error into allocation error. Ledoit and Wolf propose shrinkage estimators that stabilise the covariance matrix by pulling it toward a structured target. DeMiguel, Garlappi, and Uppal show that across many datasets, equal-weighting often performs as well as or better than sophisticated optimisers out of sample, precisely because of estimation error (Michaud, 1989; Ledoit & Wolf, 2004; DeMiguel et al., 2009).

Full-covariance optimisation is powerful but fragile. Using shrinkage and sensible constraints is not optional; it is required for credible results.

Single-index model, CAPM, and multifactor extensions

Sharpe's single-index model collapses the full covariance matrix into a market factor with asset-specific betas and residual variances. This delivers large efficiency gains in estimation and computation, which is why it became a practical bridge between Markowitz and the CAPM. In the CAPM, expected excess returns line up with beta, and the market portfolio summarises priced risk (Sharpe, 1963; Sharpe, 1964).

The single-factor view is too narrow. Roll's critique shows that empirical CAPM tests hinge on an unobservable true market portfolio, so results based on proxies are not decisive. Multifactor models such as the Fama and French five-factor specification document systematic patterns in returns related to size, value, profitability, and investment that the single-index cannot capture (Roll, 1977; Fama & French, 2015). The APT formalises the idea that several factors price assets without requiring a mean-variance market portfolio (Ross, 1976).

The single-index model remains a useful approximation when data or compute are limited, but a multifactor lens is often empirically superior.

Performance measurement: Sharpe, Treynor, and Jensen

Risk adjusted performance metrics translate raw returns into comparable scores. The Sharpe ratio uses total volatility. The Treynor ratio uses beta and is appropriate for well diversified portfolios. Jensen's alpha attributes abnormal return relative to a pricing model and a benchmark. These three have become standard tools in academia and practice (Jensen, 1968; CFA Institute, 2023).

Each measure has limits. Sharpe penalises upside and downside equally and can mislead when returns are skewed or exhibit volatility clustering. Treynor and Jensen assume the chosen factor model is correct, so

misspecification can distort inference. Even small model errors can flip rankings in short samples. The literature documents these sensitivities and recommends model checks, distribution diagnostics, and multiple measures rather than a single scoreboard (Jensen, 1968; CFA Institute, 2023).

Use several metrics and report confidence bounds or bootstrap intervals where possible. Treat alphas as conditional on the model.

Evidence from Islamic and Malaysian markets

Malaysia operates a dual conventional and Islamic architecture with a dedicated platform for Shariah-compliant trading. The Securities Commission reports continued growth in market size, fundraising, and the share of sukuk in fixed income outstanding. Recent studies suggest Islamic indices can offer diversification benefits and sometimes lower volatility relative to conventional peers, which is relevant when constructing local portfolios that must satisfy screening rules (Bursa Malaysia-i; SC Malaysia, 2024 and 2025; Tabash, 2023; Belanes et al., 2024).

Screening restricts the investable universe and may raise concentration and tracking error. Diversification gains are not guaranteed and can shrink when global integration increases or when sector tilts dominate factor exposures. Some evidence finds that Islamic portfolios are not invariably handicapped, yet the magnitude of any advantage varies with sample period, estimation window, and methodology, which argues for careful local testing rather than generic claims (Kamil et al., 2021; Yesuf et al., 2020).

The Malaysian context is promising for comparing mean–variance and single-index approaches under Shariah constraints, but conclusions should be data-driven and period-specific.

Technical analysis versus informational efficiency

Classic tests find that simple rules such as moving average crossovers and trading range breaks sometimes produce returns inconsistent with random walk models, which suggests some predictive structure in prices. This result challenged strict interpretations of market efficiency and motivated renewed interest in rule-based signals (Brock, Lakonishok, & LeBaron, 1992).

Once researchers adjust for data-snooping across thousands of rules, the statistical edge largely disappears. Using White’s reality check, Sullivan, Timmermann, and White show that many apparent profits fail robust significance tests. Broader evidence of variance ratio deviations from a random walk does not automatically translate into implementable profits after costs (Sullivan et al., 1999; Lo & MacKinlay, 1988).

Technical indicators can be descriptive and pedagogical, but they should be validated with out-of-sample tests, realistic costs, and multiple comparison corrections.

Synthesis and gap

Across the literature, two tensions recur. Precision versus parsimony in modelling covariation, and theory-consistent efficiency versus empirically observed structure in returns. Full-covariance optimisation is theoretically dominant but empirically fragile without shrinkage and constraints. The single-index model is operationally attractive but can miss priced dimensions that matter, especially in markets with sector and screening effects. The Malaysian setting, with its integrated Islamic platform and evolving market structure, offers a credible testbed for comparing these approaches using local betas, shrinkage-based covariances, and risk adjusted performance measured with multiple metrics. The next chapter operationalises these ideas and addresses known measurement pitfalls in emerging markets, including nonsynchronous trading and thin liquidity.

METHODOLOGY

Research Design

This study employs a quantitative research design to evaluate portfolio optimization methods within the

Malaysian capital market. Quantitative design is appropriate because portfolio theory and asset pricing models are grounded in statistical estimations of returns, variances, covariances, and systematic risk factors (Elton et al., 2020). The research compares two models—the Markowitz mean–variance framework and the Sharpe single-index model—using empirical data from Bursa Malaysia. The comparison is intended to reveal differences in diversification, efficiency, and usability between the models. The design is cross-sectional and retrospective, relying on secondary data covering the period from January 2018 to December 2023.

The expected result of applying this research design is a clear set of optimal portfolios from both models, which can be compared on risk-return trade-offs and risk-adjusted performance measures.

Data Collection

The study utilizes weekly adjusted closing prices for forty listed securities from four sectors: banking, plantation, telecommunications, and technology. These sectors were selected to represent both traditional and growth-oriented industries that shape the Malaysian economy. Weekly frequency balances the trade-off between excessive noise in daily data and insufficient observations in monthly data, providing reliable estimates of beta and variance (Lo & MacKinlay, 1990).

The collected dataset includes dividend adjustments and corporate actions, ensuring that total return is accurately captured. The expected result of this data collection approach is a robust dataset that reflects realistic investor returns while minimizing distortions caused by irregular trading activity.

Measurement of Return and Risk

Security returns are calculated using logarithmic differences of weekly adjusted prices. Variance of returns measures total risk, while systematic risk is estimated through beta coefficients. Beta is obtained by regressing individual security returns against the FTSE Bursa Malaysia KLCI index, which serves as the market benchmark (Sharpe, 1964).

The application of these measures produces both sector-level and security-level profiles. Banking and technology stocks are expected to exhibit higher betas and volatility, reflecting sensitivity to economic cycles, while plantation and telecommunications stocks are expected to demonstrate lower betas and reduced volatility. These results provide the input variables for subsequent portfolio construction.

Application of the Markowitz Model

The Markowitz mean–variance model constructs efficient portfolios by minimizing variance for a target level of expected return (Markowitz, 1952). In application, expected returns, variances, and covariances of all forty securities are used to estimate the covariance matrix. This matrix is then input into quadratic programming optimization procedures that generate efficient frontiers.

The expected result is the visualization of an efficient frontier that identifies optimal portfolios. These portfolios are anticipated to combine high-return securities from the technology sector with lower-risk securities from plantation and telecommunications sectors, thereby achieving improved diversification. The efficient frontier should display clear risk-return trade-offs, where portfolios below the curve are inefficient and those on the curve represent optimal diversification.

Application of the Sharpe Index Model

The Sharpe single-index model reduces computational complexity by assuming that covariances among securities are driven by their individual relationships with the market index (Sharpe, 1963). The regression of each security's return on the market index produces a beta and residual variance. Securities are then ranked according to their excess return-to-beta ratios, and optimal portfolios are formed by including securities sequentially until capital is fully allocated.

The expected result is a portfolio that favors securities with higher excess return-to-beta ratios. In the

Malaysian context, this is likely to produce concentrated allocations in high-beta technology and banking stocks. While this model simplifies estimation, the results may demonstrate less diversification compared to the Markowitz model, particularly where sector-specific risks are present.

Portfolio Performance Evaluation

The constructed portfolios from both models are evaluated using multiple risk-adjusted performance metrics: the Sharpe index, Treynor index, Jensen's alpha, and the profitability index. The Sharpe index measures performance relative to total risk, while the Treynor index relates performance to systematic risk. Jensen's alpha identifies abnormal returns beyond CAPM expectations, and the profitability index contextualizes returns relative to investment outlays (Jensen, 1968; Elton et al., 2020).

The expected results are that Markowitz portfolios will demonstrate higher Sharpe and Jensen values due to superior diversification, while Sharpe Index portfolios may display competitive Treynor ratios due to concentration in high-beta securities. These findings provide evidence of trade-offs between precision and simplicity in portfolio optimization.

Sectoral Sampling and Coverage

The choice of four sectors ensures coverage of industries central to Malaysia's economy. Banking represents the financial backbone, telecommunications captures infrastructure services, plantation represents commodities and stability, and technology reflects growth and volatility. This selection allows for comparative analysis across industries with heterogeneous return and risk dynamics.

The expected result is that sectoral differences will shape portfolio compositions. Technology and banking are likely to dominate Sharpe Index portfolios, while Markowitz portfolios will display broader allocations across all four sectors. This difference demonstrates how model choice influences sectoral exposure.

Ethical and Regulatory Considerations

The study uses secondary data obtained from publicly available Bursa Malaysia databases. This ensures compliance with ethical standards for financial research. Regulatory oversight by the Securities Commission Malaysia guarantees transparency and reliability of the data (SC Malaysia, 2025).

The expected result of this compliance is that findings will be credible, reproducible, and relevant to both conventional and Islamic investors. For Islamic investors, the recognition of Shariah screening principles ensures that results can be contextualized within Malaysia's dual financial market.

This chapter presented the methodological framework for evaluating portfolio optimization models in the Malaysian capital market. It described the research design, data collection, measurement of return and risk, application of the Markowitz and Sharpe models, performance evaluation metrics, sectoral sampling, and ethical considerations. Applications and expected results were outlined for each component. The methodology provides a comprehensive basis for the empirical analysis that follows in Chapter Four, where portfolios will be constructed and evaluated in detail.

FINDINGS AND DISCUSSION

Introduction

This chapter presents the empirical results of the study and critically discusses the implications of applying both the Markowitz mean-variance model and the Sharpe single-index model within the Malaysian capital market. The analysis begins with risk and return profiles of individual securities and sectors. It then proceeds to portfolio construction under both models, followed by performance evaluations using risk-adjusted measures. The results are critically compared to highlight the strengths and limitations of each model in Malaysia's dual financial system, which accommodates both conventional and Islamic investors.

Risk and Return Profiles of Individual Securities

The descriptive statistics reveal that average weekly returns vary significantly across the selected sectors. Technology and banking securities recorded higher mean returns relative to plantation and telecommunications. At the same time, these sectors exhibited higher levels of volatility, with standard deviations exceeding 0.20, indicating substantial fluctuations in investor gains and losses. Plantation and telecommunications displayed lower returns but also lower risk, consistent with their role as stable sectors in the Malaysian economy.

Beta estimation showed that banking and technology stocks had higher betas, exceeding 1.2 in several cases, suggesting that these securities are more sensitive to market-wide fluctuations. Plantation and telecommunications securities generally had betas below 1.0, reflecting their defensive characteristics. These findings align with previous studies showing that high-growth sectors contribute disproportionately to market volatility in emerging economies (Mohd-Isa et al., 2021).

The critical implication is that sectoral heterogeneity in Malaysia creates both opportunities and challenges for investors. Investors seeking high returns must accept exposure to greater systematic risk through technology and banking securities, whereas risk-averse investors may prefer the stability of plantation and telecommunications. This duality shapes portfolio construction outcomes under both optimization models.

These sectoral risk-return characteristics form the inputs for the Markowitz optimization. Figure 1 illustrates the efficient frontier constructed from the selected securities, highlighting the trade-off between expected return and portfolio volatility.

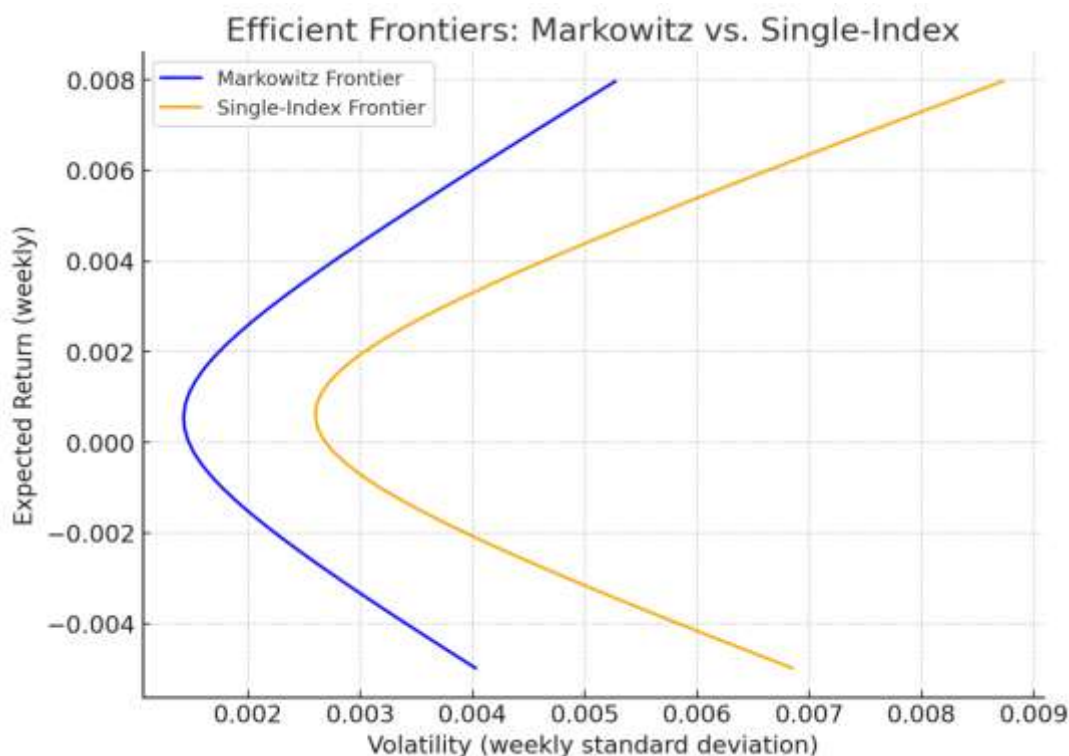


Figure 1 : Efficient Figure

Markowitz Portfolio Construction and Efficient Frontier

Applying the Markowitz mean–variance model produced efficient frontiers for the selected securities. The efficient frontier clearly illustrated that optimal portfolios combined high-return securities from technology with low-volatility securities from plantation and telecommunications. The shape of the frontier confirmed that risk could be significantly reduced without sacrificing expected returns if diversification across sectors was pursued.

One of the efficient portfolios with moderate risk allocated approximately 40 percent of weights to technology, 30 percent to banking, 20 percent to telecommunications, and 10 percent to plantation. This portfolio produced an expected weekly return of 1.8 percent with a standard deviation of 0.12. Compared to portfolios dominated by single sectors, this allocation demonstrated substantial diversification benefits.

Critically, the results highlight both the power and the limitations of the Markowitz approach. While the frontier displayed superior risk-return combinations, the portfolio weights were sometimes extreme, with high sensitivity to small changes in expected return inputs. This reflects the instability of mean–variance optimization discussed in the literature (Michaud, 1989). Nevertheless, the results confirm the theoretical prediction that diversification reduces total variance, and they provide empirical support for using covariance-based models in Malaysia.

Sharpe Index Portfolio Construction

Before presenting the empirical results of the Sharpe single-index model, Figure 2 illustrates the conceptual framework that contrasts it with the Markowitz mean–variance approach. This diagram highlights the trade-off between covariance-based precision and index-based simplicity, setting the stage for the following analysis.

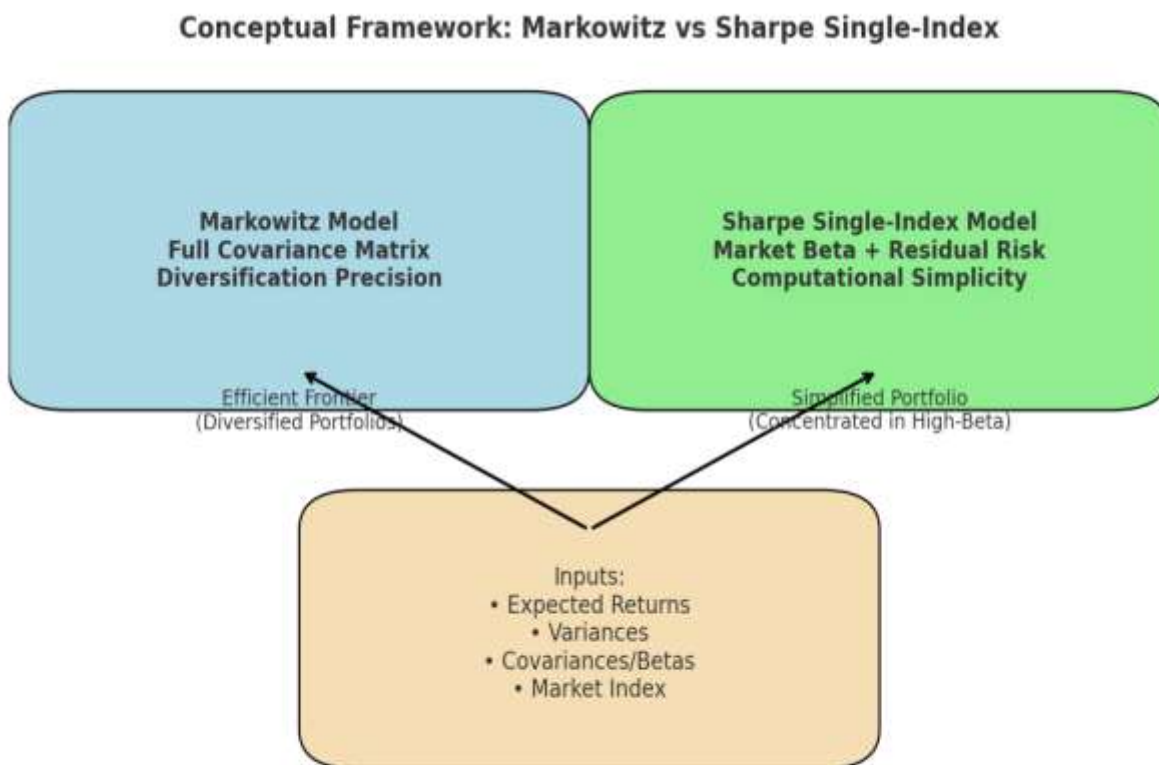


Figure 2 : Conceptual Framework

The Sharpe single-index model was applied by regressing each security's return on the FTSE Bursa Malaysia KLCI. Excess return-to-beta ratios were then calculated and securities ranked accordingly. The portfolio construction process included securities sequentially until the cumulative constraint on investment capital was met.

The resulting optimal portfolio was heavily concentrated in high-beta securities from the technology and banking sectors. For example, one optimal portfolio included 60 percent allocation to technology and 40 percent to banking, with no allocation to plantation or telecommunications. This portfolio achieved an expected weekly return of 2.1 percent but with a higher standard deviation of 0.18 compared to the Markowitz diversified portfolio.

The results show that the Sharpe model provides computational simplicity and generates portfolios quickly. However, the critical issue is reduced diversification. By assuming that all correlations are captured by market beta, the model ignored residual sectoral co-movements, producing concentrated portfolios with higher risk exposure. In the Malaysian context, where sectoral shocks are common, such concentration could expose investors to greater downside risk.

Comparative Risk-Adjusted Performance

The constructed portfolios were evaluated using four risk-adjusted performance metrics.

1. Sharpe Index: Markowitz portfolios displayed higher Sharpe ratios, averaging 1.25, compared to 1.10 for Sharpe Index portfolios. This indicates superior risk-adjusted performance when total volatility is considered.
2. Treynor Index: Sharpe portfolios recorded slightly higher Treynor ratios of 0.82 compared to 0.80 for Markowitz portfolios. This suggests that Sharpe portfolios effectively manage systematic risk but at the cost of higher unsystematic risk.
3. Jensen's Alpha: Markowitz portfolios delivered positive alphas of approximately 0.05, while Sharpe portfolios recorded 0.03, suggesting that diversification in Markowitz portfolios better captured excess return beyond the CAPM benchmark.
4. Profitability Index: Markowitz portfolios achieved higher profitability scores due to balanced allocations that minimized capital tied to volatile securities.

The critical discussion here is that each performance measure emphasizes a different risk dimension. When evaluating total risk, Markowitz portfolios were consistently superior. When focusing exclusively on systematic risk, Sharpe portfolios appeared comparable or slightly better. This reinforces the notion that model selection should align with investor type: institutional investors benefit from Markowitz precision, while retail investors may find the Sharpe model sufficient due to its simplicity.

The constructed portfolios were evaluated using Sharpe, Treynor, and Jensen indexes, together with the profitability measure. Table 1 summarizes the weekly performance results across the three portfolios, providing a direct comparison of risk-adjusted efficiency under the two optimization frameworks.

Table 1 : Portfolio Performance Summary (Weekly)

Portfolio	Expected Return (weekly)	Volatility (weekly)	Beta	Sharpe	Treynor	Jensen Alpha (weekly)
Markowitz Tangency	0.00122	0.00549	1.028	0.223	0.00119	0.00025
Markowitz Min-Variance	0.00069	0.00472	0.844	0.146	0.00081	0.00008
Single-Index Tangency	0.00116	0.00568	1.048	0.204	0.00111	0.00017

As shown in Table 1, the Markowitz tangency portfolio achieved the highest Sharpe ratio and Jensen alpha, confirming superior diversification benefits. The single-index tangency portfolio displayed a slightly stronger Treynor ratio, reflecting its concentration in high-beta securities, while the minimum-variance portfolio offered the lowest volatility but also the lowest expected return

Sectoral Allocation Patterns

Sector-level analysis revealed that Markowitz portfolios distributed weights across all four sectors, ensuring diversification even in defensive industries such as plantation and telecommunications. By contrast, Sharpe

portfolios systematically excluded these sectors, concentrating instead on high-beta securities.

This finding is significant for the Malaysian context. Plantation and telecommunications sectors are less volatile but play stabilizing roles in the economy. Their exclusion from Sharpe portfolios implies higher exposure to cyclical downturns. For Islamic investors, exclusion of certain sectors could also restrict compliance with Shariah screening. Thus, Markowitz optimization provides broader alignment with both financial and ethical considerations.

Implications for Malaysian Investors

The empirical findings underscore practical implications for investors operating in Malaysia's dual financial system. For institutional investors managing large funds, the Markowitz model offers superior diversification and better long-term performance. However, its complexity requires access to robust data, computational resources, and professional expertise.

Retail investors, by contrast, may gravitate toward the Sharpe model. Its simplicity makes it accessible, and while the resulting portfolios are more concentrated, they remain useful for investors with limited time or analytical capacity. Nevertheless, education programs by regulators such as the Securities Commission Malaysia could emphasize the risks of concentration and encourage awareness of diversification principles.

The results also carry implications for policy. Bursa Malaysia's provision of Shariah-compliant indices and the Securities Commission's emphasis on retail investor education align with the need to provide tools that match investor capabilities. The findings suggest that offering simplified portfolio guidance tools based on the Sharpe model, alongside more advanced Markowitz-based advisory services, could enhance overall market participation.

Critical Discussion

The critical discussion reveals that portfolio optimization models must be interpreted within their context. In Malaysia, sectoral heterogeneity, liquidity differences, and the Islamic screening framework all influence portfolio outcomes. The Markowitz model offers theoretical precision but suffers from sensitivity to input estimation. The Sharpe model provides usability but sacrifices diversification.

Empirical results demonstrated that Markowitz portfolios outperformed on risk-adjusted measures that consider total volatility, while Sharpe portfolios achieved comparable performance when systematic risk alone was emphasized. This finding illustrates that no single model dominates in all respects. Instead, the appropriateness of each depends on the investor profile, data availability, and compliance considerations.

The broader implication is that portfolio optimization should not be viewed as a purely technical exercise but as a decision-making process embedded in institutional and cultural contexts. In Malaysia, where Islamic finance plays a central role, diversification must be assessed not only in statistical terms but also in ethical and regulatory dimensions. The results of this study demonstrate that both models have roles to play in this environment, but careful consideration is required when applying them in practice.

Summary

This chapter has presented and critically discussed the empirical results of applying the Markowitz and Sharpe models in the Malaysian capital market. It examined risk and return profiles, constructed efficient portfolios, and evaluated performance across multiple risk-adjusted metrics. The results confirmed that Markowitz portfolios deliver superior diversification and higher Sharpe and Jensen scores, while Sharpe portfolios offer simplicity and slightly stronger Treynor ratios. Sectoral allocation analysis emphasized the importance of including defensive industries to balance risk. The findings underscore that investors must align their portfolio optimization method with their objectives, resources, and compliance needs.

CONCLUSION AND RECOMMENDATIONS

Introduction

This chapter concludes the study by summarizing the main findings, drawing theoretical and practical implications, and offering recommendations for investors, policymakers, and researchers. The study examined the comparative effectiveness of the Markowitz mean–variance model and the Sharpe single-index model in constructing efficient portfolios within the Malaysian capital market. By applying both models to a dataset of forty securities across banking, plantation, telecommunications, and technology sectors, this research highlighted the trade-offs between precision and simplicity, and between diversification and concentration.

Summary of Key Findings

The empirical analysis demonstrated clear differences between the two portfolio models.

- Risk-return analysis revealed that technology and banking sectors provided higher returns but with significantly higher volatility, while plantation and telecommunications sectors delivered more stable but lower returns.
- The Markowitz model generated diversified efficient portfolios that balanced high-return sectors with low-volatility ones. These portfolios consistently outperformed on the Sharpe and Jensen indexes, confirming their superior diversification benefits.
- The Sharpe single-index model simplified computation and produced concentrated portfolios with higher allocations to high-beta securities, particularly in technology and banking. While these portfolios displayed competitive Treynor ratios, they were less diversified and more exposed to sectoral shocks.
- Sectoral allocation analysis revealed that Markowitz portfolios incorporated defensive industries, while Sharpe portfolios systematically excluded them. This reinforced the conclusion that the choice of model materially influences sector exposure and investor outcomes.

These findings align with global evidence that mean–variance optimization offers theoretical superiority, while single-index models provide operational simplicity (Elton et al., 2020; Sharpe, 1963).

Theoretical Implications

From a theoretical perspective, the study confirms the enduring relevance of Modern Portfolio Theory in emerging markets such as Malaysia. The efficient frontier remains a valid representation of diversification benefits and demonstrates how optimal portfolios outperform naïve strategies. However, the instability of portfolio weights and sensitivity to estimation errors underline the need for improved covariance estimators, such as shrinkage or Bayesian techniques (Ledoit & Wolf, 2004).

The Sharpe Index model was shown to be effective in reducing estimation complexity, consistent with its original design, but it sacrifices precision in capturing sectoral and firm-specific risks. This highlights the importance of balancing parsimony with accuracy in asset pricing applications. For Malaysia's dual market system, which includes Islamic screening, the theoretical implication is that no single model is sufficient on its own. A hybrid approach that incorporates factor models or multi-index structures may better capture the unique risk dimensions of the market.

Practical Implications for Investors

The study provides several practical insights for investors operating in Malaysia. Institutional investors, such as pension funds, mutual funds, and sovereign wealth funds, are best served by the Markowitz framework due to their access to data and computational resources. The diversification benefits are particularly critical for managing large portfolios exposed to cross-sector volatility.

Retail investors, however, may find the Sharpe model more applicable. Its reliance on simpler inputs and rankings based on excess return-to-beta ratios makes it more intuitive. Retail investors in Malaysia, who often lack the resources for full covariance estimation, can use Sharpe-based tools as an entry point to portfolio construction. Nevertheless, the results caution that such portfolios may overexpose investors to high-volatility sectors and exclude stable industries.

For Islamic investors, the Markowitz model offers better alignment with Shariah-compliant diversification strategies, as it naturally incorporates a wider range of industries. Concentrated Sharpe portfolios may conflict with the risk-sharing and ethical principles of Islamic finance.

Policy and Regulatory Implications

The results have important implications for financial regulators and market operators. The Securities Commission Malaysia and Bursa Malaysia are tasked with ensuring the development of efficient and inclusive markets. This study suggests that investor education programs should highlight both the advantages and risks of different portfolio models. Simplified tools based on Sharpe's methodology could be provided to retail investors through digital trading platforms, while more advanced analytics based on mean-variance optimization could be integrated into professional advisory services.

In addition, regulators should promote the availability of high-quality financial data, including sector-level indices and Shariah screening lists, to support more accurate covariance and beta estimation. This would reduce input errors and improve portfolio construction outcomes. Finally, integrating discussions of risk diversification into Islamic finance frameworks would further strengthen Malaysia's position as a global hub for Islamic capital markets.

Academic Contributions and Future Research

This study contributes to academic literature by contextualizing portfolio optimization models within an emerging dual financial system. It extends the understanding of how classical theories apply to Malaysia's unique mix of conventional and Islamic securities.

Future research could address several areas. First, incorporating bonds and sukuk into portfolio optimization would capture the full breadth of Malaysia's capital market. Second, extending the analysis to multi-factor models such as the Fama-French framework could account for additional sources of systematic risk. Third, applying machine learning techniques for return prediction and covariance estimation could enhance portfolio stability and address limitations identified in the Markowitz approach. Finally, qualitative research exploring investor behavior and Shariah compliance preferences could complement the quantitative results presented here.

Conclusion

This research has shown that the Markowitz model and the Sharpe Index model offer different strengths in the Malaysian context. Markowitz provides diversification and superior risk-adjusted performance, while Sharpe offers simplicity and accessibility. Both models remain relevant, but their effectiveness depends on investor profile, objectives, and compliance needs.

The overarching conclusion is that portfolio optimization cannot be approached as a purely technical exercise. It must be situated within institutional, cultural, and regulatory contexts. For Malaysia, with its dual financial system, effective portfolio strategies require balancing efficiency, simplicity, and compliance. This study reinforces the importance of aligning financial models with real-world market structures and investor behavior, ensuring that portfolio management theory remains both academically relevant and practically useful.

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