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# Comparative Analysis of Risk and Return Between Mid-Cap and Large-Cap Portfolios in Malaysia Stock Exchange: A Single Index Model Approach

Avhita Nurmailia[1*],Titi Dewi Warninda[2**]

Syarif Hidayatullah State Islamic University, Indonesia

***Abstract*** : *This study applies the formation of Single Index Model and compare the risk and return of optimal portfolio of mid-cap (FTFBM70) and large-cap (FBMKLCI) stock portfolios in Malaysia from January 2020 to June 2024.The comparative research results show no significant difference in average returns, indicating similar performance potential. However, a significant difference in risk levels is observed, with large-cap stocks exhibiting higher volatility than mid-cap stocks. These findings challenge the common perception of large-cap stocks as more stable, especially during periods of market stress such as the COVID-19 crisis. Mid-cap stocks demonstrate a strategic balance of growth and risk, offering potential advantages in uncertain conditions.*

**Keyword**: Optimal portfolio, Single Index Model, Risk, Return, FBMKLCI, FTFBM70

**Abstrak** : Penelitian ini menerapkan pembentukan Model Indeks Tunggal dan membandingkan risiko dan pengembalian portofolio optimal dari portofolio saham berkapitalisasi menengah (FTFBM70) dan berkapitalisasi besar (FBMKLCI) di Malaysia dari Januari 2020 hingga Juni 2024. Hasil penelitian komparatif menunjukkan tidak ada perbedaan yang signifikan dalam pengembalian rata-rata, yang mengindikasikan potensi kinerja yang serupa. Namun, ada perbedaan yang signifikan dalam tingkat risiko, dengan saham berkapitalisasi besar menunjukkan volatilitas yang lebih tinggi daripada saham berkapitalisasi menengah. Temuan ini menantang persepsi umum bahwa saham berkapitalisasi besar lebih stabil, terutama selama periode tekanan pasar seperti krisis COVID-19. Saham-saham berkapitalisasi menengah menunjukkan keseimbangan strategis antara pertumbuhan dan risiko, menawarkan potensi keuntungan dalam kondisi yang tidak pasti.

**Kata Kunci**: Portofolio optimal, Model Indeks Tunggal, Risiko, Imbal Hasil, FBMKLCI, FTFBM70

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[1*] Graduate Student of Syarif Hidayatullah State Islamic University. E-mail: avhitanurmailia@gmail.com
[2**] Faculty Member, Syarif Hidayatullah State Islamic University.

## Introduction

The capital market is one of the most developed forms of investment because it reflects economic performance, investor perceptions, and overall macro conditions (Omar et al., 2022). Apart from being a means of raising funds, capital markets also play a role in efficient price formation and risk distribution (Acharya & Pedersen, 2019).

Malaysia is recognized as one of the most attractive countries for investors, as reflected in the Milken Institute Global Opportunity Index 2022, which ranked it first in the Emerging Southeast Asia category. This ranking was based on Malaysia's strong performance in critical areas such as global integration, economic strength, and labor quality. The report evaluates the potential attractiveness for foreign investment across 126 countries, reinforcing Malaysia's position as a key destination for international capital (Contreras et al., 2022).

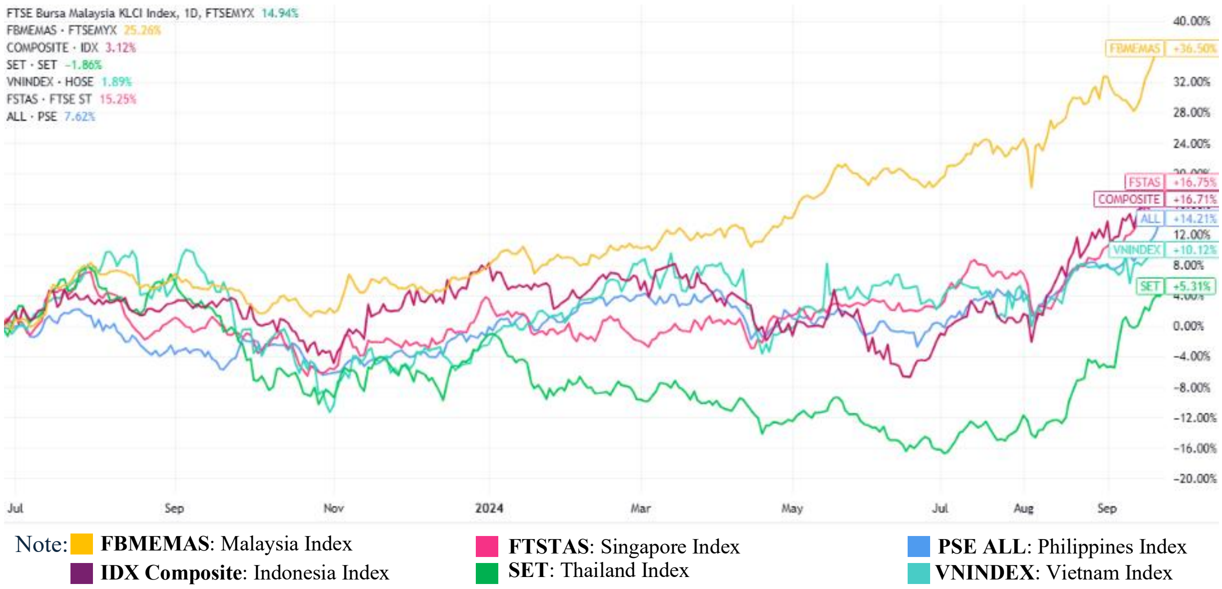


Figure 1. Stock Performance of ASEAN Countries

*Sources: Trading View (2024)*

This recently recognition is consistent with Malaysia's actual stock market performance in the subsequent period. Based on Figure 2, from June 2023 to September 2024, Malaysia recorded the highest growth in the ASEAN region, with the FBMEMAS index rising by 36.50%. This significantly outpaced the returns of Singapore (16.75%), Indonesia (16.71%), the Philippines (14.21%), Vietnam (10.12%), and Thailand (5.31%). These figures further confirm Malaysia's status as a leading investment destination in Southeast Asia. Based on data from the Malaysian Investment Development Authority (MIDA), total incoming foreign direct investment in 2023 reached RM329.5 billion, the highest since 2020, driven by the renewable energy and high-tech manufacturing sectors.

In the context of equity investment, market risk is an unavoidable element, prompting investors to strategically manage their portfolios to reduce potential losses due to market volatility. One widely adopted strategy is portfolio diversification, which involves spreading investments across various types of assets. This approach is believed to enhance expected return performance without necessarily sacrificing profit potential, especially when compared to investing in a single type of stock (Fransiska et al., 2023)

Portfolio diversification can be further optimized through the application of the Single Index Model, particularly when applied to mid-capitalization stocks. Mid-cap stocks are often viewed as having relatively stable volatility compared to large-cap stocks while still offering considerable growth opportunities (Ravichandran, 2018). This makes mid-cap stocks the optimal point "*sweet spot*" in investment strategies, which is the ideal position that creates a balance between risk and return (Chan, 2015).


Note: **FBMKLCI:** Malaysia Large-Cap Stock **FBMSCAP:** Malaysia Small-Cap Stock **FBM70:** Malaysia Mid-Cap Stock

Figure 3: Stock Performance of FBMKLCI, FBM70 and FBMSCAP

*Source: Trading View (2024)*

Despite the strategic appeal of mid-cap stocks, existing academic literature continues to focus predominantly on large-cap stocks. This trend is evident from the frequent use of indices such as the SSE 50 (Zhu & Huang, 2022)., S&P 500 (Qiucen Lin, 2022) and NIFTY 50 (Gautami et al., 2022) as the basis for portfolio analysis. In Malaysia alone, the FBMKLCI is still the most frequently used index in portfolio optimization studies (Sifat et al., 2021; Lim et al., 2023). Recent studies, however, have begun to highlight the notable performance and advantages of mid-cap stocks. Research indicates that these stocks not only offer higher return potential but also exhibit manageable risk levels and play a significant role in influencing overall market volatility (Jena et al., 2021; Kaprielyan & Jansen, 2024)

This is further supported by empirical data from the Malaysian stock market during the period from April 2023 to October 2024, which reveals substantial performance differences among stock categories. The FBMKLCI index, representing large-cap stocks, recorded a modest growth of only 1.67 percent, suggesting stagnation and limited investor appeal. In contrast, the FTFBM70 index, which represents mid-cap stocks, surged by 36.46 percent, while the FBMSCA index, representing small-cap stocks, grew by 11.65 percent. These findings demonstrate that mid-cap stocks offered superior growth potential and emerged as a key attraction for investors during the observed period.

Based on these gaps in the literature, this study aims to examine portfolio optimization using the Single Index Model approach on two categories of stock capitalization in Malaysia, namely mid-cap (FTFBM70) and large-cap (FBMKLCI). This study explore the performance of each index in terms of risk and return. This study is expected to provide theoretical and practical contributions towards a more inclusive investment strategy that is relevant to the characteristics of emerging markets such as Malaysia, and fill a research gap that has not been widely discussed before.

## Literature Review

Valuation is a crucial process in determining the intrinsic value of a stock, and the method chosen by investors often depends on their investment strategies and risk profiles. According to Özyeşil (2021), long-term investors tend to rely on fundamental analysis, while short-term investors prefer technical analysis to enhance investment returns. To optimize returns and manage risk effectively, investors must consider how to construct an optimal portfolio. An optimal portfolio refers to a carefully selected mix of investment instruments designed to achieve the best possible balance between expected returns and acceptable levels of risk. This concept is rooted in Harry Markowitz's pioneering work *"Portfolio Selection"* (1952), which introduced the Mean-Variance Optimization theory.

According to Markowitz, rational investors should build portfolios by considering both risk and return, and diversification is key to reducing risk without sacrificing potential return. Using mathematical techniques, this model evaluates risk through the variance or standard deviation of portfolio returns (Markowitz, 1952).

The importance of diversification, as emphasized in the Markowitz model, lies in its ability to reduce firm-specific risk and improve portfolio stability amidst market fluctuations (Lin et al., 2023). This model enables investors to lower the total risk exposure by spreading investments across a variety of assets, ultimately aiming to enhance profitability (Feng, 2022). Nevertheless, while diversification helps mitigate unsystematic risk, it cannot fully eliminate risks stemming from broader macroeconomic influences such as inflation and interest rates (Chen et al., 2022).

Recognizing the complexity involved in Markowitz's model, William Sharpe introduced the Single Index Model in 1963 as a simpler alternative for portfolio optimization. The Single Index Model posits that the return of an asset is significantly correlated with the overall market return, using a single market index as a benchmark. This approach focuses on the relationship between individual asset returns and market returns through the beta coefficient ($\beta$), which captures the sensitivity of an asset to market movements (Sharpe, 1963).

The Single Index Model has a key advantage in its simplicity compared to the more complex Markowitz model, especially as the number of securities in a portfolio increases. This model offers a practical yet effective solution for constructing efficient portfolios without requiring complicated covariance calculations (Leković et al., 2022). Supporting this, Yusup (2022) found that the Single Index Model produced better optimization results than the mean-variance approach in the context of the Indonesian stock market. Recent studies also indicate that portfolios constructed using the Single Index Model can outperform those built using the Capital Asset Pricing Model (CAPM) under certain market conditions (Salim et al., 2024).

## Methodology

This study uses a descriptive-quantitative approach to provide a systematic and factual description of the phenomenon of optimal portfolio formation from stocks listed in the FBMKLCI and FTFBM70 indices. The descriptive approach is used to explain population characteristics in detail and factually, while quantitative methods allow researchers to analyze numerical data objectively and measurably.

This study utilizes the Single Index Model method as the main approach in forming the optimal portfolio, because this method is able to model the relationship between individual stock returns and market returns. The data used are monthly closing stock prices from 148 companies listed in the FBMKLCI and FTFBM70 indices during the period January 2020 to

June 2024. However, only 51 companies were were consistently listed in the index during the 42-month observation.

***Building an Optimal Portfolio Using the Single Index Model***

The following are the steps in forming an optimal portfolio analysis:

1. Calculation of realized return, expected return and standard deviation of each stock and market.

$$Realized\ Return = \frac{(P_t - P_{t-1})}{P_{t-1}} \quad (1)$$

$$Expected\ return = \sum \frac{R_i}{n} \quad (2)$$

$$Standard\ Deviation = \sqrt{\sum_{t-1}^{n} \frac{[R_i - E(R_i)]^2}{n}} \quad (3)$$

In this study, $R_i$ represents the realized return, which is the actual profit gained from a stock investment during the i period. The variable $P_t$ denotes the stock price at the current period ttt, while $P_{t-1}$ refers to the stock price in the previous period. The expected return of a stock, symbolized as $E(R_i)$, is the average return of the investment over the observed periods. The total number of time periods or observations used in the research is represented by $n$.

1. Calculation of beta, alpha and Variance error residual of each stock

$$\beta_i = \frac{Cov\ (R_i, R_m)}{Var\ (R_m)} \quad (4)$$

$$\alpha_i = E(R_i) - \beta_i . E(R_m) \quad (5)$$

$$\sigma_{ei}{}^2 = \sigma_i{}^2 - \beta_i{}^2 . \sigma_m{}^2 \quad (6)$$

In this analysis, $\beta_i$ represents the beta of an individual stock, which measures the stock's sensitivity to market movements, while $\alpha_i$ denotes the alpha, indicating the stock's excess return relative to its expected performance. The term $Cov\ (R_i, R_m)$ refers to the covariance between the return of an individual stock and the return of the market.

Meanwhile, $Var\ (R_m)$ signifies the variance of market returns, used to assess the market's overall volatility. $E(R_m)$ is the expected return of the market, and $E(R_i)$ is the expected return of the individual stock. Lastly, $\sigma_{ei}{}^2$ denotes the residual error variance of the individual stock, which reflects the portion of a stock's return that cannot be explained by market movements and represents firm-specific risk.

2. Calculation of the risk-free interest rate of each stock. In this calculation, an average risk-free rate of 0.001994 is used, which is obtained from the Malaysia 3-Month Treasury Bill Yield divided by 12 to obtain the monthly risk-free rate during the period January 2020 - June 2024.
3. Calculation of Excess Return to Beta for each stock

$$ERB_i = \frac{E(R_i) - R_f}{\beta_i} \quad (7)$$

$ERB_i$ refers to the Excess Return to Beta. The term $E(R_i)$ represents the expected return of the stock, or the average return anticipated from the investment over a given period. Meanwhile, $R_f$ denotes the risk-free rate.

4. Calculation of $C_i$ and determination of cut-off point (C*)

$$C_i = \frac{\sigma_m{}^2 \sum_{j=1}^{i} \frac{[E(R_i) - R_f] . \beta_i}{\sigma_{ei}{}^2}}{1 + \sigma_m{}^2 \sum_{j=1}^{i} \left(\frac{\beta_i{}^2}{\sigma_{ei}{}^2}\right)} \quad (8)$$

In this analysis, $C_i$ refers to the cut-off point for an individual stock, which represents the threshold used to determine whether a stock should be included in the optimal portfolio. $E(R_i)$ denotes the expected return. The symbol $R_f$ represents the risk-free rate. $\beta_i$ is the beta of the individual stock. The term ${\sigma_{ei}}^2$ denotes the residual error variance. Finally, ${\sigma_m}^2$ refers to the variance or squared standard deviation of the market return, serving as a measure of market risk.

5. Calculation of the proportion of each stock in the portfolio

$$W_i = \frac{Z_i}{\sum Z_j} \quad (9)$$

$$Z_i = \frac{\beta_i}{{\sigma_{ei}}^2}(ERB_i - C^*) \quad (10)$$

In the context of portfolio optimization using the Single Index Model, $W_i$ represents the weight or proportion of the i-th investment within the overall portfolio, determining the extent to which each asset contributes to the total portfolio. The variable $Z_i$ refers to the z-score value of the i-th investment, which is a standardized measure of its excess return to beta.

The term $\sum Z_j$ indicates the sum of all z-scores across the assets considered in the portfolio, serving as the basis for calculating relative weights. $ERB_i$ or Excess Return to Beta, denotes the ratio of the excess return of an asset (i.e., return above the risk-free rate) to its beta, capturing its risk-adjusted performance. $C^*$ refers to the cut-off point, which is the threshold z-score that determines the inclusion of assets in the optimal portfolio; only those investments with a higher $ERB_i$ than the cut-off contribute to the final portfolio composition.

6. Calculate the expected return and portfolio risk that can be used to measure portfolio risk using the Single Index Model.

$$Single\ Index\ Model =$$

$$\alpha_i + (\beta_i . R_m) + e_i \quad (11)$$

$${\sigma_p}^2 = {\beta_p}^2 . {\sigma_m}^2 + (\textstyle\sum_{i-1}^{n} W_i . \sigma_{ei})^2 \quad (12)$$

The term $\beta_p$ denotes the portfolio beta. Meanwhile, $\alpha_p$ represents the portfolio alpha. Lastly, ${\sigma_p}^2$ refers to the variance or standard deviation of the portfolio.

***Comparing Risk and Return***

The two mean comparison test aims to assess whether there is a difference between the return and risk of the optimal portfolio in mid-cap stocks represented by the FTFBM70 index and large-cap stocks represented by the FBMKLCI index. The prerequisite for the difference test is to conduct a normality test. Without performing this test, the results of the two mean comparison test may be of doubtful validity (Wang et al., 2017). If the previously tested data is normally distributed, then the independent sample t-test can be applied. However, if the research data is not normally distributed, the Mann-Whitney Test is a non-parametric test that can be used instead of the independent sample t-test. The following is the hypothesis:

**H1**: There is a statistical difference in the return of mid-cap stocks represented by the FTFBM70 and large-cap stocks represented by the FBMKLCI index from the Single Index Model analysis results in the period January 2020 - June 2024.

**H2**: There is a statistical difference in the risk of mid-cap stocks represented by the FTFBM70 index and large-cap stocks represented by the FBMKLCI index from the results of the Single Index Model analysis in the period January 2020 - June 2024.

# Results and Discussion

***Optimal Portfolio Using the Single Index Model Result***

Based on Table 1, the stock with the highest expected return in the FTFBM70 index is Malaysian Pacific Industries (MPIM) at 0.02839. The stocks with the lowest standard deviation, indicating lower risk, are Axis REITs (AXSR) and Alliance Bank Malaysia Bhd (ALLI), both at 0.03507. In the FBMKLCI index, Press Metal Aluminium Holdings Bhd (PMET) has the highest expected return of 0.02127, indicating strong profit potential. Meanwhile, Malayan Banking Bhd (MBBM) has the lowest standard deviation at 0.03641, making it the least risky stock in the group.

Then for the market index, the FTFBM70 index shows a higher expected return (0.0062) and greater market risk, as indicated by its standard deviation (0.0482), compared to FBMKLCI's expected return (0.0014) and standard deviation (0.0365). To evaluate stock performance and risk, key indicators such as alpha, beta, and residual variance are used. Alpha reflects a stock's performance relative to its expected return, beta measures its volatility against the market, and residual variance indicates firm-specific risk.

According to Table 4, within the FTFBM70 index, Malaysian Pacific Industries (MPIM) has the highest alpha (0.02179), while DRB-HICOM (DRBM) records the lowest (-0.01338) and also the highest residual variance (0.04820). SP Setia Berhad (SETI) holds the highest beta (2.1076), while Axis REIT (AXSR) has the lowest (0.18789). On the FBMKLCI index, Press Metal (PMET) records the highest alpha (0.01879) and beta (1.79460), whereas AXIATA (AXIA) and Genting Malaysia (GENM) show the lowest alpha (-0.00766) and beta (0.06087), respectively. GENM also has the highest residual variance (0.0641), while Maybank (MBBM) has the lowest (0.00048).

A stock can be included in the optimal portfolio if it has an ERB that exceeds the Cut-off Point (Yusup, 2022). Based on Table 2, in the FTFBM70 index, the highest Ci value is recorded at 0.01158, which also serves as a Cut-off Point to determine the optimal portfolio. Meanwhile, in the FBMKLCI index, the highest Ci value is 0.00828, which is also used as the Cut-off Point, which forms the optimal portfolio based on Table 3, including PMET and TLMM.

The optimal portfolio analysis results show that in the FTFBM70 index, Time Dotcom Bhd (TCOM) shares have the largest weight in the portfolio of 30.07%, followed by Scientex Bhd (11.50%) and Gamuda Bhd (10.60%). All three contributed significantly to the portfolio's performance. In addition, KPJ Healthcare Bhd (9.66%), Frontken Corporation Bhd (8.86%), and Malaysian Pacific Industries (8.26%) also showed large allocation weights. Meanwhile, stocks such as MY E.G. Services Bhd (6.34%), Pentamaster Corporation Bhd (4.46%), and V.S Industry Bhd (4.41%) also supported portfolio diversification. On the other hand, the three stocks with the smallest allocation in the FTFBM70 portfolio are UEM Sunrise Bhd (2.68%), MI Technovation Bhd (2.20%), and Bermaz Auto Bhd (0.96%). For the FBMKLCI index, the optimal portfolio is dominated by two major stocks, namely Press Metal Aluminum Holdings Bhd (76.1%) and Telekom Malaysia Bhd (23.9%), indicating a high concentration in stable large-cap stocks.

Table 4. Expected Return & Standard Deviation

| FTFBM70 | | | FBMKLCI | | |
|---|---|---|---|---|---|
| **Stocks** | **E($R_i$)** | **$\sigma_i$** | **Stocks** | **E($R_i$)** | **$\sigma_i$** |
| AXSR | 0,00113 | 0,03507 | AXIA | -0,00563 | 0,08361 |
| ALLI | 0,00113 | 0,03507 | CIMB | 0,00913 | 0,07523 |
| BERA | 0,01114 | 0,08804 | GENT | 0,00152 | 0,08824 |

| | | | | | |
|---|---|---|---|---|---|
| BATO | -0,00364 | 0,07773 | GENM | 0,00082 | 0,08011 |
| BUAB | 0,02057 | 0,14178 | HLBB | 0,00431 | 0,04190 |
| BMYS | 0,01177 | 0,07765 | HLCB | 0,00266 | 0,05282 |
| DRBM | -0,00501 | 0,08945 | IHHH | 0,00329 | 0,04729 |
| FRAS | 0,00111 | 0,05710 | IOIB | -0,00184 | 0,06441 |
| FRKN | 0,02733 | 0,11250 | KLKK | 0,00034 | 0,06726 |
| GAMU | 0,01497 | 0,07631 | MBBM | 0,00382 | 0,03641 |
| GNCH | 0,01218 | 0,13981 | MXSC | -0,00635 | 0,04983 |
| KRIB | 0,01647 | 0,20803 | MISC | 0,00312 | 0,04690 |
| KPJH | 0,01501 | 0,06564 | NESM | -0,00635 | 0,04983 |
| LOTT | 0,00304 | 0,14429 | YINS | 0,00097 | 0,08200 |
| MAHB | 0,01195 | 0,09471 | PCGB | 0,00277 | 0,06634 |
| MPIM | 0,02839 | 0,10654 | PETR | -0,00181 | 0,07024 |
| MYRS | 0,00647 | 0,13193 | PGAS | 0,00417 | 0,05249 |
| MITE | 0,01794 | 0,15979 | PEPT | -0,00376 | 0,04600 |
| MYEG | 0,01726 | 0,09385 | PMET | 0,02127 | 0,09926 |
| PDNI | 0,00620 | 0,09155 | PUMB | 0,00295 | 0,05523 |
| PMAS | 0,01335 | 0,10169 | RHBC | 0,00069 | 0,05152 |
| STIK | 0,01033 | 0,05272 | SIME | 0,00699 | 0,06177 |
| SETI | 0,01665 | 0,18550 | TLMM | 0,01208 | 0,05511 |
| TAKA | -0,00030 | 0,08237 | TENA | 0,00471 | 0,05118 |
| TCOM | 0,01457 | 0,03683 | | | |
| UMSB | 0,02391 | 0,17274 | | | |
| VSID | 0,02046 | 0,12982 | | | |
| YINS | 0,00097 | 0,08200 | | | |
| Market Index | 0,0062 | 0,0482 | Market Index | 0,0014 | 0,0365 |

Table 5. Alpha ($\alpha_i$), Beta ($\beta_i$) dan Variance error residual ($\sigma_{ei}$)

| FTFBM70 | | | | FBMKLCI | | | |
|---|---|---|---|---|---|---|---|
| **Stocks** | **$\alpha_i$** | **$\beta_i$** | **$\sigma_{ei}$** | **Stocks** | **$\alpha_i$** | **$\beta_i$** | **$\sigma_{ei}$** |
| AXSR | -0,00004 | 0,18789 | 0,00115 | AXIA | -0,00004 | 0,1878 9 | 0,0011 5 |
| ALLI | -0,00024 | 0,21939 | 0,00112 | CIMB | -0,00024 | 0,2193 9 | 0,0011 2 |
| BERA | 0,00645 | 0,75179 | 0,00644 | GENT | 0,00645 | 0,7517 9 | 0,0064 4 |
| BATO | -0,00760 | 0,63560 | 0,00510 | GENM | -0,00760 | 0,6356 0 | 0,0051 0 |
| BUAB | 0,00877 | 1,88956 | 0,01181 | HLBB | 0,00877 | 1,8895 6 | 0,0118 1 |
| BMYS | 0,00465 | 1,14096 | 0,00300 | HLCB | 0,00465 | 1,1409 6 | 0,0030 0 |
| DRBM | -0,01338 | 1,33906 | 0,04820 | IHHH | -0,01338 | 1,3390 6 | 0,0482 0 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| FRAS | -0,00036 | 0,23532 | 0,00313 | IOIB | -0,00036 | 0,23532 | 0,00313 |
| FRKN | 0,01837 | 1,43548 | 0,00787 | KLKK | 0,01837 | 1,43548 | 0,00787 |
| GAMU | 0,00887 | 0,97807 | 0,00360 | MBBM | 0,00887 | 0,97807 | 0,00360 |
| GNCH | 0,00169 | 1,68034 | 0,01299 | MXSC | 0,00169 | 1,68034 | 0,01299 |
| KRIB | 0,00492 | 1,84953 | 0,03533 | MISC | 0,00492 | 1,84953 | 0,03533 |
| KPJH | 0,01258 | 0,38806 | 0,00396 | NESM | 0,01258 | 0,38806 | 0,00396 |
| LOTT | -0,00936 | 1,98670 | 0,01165 | PCGB | -0,00936 | 1,98670 | 0,01165 |
| MAHB | 0,00453 | 1,18820 | 0,00569 | PETR | 0,00453 | 1,18820 | 0,00569 |
| MPIM | 0,02179 | 1,05572 | 0,00876 | PGAS | 0,02179 | 1,05572 | 0,00876 |
| MYRS | -0,00554 | 1,92422 | 0,00880 | PEPT | -0,00554 | 1,92422 | 0,00880 |
| MITE | 0,00904 | 1,42496 | 0,02081 | PMET | 0,00904 | 1,42496 | 0,02081 |
| MYEG | 0,01166 | 0,89730 | 0,00694 | PUMB | 0,01166 | 0,89730 | 0,00694 |
| PDNI | 0,00005 | 0,98466 | 0,00613 | RHBC | 0,00005 | 0,98466 | 0,00613 |
| PMAS | 0,00661 | 1,07855 | 0,00764 | SIME | 0,00661 | 1,07855 | 0,00764 |
| STIK | 0,00746 | 0,45903 | 0,00229 | TLMM | 0,00746 | 0,45903 | 0,00229 |
| SETI | 0,00348 | 2,10764 | 0,02409 | TENA | 0,00348 | 2,10764 | 0,02409 |
| TAKA | -0,00736 | 1,13044 | 0,00382 | | | | |
| TCOM | 0,01314 | 0,22817 | 0,00124 | | | | |
| UMSB | 0,01301 | 1,74541 | 0,02276 | | | | |
| VSID | 0,01126 | 1,47290 | 0,01181 | | | | |
| YINS | -0,00499 | 0,95508 | 0,00461 | | | | |

Table 6. Excess Return to Beta ($ERB_i$) of FTFBM70 Index

| **$ERB_i$ > C* = Included Optimal Portfolio** | | | | |
|---|---|---|---|---|
| **Stocks** | **$ERB_i$** | **$C_i$** | **C*** | **Optimal Portfolio Candidate** |
| AXSR | -0,00458 | -0,00033 | 0,01158 | Excluded |
| ALLI | 0,00517 | 0,00052 | 0,01158 | Excluded |
| BERA | 0,01482 | 0,00302 | 0,01158 | Included |
| BATO | -0,00572 | -0,00105 | 0,01158 | Excluded |
| BUAB | 0,01089 | 0,00765 | 0,01158 | Excluded |
| BMYS | 0,01032 | 0,01039 | 0,01158 | Excluded |
| DRBM | -0,00374 | -0,00032 | 0,01158 | Excluded |
| FRAS | 0,00470 | 0,00019 | 0,01158 | Excluded |
| FRKN | 0,01904 | 0,01158 | 0,01158 | Included |

| | | | | |
|---|---|---|---|---|
| GAMU | 0,01531 | 0,00945 | 0,01158 | Included |
| GNCH | 0,00725 | 0,00366 | 0,01158 | Excluded |
| KRIB | 0,00891 | 0,00200 | 0,01158 | Excluded |
| KPJH | 0,03867 | 0,00342 | 0,01158 | Included |
| LOTT | 0,00153 | 0,00121 | 0,01158 | Excluded |
| MAHB | 0,01006 | 0,00580 | 0,01158 | Excluded |
| MPIM | 0,02689 | 0,00795 | 0,01158 | Included |
| MYRS | 0,00336 | 0,00329 | 0,01158 | Excluded |
| MITE | 0,01259 | 0,00285 | 0,01158 | Included |
| MYEG | 0,01924 | 0,00519 | 0,01158 | Included |
| PDNI | 0,00630 | 0,00231 | 0,01158 | Excluded |
| PMAS | 0,01238 | 0,00438 | 0,01158 | Included |
| STIK | 0,02250 | 0,00481 | 0,01158 | Included |
| SETI | 0,00790 | 0,00338 | 0,01158 | Excluded |
| TAKA | -0,00027 | -0,00021 | 0,01158 | Excluded |
| TCOM | 0,06385 | 0,00625 | 0,01158 | Included |
| UMSB | 0,01370 | 0,00426 | 0,01158 | Included |
| VSID | 0,01389 | 0,00593 | 0,01158 | Included |
| YINS | 0,00102 | 0,00047 | 0,01158 | Excluded |

Table 7. Excess Return to Beta ($ERB_i$) of FBMKLCI Index

| **$ERB_i$ > C* = Included Optimal Portfolio** | | | | |
|---|---|---|---|---|
| **Stocks** | **$ERB_i$** | **$C_i$** | **C*** | **Optimal Portfolio Candidate** |
| AXIA | -0,00762 | -0,00363 | 0,00828 | Excluded |
| CIMB | 0,00714 | 0,00477 | 0,00828 | Excluded |
| GENT | -0,00047 | -0,00017 | 0,00828 | Excluded |
| GENM | -0,00117 | -0,00001 | 0,00828 | Excluded |
| HLBB | 0,00232 | 0,00234 | 0,00828 | Excluded |
| HLCB | 0,00066 | 0,00037 | 0,00828 | Excluded |
| IHHH | 0,00130 | 0,00070 | 0,00828 | Excluded |
| IOIB | -0,00384 | -0,00292 | 0,00828 | Excluded |
| KLKK | -0,00165 | -0,00118 | 0,00828 | Excluded |
| MBBM | 0,00182 | 0,00399 | 0,00828 | Excluded |
| MXSC | -0,00834 | -0,00404 | 0,00828 | Excluded |
| MISC | 0,00113 | 0,00071 | 0,00828 | Excluded |
| NESM | -0,00834 | -0,00404 | 0,00828 | Excluded |
| PCGB | 0,00078 | 0,00042 | 0,00828 | Excluded |
| PETR | -0,00380 | -0,00212 | 0,00828 | Excluded |
| PGAS | 0,00218 | 0,00115 | 0,00828 | Excluded |
| PEPT | -0,00575 | -0,00521 | 0,00828 | Excluded |
| PMET | 0,01927 | 0,00828 | 0,00828 | Included |
| PUMB | 0,00095 | 0,00071 | 0,00828 | Excluded |
| RHBC | -0,00130 | -0,00137 | 0,00828 | Excluded |
| SIME | 0,00499 | 0,00254 | 0,00828 | Excluded |
| TLMM | 0,01009 | 0,00260 | 0,00828 | Included |
| TENA | 0,00271 | 0,00149 | 0,00828 | Excluded |

Table 8. Individual Stock Weight of Optimal Portfolio FTFBM70 Index

| Stocks | $Z_i$ | $W_i$ | $W_i$ (%) |
|---|---|---|---|
| BERA | 0,37784 | 0,00963 | 0,96% |
| FRKN | 3,47369 | 0,08855 | 8,86% |
| GAMU | 4,15904 | 0,10602 | 10,60% |
| KPJH | 3,79126 | 0,09665 | 9,66% |
| MPIM | 3,23985 | 0,08259 | 8,26% |
| MITE | 0,86205 | 0,02198 | 2,20% |
| MYEG | 2,48838 | 0,06343 | 6,34% |
| PMAS | 1,74762 | 0,04455 | 4,46% |
| STIK | 4,51082 | 0,11499 | 11,50% |
| TCOM | 11,79466 | 0,30067 | 30,07% |
| UMSB | 1,05034 | 0,02678 | 2,68% |
| VSID | 1,73188 | 0,04415 | 4,41% |
| **Σ** | **39,22744** | **1,000** | **100%** |

Table 9. Individual Stock Weight of Optimal Portfolio FBMKLCI Index

| Stocks | $Z_i$ | $W_i$ | $W_i$ (%) |
|---|---|---|---|
| PMET | 6,21760 | 0,76096 | 76,1% |
| TLMM | 1,95311 | 0,23904 | 23,9% |
| **Σ** | **8,17071** | **1,000** | **100%** |

Table 10. Expected Return & Risk of Optimal Portfolio of FTFBM70 Index

| Stocks | $W_i$ | α | β | $\sigma^2_{ei}$ | $\alpha_p$ | $\beta_p$ | $\sigma^2_{ep}$ |
|---|---|---|---|---|---|---|---|
| BERA | 0,0096 | 0,0064 | 0,7518 | 0,0064 | 0,00006 | 0,00724 | 0,00000013 |
| FRKN | 0,0886 | 0,0184 | 1,4355 | 0,0079 | 0,00163 | 0,12712 | 0,00003802 |
| GAMU | 0,1060 | 0,0089 | 0,9781 | 0,0036 | 0,00094 | 0,10370 | 0,00002513 |
| KPJH | 0,0966 | 0,0126 | 0,3881 | 0,0040 | 0,00122 | 0,03751 | 0,00000341 |
| MPIM | 0,0826 | 0,0218 | 1,0557 | 0,0088 | 0,00180 | 0,08719 | 0,00001819 |
| MITE | 0,0220 | 0,0090 | 1,4250 | 0,0208 | 0,00020 | 0,03131 | 0,00000249 |
| MYEG | 0,0634 | 0,0117 | 0,8973 | 0,0069 | 0,00074 | 0,05692 | 0,00000772 |
| PMAS | 0,0446 | 0,0066 | 1,0786 | 0,0076 | 0,00029 | 0,04805 | 0,00000548 |
| STIK | 0,1150 | 0,0075 | 0,4590 | 0,0023 | 0,00086 | 0,05278 | 0,00000654 |
| TCOM | 0,3007 | 0,0131 | 0,2282 | 0,0012 | 0,00395 | 0,06860 | 0,00001107 |
| UMSB | 0,0268 | 0,0130 | 1,7454 | 0,0228 | 0,00035 | 0,04673 | 0,00000545 |
| VSID | 0,0441 | 0,0113 | 1,4729 | 0,0118 | 0,00050 | 0,06503 | 0,00001010 |
| | | **Σ** | | | **0,01253** | **0,73219** | **0,00013372** |

$E(R_m)$ : 0,00624
$\sigma_m$ : 0,04820

$$\textbf{\textit{Single Index Model}}\ \textbf{(SIM)} = E(R_p) = \alpha_p + \beta_p(E(R_m))$$
$$= 0{,}01253 + 0{,}73219 \times 0{,}00624$$
$$= 0{,}01711\ or\ 1{,}71\%$$
$$Risk\ Systematic = {\beta_p}^2 \times {\sigma_m}^2$$
$$= 0{,}73219^2 \times 0{,}04820^2$$
$$= 0{,}001245$$

$$Total\ Risk = Systematic\ Risk + Unsystematic\ Risk$$
$$= 0{,}001245 + 0{,}00013372$$
$$= 0{,}001379 \text{ or } 0{,}138\%$$

**Table 11. Expected Return & Risk of Optimal Portfolio of FBMKLCI Index**

| Stocks | $W_i$ | α | β | $\sigma^2_{ei}$ | $\alpha_p$ | $\beta_p$ | $\sigma^2_{ep}$ |
|---|---|---|---|---|---|---|---|
| PMET | 0,47920 | 0,01879 | 1,79460 | 0,00556 | 0,00900 | 0,85998 | 0,000992 |
| TLMM | 0,52080 | 0,01136 | 0,51871 | 0,00268 | 0,00592 | 0,27014 | 0,000099 |
| | | **Σ** | | | **0,01492** | **1,13012** | **0,001091** |

$E(R_m)$ : 0,00138
$\sigma_m$ : 0,03649

$$\textbf{\textit{Single Index Model}}\ \textbf{(SIM)} = E(R_p) = \alpha_p + \beta_p(E(R_m))$$
$$= 0{,}01492 + 1{,}13012 \times 0{,}001091$$
$$= 0{,}01648\ or\ 1{,}65\%$$

$$Risk\ Systematic = {\beta_p}^2 \times {\sigma_m}^2$$
$$= 1{,}13012^2 \times 0{,}03649^2$$
$$= 0{,}0466041$$

$$Total\ Risk = Systematic\ Risk + Unsystematic\ Risk$$
$$= 0{,}046604 + 0{,}001091$$
$$= 0{,}04770 \text{ or } 4{,}77\%$$

***Comparison of Return and Risk of FTFBM70 and FBMKLCI Index Companies Results***

Based on Table 11 and Table 12, the optimal portfolio constructed from stocks in the FTFBM70 index using the Single Index Model calculation achieved an expected return of 0.01711, or 1.71%. This return is notably higher than the market's expected return of 0.0062 (0.62%). In terms of risk, the total portfolio risk was 0.001379 (0.138%), comprising systematic risk of 0.001245 and unsystematic risk of 0.00013372. These results indicate that the portfolio not only provides a higher return but also carries a lower overall risk compared to the market, which recorded a standard deviation of 0.0482.

In comparison, the optimal portfolio derived from the FBMKLCI index during the same period produced an expected return of 0.01648, or 1.65%, also surpassing the market return of 0.0014 (0.14%). The total portfolio risk was 0.04770, with systematic risk at 0.046604 and unsystematic risk at 0.001096. Although this portfolio exhibited a higher total risk than the FTFBM70 portfolio, its overall risk remained below that of the market, which had a standard deviation of 0.0365.

However, the statistical test results show that there is no significant difference in the average return between the FTFBM70 (mid-cap) and FBMKLCI (large-cap) stock portfolios, so hypothesis **$H_1$ is rejected**. However, this finding is not entirely in line with some previous studies. Gore et al. (2023) found that in the short term, mid-cap stock funds tend to provide higher returns than large-cap stocks. However, in the long run, large-cap stocks are considered more stable and are often the top choice of investors.

In addition, research by Al-Nassar (2023) also shows that during periods of economic crisis, investors tend to increase the proportion of their investments in large-cap stocks as a measure to reduce risk. Al-Nassar's research analyzes risk through return volatility and correlations across stocks with varying capitalizations, especially during periods of uncertainty. Thus, if fund managers are limited to a single stock category like large caps without considering market conditions, portfolio performance may be sub-optimal.

The average risk shows that there is a statistical risk difference between the stock risk of medium-cap companies represented by the FTBMKLCI index and large-cap companies represented by the FBMKLCI index, so **$H_2$ is accepted**. The average risk measured by portfolio standard deviation shows that the FBMKLCI index has a higher level of risk than the FTFBM70 index. Research conducted by Selemela et al. (2021) also strengthens these findings. In an analysis that covers the COVID-19 crisis period, it was found that the overall risk of mid-cap stocks was lower than large-cap and small-cap stocks. The risk is measured by stock price volatility, and the results show that mid-cap stocks have a strategic position because they are able to utilise the advantages of both groups.

In addition, he study by Amir et al. (2022) showed a significant negative impact on the FBMKLCI index after the emergence of the COVID-19 pandemic. From January to March 2020, the index experienced a sharp decline after the introduction of the Movement Control Order. This sharp decline reflects the high sensitivity of stocks in the FBMKLCI index to the crisis, which is an indicator of high volatility and risk. The results support the finding that large-cap stocks are not always more stable in the face of extreme market stress.

## Conclusion

This study applies the Single Index Model to examine the construction and performance of optimal stock portfolios using two major segments of the Malaysian equity market: the FTFBM70 index representing mid-cap stocks and the FBMKLCI index representing large-cap stocks, over the period from January 2020 to June 2024. The findings reveal that there is no statistically significant difference in the average return between mid-cap and large-cap portfolios. This suggests that, within the observed timeframe, both portfolio types offered similar return potential despite market fluctuations.

However, the analysis of risk, measured through portfolio standard deviation, shows a significant difference between the two categories. The FBMKLCI index exhibited a higher level of risk compared to the FTFBM70 index. These results are consistent with previous studies, particularly during the COVID-19 crisis, where mid-cap stocks demonstrated lower volatility and more stable performance than large-cap stocks.

The findings of this study highlight the importance of considering both return and risk in portfolio construction. Relying solely on large-cap stocks, particularly during periods of economic stress, may not always lead to optimal portfolio performance. Therefore, fund managers and investors are encouraged to adopt a more flexible and dynamic investment strategy that considers market conditions and includes a balanced mix of stock capitalizations to better manage risk and enhance long-term performance.

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