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Combining fundamental and technical analyses for better stock selection: An empirical study on Bursa Malaysia

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ABSTRACT

This research aims to examine the impact of fundamental and technical analyses in stock selection, focusing on the FBM 100 index stocks in Bursa Malaysia from 2021 to 2023. The design of this research is based on the filtration of variables within fundamental and technical analyses and the application of Monte Carlo simulations using Python. Using a filtration approach, the Monte Carlo simulations are applied to varying combinations of fundamental metrics, namely price-earnings ratio, dividend yield, price-to-book ratio, and earnings per share, as well as technical indicators such as moving average convergence divergence (MACD), moving average crossovers, and relative share price momentum. The strategy that employs all the fundamental and technical analysis filters achieved a monthly return of 3.34% and a weekly return of 1.05%, compared to just 0.60% and 0.23% without filters. Although the higher returns are accompanied by higher volatility, the hybrid combination of both fundamental and technical analyses yields better risk-adjusted performance. Within the scope of fundamental analysis, this study further reveals that sector affiliation is a significant determinant of share price performance. This study highlights the complementary nature of fundamental and technical analyses, which offer a practical, flexible, and hybrid stock selection framework for enhancing equity investment outcomes.

Contribution/Originality: This paper has demonstrated that the harmonization of fundamental and technical analyses improves the returns of stock selection for both weekly and monthly data, which is often overlooked by most existing literature due to its conflicting schools of thought.

1. INTRODUCTION

In the field of equity investment, selecting the right stocks is a crucial element for achieving favorable returns. Investors and analysts often rely on various methodologies to assess the potential of stocks. Two of the most prominent approaches are fundamental analysis and technical analysis, each offering unique insights into stock performance. There are many conflicting opinions about both fundamental analysis and technical analysis since the two approaches come from very different philosophical backgrounds. While both methods have their strengths and weaknesses, combining these approaches could offer a more comprehensive framework for stock selection.

Fundamental analysis is performed to determine a company's intrinsic value (Krantz, 2016). The intrinsic value is also known as fair value in most research reports. It primarily involves evaluating the financial standing of an organization using different financial metrics. When fundamental analysis is the chosen methodology, it is usually for long-term investment, and there is no need for an investor to time the market if the share price is deemed to be trading below a stock's intrinsic value.

In contrast, technical analysis is usually applied in short-term trading, which often involves seeking better timing for the entry and exit of stocks by tracking trends and market psychology. Through chart indicators, technical analysis provides psychological components that indicate whether buyers or sellers are in control of a particular share. While technical analysis can be useful in determining a trend's direction, it may not always accurately predict the direction of a share price (Pring, 2001).

Despite the strength of both approaches, most of the existing literature has overlooked the integration of fundamental analysis and technical analysis to improve equity returns. This research addresses this gap by examining data on Malaysian-listed companies and applying Monte Carlo simulations to assess how combining fundamental and technical analyses can lead to better investment outcomes. The research contributes by exploring how harmonizing both fundamental and technical analyses may potentially result in greater upside potential and lower downside risks in stock selection.

The problem also lies in the perception that both analyses engage with different sets of criteria in stock selection. Assuming that the two different sets of criteria are to be used, then the question that arises would be which analysis should be given higher priority. In fact, both schools of thought may argue for the superiority of their respective methodologies in helping investors achieve better returns.

Hence, this research aims to demonstrate that both technical and fundamental analysis can be utilized simultaneously to lower the level of investment risk, rather than prioritizing one approach over the other. Since neither technical nor fundamental analysis can be relied upon to be accurate all the time, this research will employ two sets of tools: technical and fundamental analysis within an integrated framework to improve the robustness of stock selection.

This study aims to contribute by bridging the gap between fundamental analysis and technical analysis through empirically evaluating their combined effectiveness in improving equity performance for investors. The integration of these two methods within a unified investment framework could offer a more comprehensive approach to equity fund management, as it captures both intrinsic value (fundamental analysis) and investor sentiment (technical analysis). Moreover, this hybrid investment strategy will empower investors with better decision-making tools, which may contribute to a more analytical and sophisticated financial ecosystem.

2. LITERATURE REVIEW

At this juncture, there is limited literature studying the combination of both analyses, and it is mainly concentrated in developed markets. Therefore, focusing this study on developing markets like Malaysia will be more impactful, as emerging markets might have different regulatory environments. Although there are a few Malaysian studies supporting the usefulness of using either fundamental or technical analysis, the results of combining both fundamental and technical research for stock picking are not well supported (Jakpar, Tinggi, Tak, & Chong, 2018).

Although Ruhani and Mat Junoh (2023) studied trading volume, which is a component of technical analysis, their empirical results demonstrated that only fundamental variables such as market capitalization, earnings per share, price-earnings ratio, and dividend yield have an impact on market returns. In other words, there was still insufficient evidence in Ruhani and Mat Junoh's (2023) findings to support the claim that the hybrid method of both fundamental and technical analysis would improve stock selection.

In demonstrating the virtues of fundamental analysis, Ho, Nguyen, Tran, and Vo (2023) suggested that signals based on fundamental analysis and financial statement information might help predict future changes in earnings,

potentially leading to improved investment outcomes. The study also found that using financial analysis to differentiate between winners and losers improves the outcome of a value investing strategy.

McMillan (2019) asserts that the fundamental analysis-based cyclical component of the price ratio could be used to generate a higher level of stock returns. Similarly, Tarmidi, Pramukty, and Akbar (2020) highlighted the use of financial ratios such as Return on Assets (ROA) in influencing investors or the public in analyzing the performance of organizations.

According to Baker, De Ridder, and Råsbrant (2020), listed companies that pay dividends outperformed non-dividend-paying companies. Walkshäusl (2021) provides further evidence in favor of the application of fundamental analysis. According to the Walkshäusl (2021) findings, companies that are deemed to be fundamentally undervalued perform better than those that are viewed as overvalued.

There is also a wealth of literature that supports the effectiveness of technical analysis. Ling, Abdul-Rahim, and Said (2020) demonstrated that using market timing in conjunction with technical analysis trading rules produces superior results in the Malaysian equity market. Similarly, Lee (2020)'s study supported the use of technical indicators as a reference in investment decision making for the Malaysian banking sector, while Lin (2018) presented compelling evidence that technical analysis improves the predictability of stock return.

Tan, Lai, Tey, and Chong (2020) provided more evidence in favor of the strong predictive ability of integrating technical and sentiment-based trading strategies. Furthermore, to achieve better returns over the buy-and-hold strategy's threshold, M'ng (2018) recommends employing the dynamic volatility indicator known as Adjustable Moving Average (AMA) as a trade timing tool. Alanazi and Alanazi (2020) also advocate for its application in the foreign exchange market on the basis that this approach can potentially generate excess returns.

In comparison between both analyses, Avramov, Kaplanski, and Levy (2018) state that technical recommendations perform better in terms of quality compared to fundamental analysis. Their study also argues that using technical analysis potentially yields higher returns as well as lowers the magnitude of losses in terms of individual stocks' returns.

Although Picasso, Merello, Ma, Oneto, and Cambria (2019) proposed that combining technical analysis with news item sentiment led to better market prediction, their study contend that technical analysis is superior to fundamental analysis. According to their findings, technical indicators outperformed sentiment gleaned from US news stories. As the research was mainly confined to developed markets, extending similar studies to developing markets such as Malaysia would be valuable. In addition, Picasso et al. (2019) only used sentiment in news articles as a fundamental variable, which lacks a comprehensive study of other types of variables within fundamental analysis.

According to Jakpar et al. (2018), investors in Malaysia's equities market can benefit from both fundamental and behavioral analyses to enhance their returns. However, the research did not specify which approach is more effective nor did it incorporate both analyses into its stock price prediction. Thampanya, Wu, Nasir, and Liu (2020) emphasized that fluctuations in stock prices are primarily driven by sentiment and fundamental value. It is implied that sentiment plays an important role in the psychological components of investment, highlighting the behavioral dimension. Although their research mentions the behavioral aspect, it does not include an analysis of technical indicators. This represents a gap in the literature, suggesting that further exploration of the integration of fundamental and technical analyses is warranted.

3. HYPOTHESIS DEVELOPMENT

Based on the theoretical background and existing literature, this research extends the study of fundamental and technical analyses by testing the following hypotheses:

1st hypothesis:

$H_0 =$ *Isolating fundamental or technical analyses will lead to better equity performance.*

$H_1 =$ *Combining fundamental and technical analyses will lead to better equity performance.*

2nd hypothesis:

$H_0=$ *Technical analysis is more significant than fundamental analysis in improving equity performance.*

$H_1=$ *Fundamental analysis is more significant than technical analysis in improving equity performance.*

In terms of fundamental analysis, limited research has addressed sector variables because they involve the non-quantitative aspects of fundamental analysis. They also focus specifically on one country, which in this case is Malaysia. Some studies on sector variables include research by Kamath, Shenoy, Abhilash, and Kumar N (2024), which demonstrate that positive investor sentiment influences the Indian stock market and its selected sectoral indices.

Meanwhile, Tripathi and Aggarwal (2020) empirical studies have suggested that the difference in price to book ratios between and within listed companies' sectors were statistically significant, indicating that a value premium exists within sectors despite the difference in a company's value growth orientation. James, Menzies, and Gottwald (2022)'s results also showed that there is a significant value of spreading equity holdings across sectors rather than within sectors.

Nevertheless, the scope of literature on sector analysis does not encompass the relationship between listed companies' sectors and share price performance. Since there is limited research on the effect of sector variables (part of fundamental analysis) on share price performance in Malaysia, this study also investigates the hypothesis below:

3rd hypothesis:

$H_0=$ *The sector in which listed companies belong does not play a significant role in determining companies' share price performance.*

$H_1=$ *The sector in which listed companies belong plays a significant role in determining companies' share price performance.*

In summary, the literature review highlights the strengths and limitations of both fundamental and technical analyses. Although there is considerable research supporting each method independently, the gap in literature concerning their integration in emerging markets presents an opportunity for this study. The hypotheses outlined aim to test whether combining these methodologies can yield improved stock selection strategies in Bursa Malaysia, ultimately providing new insights into the effectiveness of hybrid analysis frameworks.

4. CONCEPTUAL AND THEORETICAL FRAMEWORK

4.1. Efficient Market Hypothesis (EMH)

According to Fama's Efficient Market Hypothesis (EMH), since current market prices fully reflect all previously reported news, it is impossible to achieve returns that outperform the market (Picasso et al., 2019). This indicates that knowing past prices, public and private information is meaningless because the current price is the best assessment of a company's value (Burton & Shah, 2013). Under the strong efficient market hypothesis, there would be no undervalued or overvalued companies because their present share prices already reflect their intrinsic value.

The Efficient Market Hypothesis assumes that market prices are always efficient; therefore, any deviation from efficient prices is swiftly remedied. As this is believed to limit arbitrage opportunities (Burton & Shah, 2013), there is no need to predict share prices. This study may contradict the theory of the Efficient Market Hypothesis since it implies that investors can outperform the market by using both technical and fundamental analysis.

4.2. Value Investing Theory – Part of Fundamental Analysis

Fundamental analysts hold the view that while a stock's market price may differ from its intrinsic value, investors would be able to recognize the discrepancy (Reiley, Brown, & Leeds, 2018) and eventually, the price would reflect the stock's fair value. As part of fundamental analysis, value investing is based on the art of buying below the stock's intrinsic value. This theory basically assumes that stock investing could generate positive returns if one buys shares below their intrinsic value (Browne, 2007).

Merkle and Sextroh (2021) research on value investing found that equities with lower market-to-book values and price-to-earnings ratios are less risky. Consequently, value investing based on fundamental analysis is essential in

identifying companies with lower downside risks. This highlights the importance of value-based strategies within fundamental analysis for selecting resilient stocks. Although it is undeniable that value investing is still successful in company selection for better investment outcomes, this study seeks to question the concept that value investing is the only strategy that can generate good upside potential in stock selection. Instead, this study explores how technical analysis might be used to improve stock selection instead of solely relying on value investing or fundamental analysis, offering a more robust framework for investors.

5. RESEARCH DESIGN

The rationale of this study is to provide additional supporting evidence that investors can utilize technical analysis to enhance their fundamental analysis strategies. Specifically, this research aims to empirically assess the combination of fundamental and technical analyses in stock selection. By employing a comprehensive set of variables and constructing robust models, the study will contribute valuable insights into the benefits of integrating these two analytical approaches for more informed and effective investment decision-making. At the point of entry, it is proposed that investors are encouraged to select stocks that fulfill the criteria for both fundamental and technical analyses. In other words, multiple criteria will be used in stock selection, and the list of stocks will be narrowed down as more criteria are met. Table 1 outlines the recommendations based on the fundamental and technical analysis indicators. Both the fundamental and technical indicators need to be positive or strong before initiating a buy. A positive indicator from either analysis alone would not trigger a buy recommendation.

Table 1. Proposed conceptual framework for fundamental and technical analyses.

Companies	Fundamental analysis	Technical analysis	Recommendations
Signals	Strong	Strong	Buy
	Strong	Weak	Wait for a reversal in the share price
	Weak	Strong	Sell
	Weak	Weak	Sell

5.1. Dependent Variable

In this research, the dependent variable is the monthly stock price return of listed Malaysian companies. The monthly return is calculated based on the share price performance compared to the previous month using the formula below:

Monthly return of a stock's price $= \dfrac{\text{Share price}_{t+1} - \text{Share price}_t}{\text{Share price}_t}$

$t+1 =$ One-month period.

$t =$ Prior to one-month period.

On the other hand, weekly returns are calculated by comparing the share price performance against the previous week's, using the formula below:

Weekly return of a stock's price $= \dfrac{\text{Share price}_{t+1} - \text{Share price}_t}{\text{Share price}_t}$

$t+1 =$ One-week period.

$t =$ Prior to one-week period.

5.2. Independent Variables

The independent variables used in this study are classified into fundamental and technical analysis. Table 2 displays the fundamental variables used in this research. The fundamental analysis variables include the price-earnings ratio, dividend yield, price-to-book ratio, earnings per share growth, and sector analysis.

Table 2. Variables for fundamental analysis.

Independent variables	Analysis type	Descriptions	Abbreviations	Measurement unit
Price earnings ratio (PER) <15	Fundamental analysis	PE ratio is calculated by dividing the stock price by the company's earnings per share. The 15 PE ratio is used as a benchmark because the average PE ratio band for the 2-year average has been ranging around 15 times PER. (Source: Bloomberg)	PER<15	Ratio
Dividend yield > 0	Fundamental analysis	The company has been paying dividends.	Div > 0	Percentage %
Price to book < 1	Fundamental analysis	The share price is trading at a discount compared to its book value.	Price book < 1	Ratio
Earnings per share > 0%	Fundamental analysis	The company has been generating positive growth in net profits.	EPS > 0	Percentage %
Sector/ Industry	Fundamental analysis	The sector or industry of the listed company.	Sector	Not applicable

On the other hand, Table 3 displays the technical analysis variables used in the research. The technical analysis variables are MACD > 0, 20-day moving average (MA) − 50-day MA, share price − 50 days, and relative share price movement > 0.

Table 3. Variables for technical analysis.

Independent variables	Analysis type	Descriptions	Abbreviations	Measurement unit
Moving average convergence divergence (MACD)>0	Technical analysis	The MACD is calculated by subtracting the 26-day period of exponential moving average (EMA) from a 12-day EMA. (Pring, 2001)	MACD > 0	Positive vs Negative
20 days MA− 50 days MA	Technical analysis	The moving averages (MAs) are statistics that capture the average change in a data series over time. The 20-day MA minus the 50-day MA is used because it is the more commonly used MA for analyzing short-term returns.	20 MA − 50 MA	Positive vs Negative
Share price − 50 days MA	Technical analysis	The share price is compared with the 50-day MAs.	SP − 50 MA	Positive vs Negative
Relative share price movement > 0	Technical analysis	The percentage change over the last six months in the one-month moving average of the share price compared to the benchmark index.	RSPM>0	Positive vs Negative

5.3. Control Variables

A change in the interest rate environment may affect stock prices. In this analysis, it is assumed that the interest rate remains constant and acts as a control variable between the independent and dependent variables.

6. DATA AND METHODOLOGY

Malaysia was selected as the research market in Asia because it has a broad range of high-quality Shariah-compliant stocks. Furthermore, there remains a lack of empirical research in the Malaysian context to demonstrate that combining fundamental and technical analyses improves stock selection for better equity market performance. Generally, Malaysia's equity market is considered more defensive in nature compared to other markets in the Asian region, owing to its relatively low volatility, partly because of the high level of participation by local institutional funds. Since Malaysia is an open economy with economic ties to global equity markets, the conclusions of the proposed

research may have implications beyond Malaysia's borders. Additionally, the Malaysian market also has a good mix of large, established companies with emerging small-cap and mid-cap firms, many of which are sensitive to regional and global economic trends, further supporting Malaysia's suitability for evaluating stock selection.

The main purpose of this research is to explore the potential benefits of combining fundamental and technical analyses to enhance stock selection strategies in the context of Bursa Malaysia. Specifically, the study aims to assess the strengths and weaknesses of both fundamental and technical approaches. Moreover, it examines whether an integrated approach leads to better risk-adjusted returns.

In this study, the quantitative data from Malaysia's equity market will be analyzed based on stocks listed on Bursa Malaysia (formerly Kuala Lumpur Stock Exchange). The sample comprises the 100 stocks listed in the FBM 100 index as of the end of 2023. The FBM 100 includes the constituents of the FTSE Bursa Malaysia KLCI and FTSE Bursa Malaysia Mid 70 Index (FTSE Bursa Malaysia Indices, 2024). FBM100 primarily consists of large- to mid-capitalization stocks, which are more liquid and may reduce outliers that could distort the results of this study. Out of the 100 stocks, only 96 were selected. The four stocks, ITMAX System Berhad, CTOS Digital Berhad, Farm Fresh Berhad, and DXN Holdings Berhad, were excluded because they were listed on Bursa Malaysia as initial public offerings between 2021 and 2023. These stocks lacked sufficient historical data and could potentially distort the research results.

The quantitative data used in this study is based on the monthly return performance of the Malaysian equities market over a three-year period from 2021 to 2023. The data for 2023 was selected for weekly data analysis, as it represents the most recent 52 weeks within the three-year study period.

Annual data set is not used in this study because technical analysis is seldom used to evaluate long-term data. The monthly data provides a suitable middle ground for the evaluation of fundamental analysis (usually for long-term) and technical analysis (usually for short-term). The weekly data is also examined to better reflect the evaluation of fundamental and technical analyses.

The study period from 2021 to 2023 was deliberately selected due to its characteristic of a prolonged bearish market phase, during which the Malaysian equity market recorded three consecutive years of negative annual returns (2023: -2.7%; 2022: -4.6%; 2021: -3.7%). The period from 2021 to 2023 offers a more rigorous environment to assess the predictive effectiveness of stock selection models, as there is more negative sentiment and declining investor confidence. The year 2024 was excluded from the analysis because it marked a notable recovery with a positive annual return of 12.9%. The data used, based on a bearish market, provides a more suitable testing ground for the effectiveness of both fundamental and technical analyses.

Based on the 96 listed companies from year 2021 to 2023 (using monthly data), the sample size consists of 3,360 observation data, while the weekly data consists of 4,896 observation data over the one-year period of 2023. The benefit of using quantitative data over qualitative data is that it is more objective and aids in identifying trends. Moreover, it converts a significant amount of information into numerical data.

This study uses fundamental variables such as the price-earnings ratio, dividend yield, price-to-book ratio, and earnings per share, as well as technical indicators like the moving average convergence divergence (MACD), moving average crossovers, and relative share price momentum, due to their widespread acceptance and quantifiable nature at a given point in time. The variables analyzed have been widely used by investors for practical equity investment analysis. The fact that these variables are static at a point in time also allows for consistent measurement across different firms and time periods.

The data used in this study are sourced from the Bloomberg terminal and the annual reports of listed companies published in Bursa Malaysia. Since the sources of both primary and secondary data are reliable, this may enhance the credibility of the research.

This study adopts the Monte Carlo simulation as a tool to assess the effectiveness of combining fundamental and technical analyses. The Monte Carlo simulation, developed in the 1940s by a group of scientists, is used as a game of

chance where behavior and outcomes are based on a specific set of data. The research by Kalos and Whitlock (2008) is based on the normal distribution centered around the mean and standard deviation to estimate potential outcomes and their associated risks.

The rationale for using the Monte Carlo simulation is its ability to generate multiple possible future outcomes in returns based on different combinations of fundamental and technical analysis variables. As this study considers the standard deviation of returns, the Monte Carlo simulation is not merely a forecasting tool but also a validation mechanism to produce risk-adjusted returns across different horizons. This simulation-based testing methodology, which involves multiple variables from the context of fundamental and technical analyses, represents an innovative approach rather than relying solely on regression models.

7. RESULTS

7.1. Expected Return and Standard Deviation of Fundamental and Technical Analyses

In order to assess whether fundamental and technical analyses, or either of the analyses, are effective in generating returns from the equity market, the analysis is divided into four different scenarios: no fundamental and technical analysis (No FATA), fundamental analysis only (FA only), technical analysis only (TA only), and the combination of both fundamental and technical analyses (both FATA).

The filtration is based on one dependent variable—the monthly and weekly stock returns—and eight independent variables from both fundamental and technical analysis. As more filters are applied to the dataset, the sample data gradually decline, as fewer observations meet the increased criteria within fundamental and technical analysis. In the monthly data, the initial 3,360 data points, which had no fundamental or technical analysis filtration, have been reduced to 102 observations for the listed companies that meet four variables from fundamental analysis and four variables from technical analysis. Meanwhile, for the weekly data, the sample size decreased from 4,896 observations to 201 observations under the same filtering conditions.

Table 4 shows that the expected returns for both monthly and weekly data tend to be at the highest when more fundamental and technical variables were used in stock evaluation. In contrast, the average returns tend to be lower when fundamental analysis or technical analysis is applied in isolation. In the application of the Monte Carlo analysis, this study has taken into account the standard deviation of the average return. In other words, it takes in to account the variation of the average return. Specifically, the strategy that employs all the fundamental and technical analyses filters registered a monthly return of 3.34% and a weekly return of 1.05%, compared to a baseline return of only 0.60% and 0.23% respectively.

For the monthly dataset, a Monte Carlo simulation is conducted based on certain parameters, with an initial investment of RM1,000,000 over an investment horizon of 12 months. In the case of weekly data, the assumed initial investment is RM1,000,000 spread over a period of 52 weeks.

The average return and standard deviation for the stock would change according to the filtration of fundamental and technical analyses. To simplify the study, it is assumed that no additional investment would be injected, with the investment being on cumulative basis, for which the next period is based on the preceding period.

The formula for our Monte Carlo analysis in the algorithm would be as below:

Uniform_random = Random.random ().

Inv_norm = Norm.ppf (Uniform_random, avg_return, std_dev).

Table 4. The expected return and standard deviation for monthly (Year 2021 to Year 2023) and weekly (Year 2023) of the FBM100 index in the Malaysia equity market.

Group	PE ratio <15	Div >0%	Price to Book < 1	EPS >0%	MA CD >0	20 days MA - 50 days MA	Share price – 50 days MA	Relative Share Price Momentum >0	Monthly		Weekly	
									Average return	Standard Deviation	Average return	Standard Deviation
No FA or TA	No	No	No	No	No	No	No	No	0.60%	9.64%	0.23%	3.88%
FA Only	Yes	No	No	No	No	No	No	No	0.68%	8.65%	0.34%	3.01%
FA Only	Yes	Yes	No	No	No	No	No	No	0.62%	8.53%	0.32%	2.87%
FA Only	Yes	Yes	Yes	No	No	No	No	No	1.71%	8.74%	0.43%	3.06%
FA Only	Yes	Yes	Yes	Yes	No	No	No	No	2.07%	8.07%	0.65%	3.21%
Both FATA	Yes	Yes	Yes	Yes	Yes	No	No	No	2.26%	9.74%	0.86%	3.60%
Both FATA	Yes	Yes	Yes	Yes	Yes	Yes	No	No	2.57%	10.36%	0.91%	3.67%
Both FATA	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	2.89%	10.54%	0.90%	3.73%
Both FATA	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	3.34%	11.18%	1.05%	3.98%
Both FATA	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	3.17%	11.19%	1.15%	4.47%
Both FATA	No	No	Yes	Yes	Yes	Yes	Yes	Yes	3.18%	10.94%	1.18%	4.68%
Both FATA	No	No	No	Yes	Yes	Yes	Yes	Yes	1.55%	9.21%	0.59%	3.90%
TA Only	No	No	No	No	Yes	Yes	Yes	Yes	1.19%	10.34%	0.46%	4.44%
TA Only	No	No	No	No	No	Yes	Yes	Yes	1.14%	10.20%	0.42%	4.36%
TA Only	No	No	No	No	No	No	Yes	Yes	0.98%	9.69%	0.28%	4.09%
TA Only	No	No	No	No	No	No	No	Yes	1.23%	8.78%	0.31%	3.89%

Note: FA = Fundamental analysis.
             TA = Technical analysis.
             FATA = Fundamental analysis and technical analysis.
Source: Bloomberg terminal.

In this study, the Monte Carlo simulations were repeated 1000 times for both monthly and weekly datasets. By repeating the 1,000 possible outcomes from this method, it may increase the accuracy of the predictions. According to Kalos and Whitlock (2008), a higher level of repetition of the Monte Carlo analysis would lead to higher levels of reliability. In other words, the higher the level of repetition, the more accurate the analysis would be.

In performing the 1000 simulations, each iteration would be based on the random probabilities using the same set of parameters within the "Group". As the Monte Carlo analysis could be implemented using the algorithm, one of its limitations is the instability in the outcome of the results (Kim, 2023). While performing the algorithm, the results of the Monte Carlo analysis may change at different points in time.

In view of this, the research applied 1000 iterations using the same seed value in order to generate the same set of sequence of random numbers (Chen, Lu, & Han, 2023). By having the same set of seed value ranging from 1 to 1000, the algorithm effectively generated Monte Carlo results that are static based on a pre-set number of seed values. The seed setting function used in Python was:

Random.seed (Seed_value)

Since there are 16 groups for different combinations of fundamental and technical analyses for 1,000 iterations, Python generated a total of 192,000 possibilities in the monthly data. Using the same seed value and 1,000 iterations, 832,000 possibilities were generated for the next 52 weeks for the weekly data. Both monthly and weekly data is based on the initial investment of RM1,000,000.

The 16 groups were then subdivided into four groups, namely No FATA, FA only, TA only, and both FATA. Using the pivot table, Table 5 summarized the four different types of groups, with the average cumulative return of the 1,000 iterations over the next 12 months of monthly data and 52 weeks of weekly data.

The grand total for the four groups based on both monthly and weekly data is as below:

Table 5. Average cumulative return for different groups based on both monthly and weekly data.

Groups	Average cumulative return after 12 months	Average cumulative return after 52 weeks
Both FATA	RM1,370,609	RM1,640,433
FA only	RM1,167,121	RM1,251,355
TA only	RM1,151,272	RM1,204,160
No FA or TA	RM1,090,230	RM1,138,365

Source: Bloomberg terminal.

Based on Table 5, the application of both fundamental and technical analyses simultaneously leads to better investment outcomes compared to using either analysis in isolation. The average cumulative return, which combines partial or all combinations of fundamental and technical indicators, generated the highest return of RM1,370,609 after 12 months, whereas the cumulative return after 52 weeks was RM1,640,433. Regarding whether fundamental or technical analysis is better, fundamental analysis yielded better performance compared to technical analysis for both monthly and weekly datasets.

From an initial capital of RM1,000,000, the graphical average cumulative return also shows that the integration of fundamental and technical analyses exhibited better average cumulative returns for both monthly and weekly returns. Figures 1 and 2 illustrate the average cumulative monthly return and average cumulative weekly return, respectively. It highlights the better performance of the integrated approach of fundamental and technical analyses across the investment horizon.
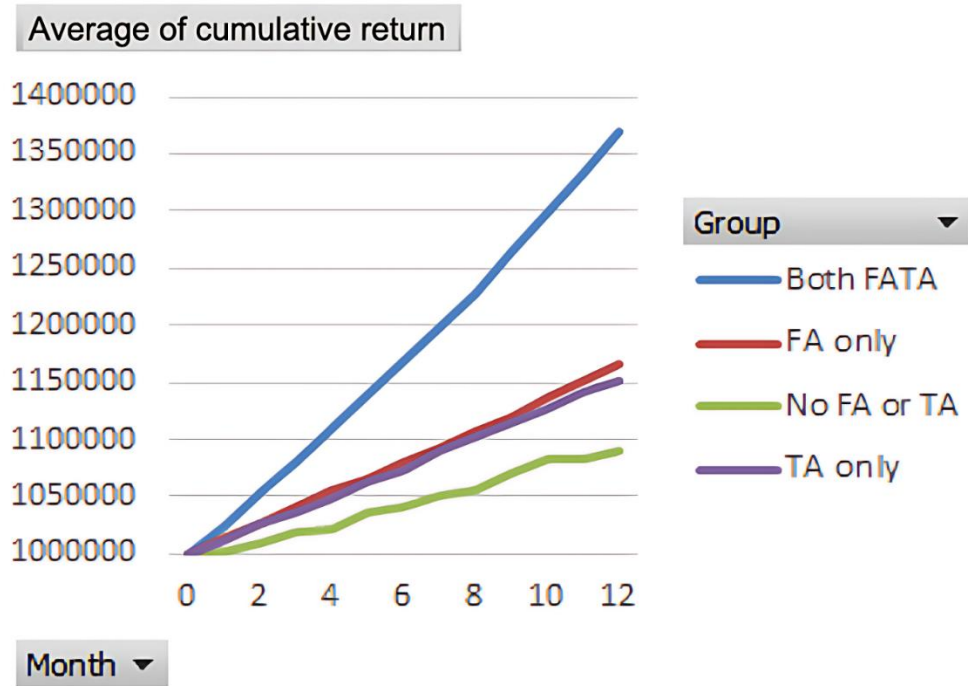
Figure 1. Average cumulative monthly return.
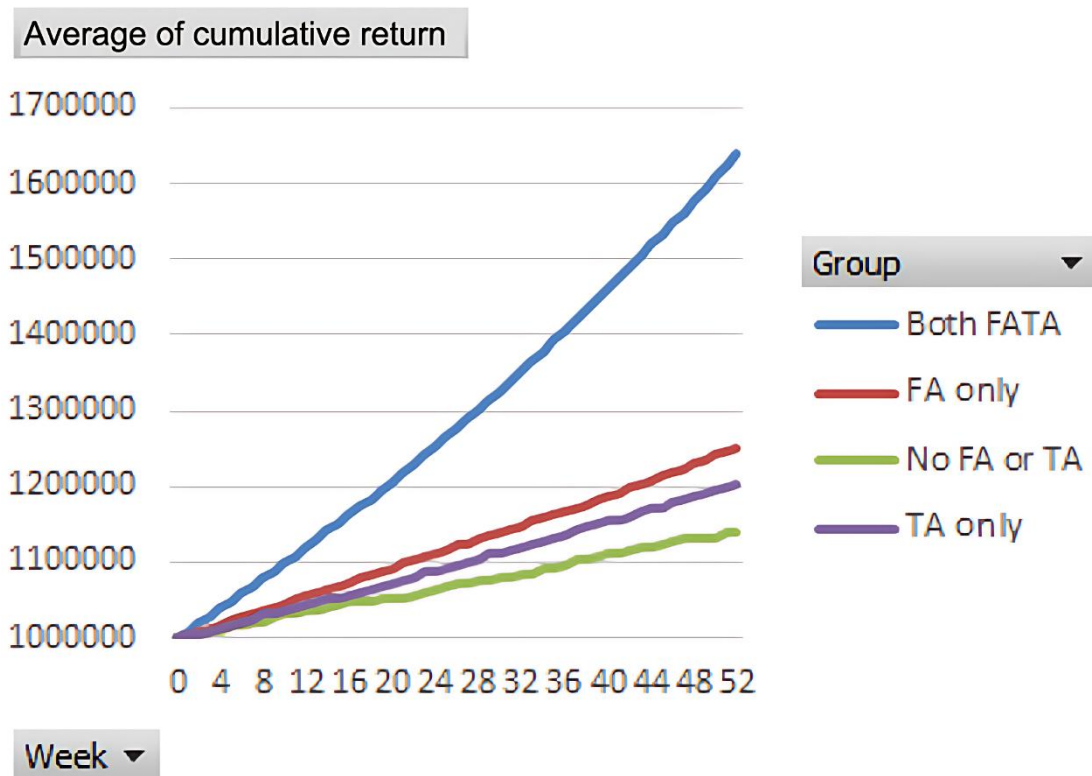
Source: Bloomberg terminal.

Figure 2. Average cumulative weekly return.

Source: Bloomberg terminal.

However, the output data generated using 1,000 Monte Carlo iterations from the static seed values of 1 to 1000 is just an indicative future return. It does not consider the behavioral aspects of investing, which may impact expected returns. Additionally, the output generated by Python could also have underestimated the possibility of extreme bull or bear markets. Nevertheless, it can be concluded that the harmonization of both fundamental and technical analyses could lead to better stock selection rather than using either analysis in isolation.

The findings of this Monte Carlo research fundamentally undermine the efficient market hypothesis (EMH), which states that the present market price completely consider all previously available information (Picasso et al., 2019). The result of this study shows that it is possible to enhance returns by incorporating fundamental and technical analyses in stock selection, which would then support the alternative hypothesis (H_1) in the first hypothesis tested in this research.

1st hypothesis:

H_0= *Isolating fundamental or technical analyses would lead to better equity performance.*

H_1= *Combining fundamental and technical analyses would lead to better equity performance.*

2nd hypothesis:

H_0= *Technical analysis is more significant than fundamental analysis in improving equity performance.*

H_1= *Fundamental analysis is more significant than technical analysis in improving equity performance.*

In reference to the second hypothesis, the Monte Carlo analysis suggests that fundamental analysis is more effective than technical analysis in improving equity performance based on monthly and weekly data. That said, changes in variables within fundamental and technical analysis may influence these results. Nevertheless, this study supports the argument that technical analysis helps to strengthen stock selection, while value investing could be complemented with technical analysis to enhance the upside potential of stock prices as well as reduce the downside risk.

8. SECTOR ANALYSIS (SHORT PANEL DATA ANALYSIS)

The third hypothesis evaluates the significance of the sector variable in determining share price performance. Since the sector variable (part of fundamental analysis) is a non-quantitative variable, each sector is assigned a numerical group. The sectors analyzed were financial services (1), utilities (2), industrial products & services (3), healthcare (4), telecommunications & media (5), transportation & logistics (6), plantation (7), construction (8), technology (9), energy (10), property and real estate investment trusts (REITs) (11), and consumer products and services (12).

3rd hypothesis:

H_0= *The sector in which listed companies belong does not play a significant role in determining companies' share price performance.*

H_1= *The sector in which listed companies belong plays a significant role in determining companies' share price performance.*

In analyzing the sector as a fundamental variable, this study grouped the numerical data of listed companies into panel data for both monthly and weekly periods. The short panel data were analyzed using Stata, a statistical software that assists in creating regression models.

Table 6 exhibits the results of the regression from Stata for the various sectors within the FBM100 index. Due to multicollinearity issue, the consumer products and services (12) has been omitted from the Stata regression. Following this exclusion, the variance inflation factor (VIF) for both monthly and weekly dataset fell to less than 2.0, which indicates that there is no multicollinearity issue. As a result, the p-value could be used to identify independent variables that are statistically significant.

In terms of monthly data, sectors with a p-value of less than 5%, or those that were statistically significant, included utilities (2), healthcare (4), and transport & logistics (6).

Meanwhile, the weekly data by sector that were found to be statistically significant included utilities (2), healthcare (4), construction (8), and property & REITs (11). The results imply that sector variables play a crucial role in improving stock performance on a weekly and monthly basis, with this effect being more apparent in the weekly data.

Table 6. Sector analysis for weekly and monthly data using Stata.

No	Sector	Monthly	Weekly
1	Financial services	0.002 (0.006)	0.002 (0.002)
2	Utilities	0.017* (0.008)	0.011* (0.003)
3	Industrial products & services	0.010 (0.006)	0.003 (0.002)
4	Healthcare	-0.020* (0.008)	0.007* (0.003)
5	Telecommunications & media	-0.006 (0.008)	-0.0002 (0.002)
6	Transportation & logistics	0.020* (0.009)	0.002 (0.003)
7	Plantation	0.004 (0.008)	0.001 (0.003)
8	Construction	0.022 (0.012)	0.015* (0.004)
9	Technology	0.000 (0.006)	0.0003 (0.002)
10	Energy	0.013 (0.008)	0.004 (0.003)
11	Property & REITs	0.011 (0.007)	0.010* (0.002)

Note: * p-value less than 5% or more than 95% confidence level.
Source: Stata, Bloomberg terminal and Bursa Malaysia.

The Stata results underscore the importance of sector-specific factors in investment decisions. This finding highlights the necessity of incorporating sector considerations as part of non-quantitative analysis in determining share price performance. By acknowledging the impact of sector dynamics within fundamental analysis, investors can make better decisions that could potentially lead to improved returns in their equity performance.

9. DISCUSSION

9.1. Limitations of the Study

The design of this study is primarily confined to the Malaysian equity market, which is considered an emerging market, and does not encompass the broader global market. Malaysia was selected due to its wide range of large- and mid-capitalisation listed companies, offering a unique and meaningful setting for this research.

The data used in this study were sourced from the Bloomberg Terminal and are based on back-testing of historical data. The research is conducted under the assumption that there will not be significant discrepancies between historical and future data patterns. It also assumes that historical data remains a reliable foundation for analytical modeling and investment analysis.

Both fundamental and technical analyses comprise a multitude of variables in assessing listed companies. Although there may be other variables that are not addressed in this study, it is not feasible to address every potential combination of variables within the framework of assessments.

A notable limitation of using quantitative data is that it does not take the investor's perspective into consideration and may fail to address questions that go beyond numerical statistics. In fact, public sentiment reflected on social media may be used to forecast share prices, but it has not been considered in this research. Prior research such as Audrino, Sigrist, and Ballinari (2020) argue that sentiment variables have strong predictive value for future stock market volatility. Similarly, Mndawe, Paul, and Doorsamy (2022) also discovered that social media can anticipate stock price movements and closing prices.

Despite implementing fundamental and technical analysis strategies, it does not guarantee that it will result in greater returns in the real world of stock investing. All these equity investment strategies are merely employed to increase the chances of generating capital appreciation as well as lowering the downside risk.

Aside from academic knowledge of investment, successful investing requires practical experience, staying up to date on current events, and having good foresight, all of which cannot be defined precisely in academic literature. Hence, practical experience is also needed to effectively select stocks, as it does not solely depend on fundamental and technical analyses.

9.2. Future Research

This study did not address robo-investing, which has gained popularity in recent years as a method for selecting stocks to improve equity performance. Future research could incorporate artificial intelligence (A.I.), such as machine learning, as an additional element for a more comprehensive analysis of stock selection in the equity market. Ayala, García-Torres, Noguera, Gómez-Vela, and Divina (2021) discovered that the combination of technical analysis and machine learning increased trading returns and reduced transaction frequency. Their findings suggest that incorporating machine learning technology into technical analysis methodologies increases trading signals and competitiveness for equity investment.

In addition to sector-specific factors, this research is primarily based on quantitative data, which is less subjective. Nevertheless, non-quantifiable elements such as a company's management capacity for innovation, increased productivity, and succession planning were not included in the fundamental analysis of this research. If these non-quantifiable elements become measurable in the future, they may add another layer of variables to the core analysis for a more in-depth investigation.

Although both fundamental and technical analyses could be used as tools to help predict stock prices, any economic crisis could derail the entire analysis on the stock selection. It is backed by a study conducted by Chopra and Mehta (2022) which examined the stock returns of several countries before and after the economic crisis. According to Chopra and Mehta (2022) research, average stock market returns were higher before the Asian financial crisis, US subprime crisis and Eurozone debt crises. As such, future studies should take into account extreme market volatility, whether it is a bull or bear run, to assess the robustness of stock selection models under heightened volatility.

In addition, future research could also incorporate the element of behavioral finance in determining the share price performance of an equity market. Jiang, Wen, Zhang, and Cui (2022) discovered herd behavior existed in the Asian equities market, where catastrophic global public crises like COVID-19 worsened market uncertainty. Their research showed that investors tend to follow others who are believed to have inside information or knowledge. When it comes to investing, Almansour, Elkrghli, and Almansour (2023) also stated that people's perceptions of risk are important because they influence their risk tolerance, which can then affect a portfolio's performance. Hence, behavioral finance can be incorporated as part of technical analysis for further research because it takes the psychological aspect of investing into account.

The integration of Environmental, Social, and Governance (ESG) factors can be studied in the future as a complementary dimension to fundamental and technical analyses for stock selection. Studies have shown that increased ESG disclosure enhances profitability and market value. As an extension of this research, the ESG factor can serve as an additional layer of screening for stock selection to improve the robustness of fundamental and technical analyses.

9.3. Significance of the Findings

Based on theoretical point of view, the findings of this research which promotes fundamental and technical analyses will assist in regulating behavioral risks associated with stock selection. The variables examined in this study

could serve as guidance in stock selection for both retail and institutional investors. According to Jaiyeoba and Haron (2016) when it comes to investing, the "feeling of comfort" influenced retail investors' decisions more than quantitative analysis. In fact, Ahmad, Ibrahim, and Tuyon (2017) suggested that there is a need to reduce those behavioral risks since fund managers' self-awareness in regulating behavioral risks in investing decisions remains relatively low.

The debate between fundamental and technical analyses, arising from their distinctive approaches and underlying assumptions, may lead to confusion regarding whether to apply fundamental analysis or technical analysis. Since this research has demonstrated that integrating both analyses may lead to more informed decisions and better equity performance, it could potentially result in higher returns for investors who apply both analyses with strict discipline.

This research may encourage capital market policymakers to introduce both technical and fundamental analyses to market participants rather than arguing over which is superior for stock selection, as it has demonstrated that combining the two may potentially result in better investment outcomes.

In the academic context, most universities, especially in Malaysia, do not offer technical analysis courses as a core subject in finance. On the other hand, there are numerous technical analysis courses conducted by private trainers, most of whom do not possess proper academic qualifications. It is believed that this study could persuade more public and private educational institutions to include a comprehensive technical analysis curriculum in their finance programs, thereby increasing awareness of the integration of both fundamental and technical analyses.

This research contributes to the ongoing debate about the optimal methods for stock selection. By offering empirical insights into the integration of fundamental and technical analyses, the study seeks to bridge the gap between theoretical and practical aspects of the equity investment decision-making process. This study aims to encourage and convince more fund managers and research analysts from the investment industry to have greater confidence in combining and employing both fundamental and technical analyses in equity portfolio management. Through the amalgamation of these two different approaches in stock selection, this research will ultimately foster more robust stock selection that could improve the performance of fund managers, whether in developing equity markets or developed markets.

10. CONCLUSION

Overall, there is ample literature covering the effectiveness and advantages of using fundamental or technical analyses, but there remains a significant shortfall of studies examining the results of combining both analyses in relation to improved stock selection and equity performance. The existing literature mainly focuses on the merits of applying either fundamental or technical analyses, without exploring their synergistic potential.

The findings of this study demonstrate that the simultaneous use of fundamental and technical analysis can lead to better equity performance, as reflected in both monthly and weekly stock returns. Through the application of Monte Carlo simulations involving 1,000 iterations, this study considers the standard deviation of returns, which may potentially provide more robust results for both weekly and monthly datasets.

In addition, the empirical results of this study indicate that the sectors of listed companies have a significant impact on their share price performance. This insight enables investors to strategically allocate a higher portion of their equity portfolios to sectors expected to perform better. It would also promote a top-down approach to investing, in which more listed companies are selected from the top-performing sectors.

Ultimately, this research provides comprehensive academic evidence of both fundamental and technical analyses with empirical findings. The findings may also serve as a reference for better stock selection in the global equity market, with a focus on emerging Asian markets such as Malaysia.

This study addresses the current gap in research on integrated investment strategies and strengthens the case for the concurrent use of both fundamental and technical analysis. Its findings have far-reaching implications, offering

valuable insights for financial institutions, corporations, pension funds, regulators, universities, and equity market participants.

The results of this study support a compelling narrative for the integration and harmonization of fundamental and technical analyses. In other words, a unified approach to fundamental and technical analyses may outperform standalone strategies.

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