

Fama-French Five Factor Model: Systematic Literature Review

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ABSTRACT

The intention of this inquiry is to ascertain, analyze, and integrate existing findings regarding the application and effectiveness of the Fama-French Five Factor Model in various market contexts through a systematic literature review approach. This research methodology uses a qualitative approach through a systematic literature review and bibliometric analysis obtained from 27 articles. Based on the results of the literature review, the Fama-French Five Factor Model has been shown to be superior in explaining asset price anomalies in several markets, such as Australia and South Africa, compared to previous models. However, its effectiveness varies depending on market characteristics, with less consistent results in emerging markets such as Asia, where profitability and investment factors are not always significant. In the context of the Indonesian market, research shows that FF5FM does not always outperform the three-factor model, suggesting that the addition of new factors may not always be relevant in all markets.

Keywords : **Fama-French Five Factor; Portfolio; Investment; Asset pricing; SLR**

ABSTRAK

Tujuan dari penelitian ini adalah untuk memastikan, menganalisis, dan mengintegrasikan temuan-temuan yang ada mengenai penerapan dan efektivitas Model Lima Faktor Fama-French dalam berbagai konteks pasar melalui pendekatan tinjauan literatur yang sistematis. Metodologi penelitian ini menggunakan pendekatan kualitatif melalui tinjauan literatur sistematis dan analisis bibliometrik yang diperoleh dari 27 artikel. Berdasarkan hasil tinjauan literatur, Fama-French Five Factor Model terbukti lebih unggul dalam menjelaskan anomali harga aset di beberapa pasar, seperti Australia dan Afrika Selatan, dibandingkan dengan model-model sebelumnya. Namun, efektivitasnya bervariasi tergantung pada karakteristik pasar, dengan hasil yang kurang konsisten di pasar negara berkembang seperti Asia, di mana faktor profitabilitas dan investasi tidak selalu signifikan. Dalam konteks pasar Indonesia, penelitian menunjukkan bahwa FF5FM tidak selalu mengungguli model tiga faktor, yang menunjukkan bahwa penambahan faktor baru mungkin tidak selalu relevan di semua pasar.

Kata Kunci : **Fama-French Five Factor; Portofolio; Investasi; Asset Pricing; SLR**

INTRODUCTION

The Fama-French Five Factor (FF5F) model is one of the most important developments in financial theory, especially in portfolio analysis and asset pricing. It extends the previous Fama-French three-factor model, which includes market factors, firm size, and book-to-market ratio, by adding two new factors: profitability and investment. Research related to FF5F has provided deep insights into how these factors affect stock returns and provided a solid foundation for academics and practitioners in testing market efficiency and investment strategies (Fama & French, 2023).

A systematic literature review of FF5F aims to identify, analyze, and integrate existing research findings related to the applicability and effectiveness of this model in various market contexts. Previous studies have shown that FF5F performs better in explaining stock returns compared to previous models, especially in the context of stock markets in various countries, both developed and developing. However, some studies also reveal weaknesses, such as the model's inability to explain certain market anomalies or different performance across different industry sectors (Fama & French, 2018).

The FF5F model has been extensively studied since its introduction, with research focusing on its ability to explain stock returns across different markets. Fama and French demonstrated that the inclusion of profitability and investment factors significantly improves the model's explanatory power. Subsequent studies, such as those by Blitz et al. (2019), have validated these findings in international markets, showing that the FF5F model outperforms earlier models like the Capital Asset Pricing Model (CAPM) and the Fama-French three-factor model. However, several gaps remain in the literature. First, while the FF5F model performs well in developed markets, its effectiveness in emerging markets is less consistent (Fama & French, 2018). Second, the model struggles to explain certain market anomalies, such as momentum and low-volatility effects. Third, there is limited research on how global economic changes, such as financial crises or technological disruptions, impact the model's validity (Hou et al., 2020). Finally, the role of industry-specific factors in the FF5F model remains underexplored (Musawa et al., 2020; Collot & Hemauer, 2021; Ali & Bashir, 2022; Singh & Walia, 2022; Gupta & Sharma, 2022; Kostin et al., 2022; Mandala et al., 2023; Lestari & Ahmar, 2024).

The novelty of our research lies in its comprehensive approach to synthesizing existing literature on the FF5F model while addressing underexplored areas. Unlike previous studies that focus on specific markets or factors, our systematic review will provide a holistic view of the model's applicability across diverse contexts. Additionally, we will explore the impact of global economic changes and industry-specific factors, which have received limited attention in prior research. This approach will not only fill existing gaps but also offer practical insights for investors and policymakers.

Our research aims to address these gaps by conducting a systematic literature review that synthesizes existing findings and identifies areas where the FF5F model can be improved. Specifically, we will analyze the model's performance in emerging markets, its ability to explain market anomalies, and its adaptability to global economic changes. This positions our research as state-of-the-art, building on previous studies while offering new insights into the model's limitations and potential enhancements.

Furthermore, the development of research on FF5F also includes an analysis of the validity and reliability of proposed additional factors, such as profitability and investment, in explaining return variability. Several studies have found that these factors can improve stock return predictability, but with varying levels of significance across markets and time periods. Moreover, there is an ongoing discussion on how these factors influence in the

context of global economic changes and evolving financial market dynamics (Blitz et al., 2019). Thus, the purpose of this analysis is to identify, analyze, and integrate existing findings on the applicability and effectiveness of the Fama-French Five Factor (FF5F) Model in various market contexts through a systematic literature review approach. The results of this literature review are expected to make a significant contribution to the development of financial theory, as well as a guide for investors and policy makers in formulating more effective and efficient investment strategies.

RESEARCH METHOD

The qualitative research methodology used in this study involves several important stages. First, in collecting data, the research will explore various types of literature sources relevant to the theme of portfolio investment taken from the Scopus database. This database was chosen because it provides access to leading academic journals. The selection criteria used to select “the sample” or the literature involves considering the time period of publication, relevance to the fama-french five factor model theme, and credibility of the source. After conducting the selection process using the specific keywords "Fama French", "Five Factor Model", and "Investment" and sorting by years 2015-2024, the research found 27 articles for further review. The search for previously published articles was conducted through online sources such as Google, ScienceDirect, and Emerald. The next process was data analysis, which involved collecting, reviewing and analyzing the selected publications. This analysis technique allowed the researcher to gain deeper insights into the topic under study and gain a rich understanding of the fama-french five factor model issue being studied.

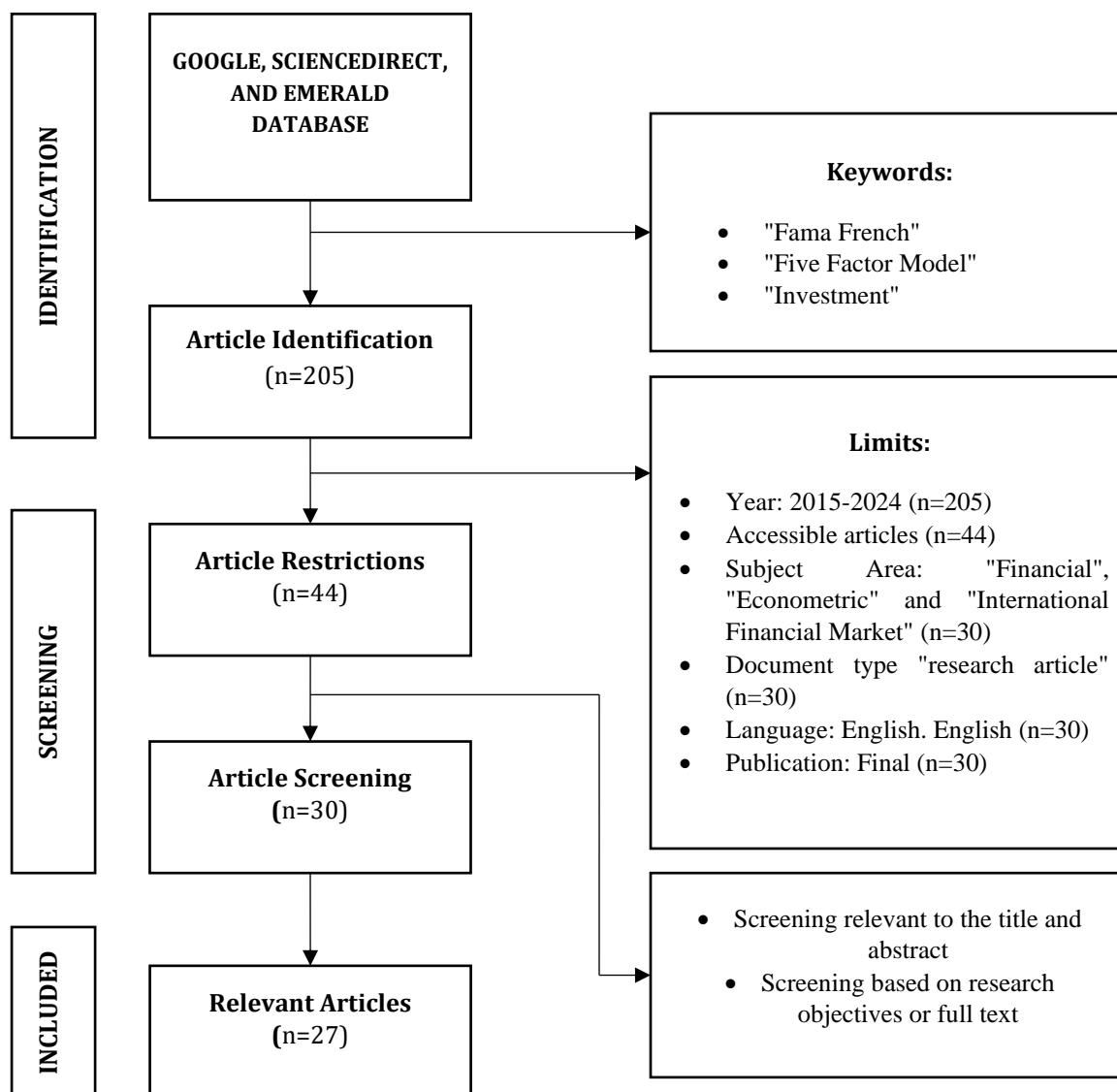
This study also used a systematic literature review and bibliometric analysis (Bartolini et al., 2019; Huang et al., 2020). The procedural phases employed as a benchmark or guide are the PRISMA Protocol, Characterized by identification, screening, and inclusion (Page et al., 2021). The bibliometric analysis procedure starts from Specifying research objectives, formulating research questions, and outlining data collection techniques (Huang et al., 2020). This study combines the systematic stages of SLR and bibliometric analysis because they have similar procedures starting from determining research objectives, formulating research questions, developing search strategies for data collection, and conducting analysis with VosViewer.

RESULTS AND DISCUSSION

The results of searching articles from Google, Sciencedirect, and Emerald literature databases according to the keywords "Fama French", "Five Factor Model", and "Investment" obtained 205 articles (published in 2015-2024) consisting of 44 accessible articles, 30 articles corresponding to the subject areas "Financial", "Econometric", and "International Financial Market", 27 articles with document type "article research", 27 articles in English, 27 articles in Indonesian and English that have been published will be collected and screened for the next stage.

Screened articles were screened by examining the entire text for relevance to the subject of the study. It was obtained that 27 articles were selected for this study. Therefore, based on the research methodology taken from 205 identified research articles, 27 relevant

research articles were used as a literature review study with the flowchart presented figure 1 below.



Source: Data Processed, 2024

Figure 1. PRISMA Flowchart of the Research Data Process

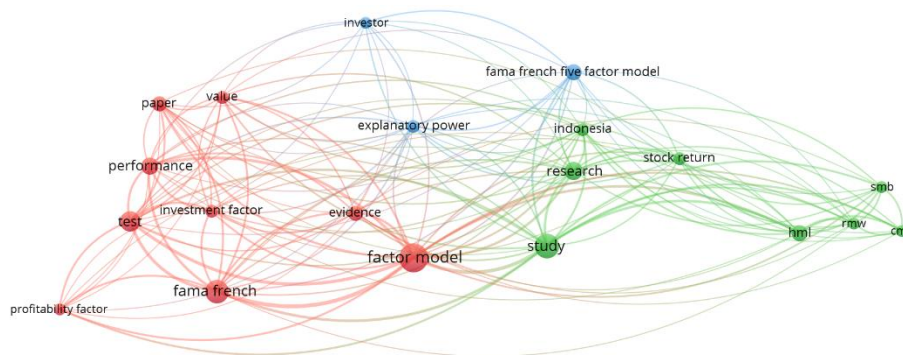
The 23 articles continued with analysis using VosViewer. Network visualization was used to explore research on character education, including recent developments and previous research. In the network visualization, interrelated terms were presented based on previous studies. The visualization consists of 4 clusters. Different colors in Figure 2 indicate clusters of terms, with the most dominant records displayed in the largest nodes. VosViewer makes it easy for readers to observe this visualization. as for the results of VosViewer research related to the Fama French Five Factor Model.

Table 1. Frequency of Number of Articles by Year

| Year | Number of Articles |
|--------------|--------------------|
| 2015 | 0 |
| 2016 | 1 |
| 2017 | 1 |
| 2018 | 8 |
| 2019 | 3 |
| 2020 | 6 |
| 2021 | 1 |
| 2022 | 4 |
| 2023 | 2 |
| 2024 | 1 |
| Total | 27 |

Source: Data Processed, 2024

Based on the article discovery data related to the FF5F Model in Table 1, it can be seen that research on this model has increased significantly since its introduction. No articles were found in 2015. In 2016 and 2017, there was only one article per year, but this number jumped sharply in 2018, with 8 articles. After that, although the number of articles decreased in 2019 (3 articles), interest remained relatively high with 6 articles in 2020. The following years showed fluctuations, with a decrease in 2021 (1 article), then a slight increase in 2022 (4 articles), and relative stability in 2023 with 2 articles. Overall, there are 28 articles showing that the FF5F Model has been a fairly consistent research topic in the academic literature, especially after 2018.



Source: VosViewer Results, 2024

Figure 2. Visualization Results Based on VosViewer

The 79 articles continued with analysis using VosViewer. Network visualization was used to explore research on the Fama-French Five Factor Model. In the network visualization, interrelated terms are presented based on previous studies. The visualization consists of 4 clusters. The different colors in Figure 2 indicate the term clusters, with the most dominant notes displayed in the largest nodes. VosViewer makes it easy for readers to observe this visualization. As for the results of VosViewer research related to the Fama French Five Factor Model.

The results of bibliographic visualization with VOSviewer displayed in this figure show the network of interrelationships between keywords that often appear in related research.

Different colors indicate different groups or clusters of keywords that are strongly related to each other. From the figure, we can identify three main clusters distinguished by color: red, green, and blue. The red cluster seems to be closely related to the concepts of "Fama-French," "performance," and "profitability factor," indicating the focus of research on the Fama-French factor model and investment performance, including factors such as value and profitability.

The green cluster corresponds to concepts such as "study," "stock return," and "SMB," indicating that studies in this group tend to focus on analyzing stock returns and specific factors such as firm size (SMB) and other factors that affect stock returns. This cluster may also include studies that evaluate the relationship between stock returns and other factors in the Fama-French model.

Meanwhile, the smaller blue clusters seem to be associated with keywords such as "Fama French five-factor model," "investor," and "explanatory power." This suggests a focus on the explanatory power of the Fama-French five-factor model in the context of investors and perhaps also in the context of markets in Indonesia. Overall, this visualization indicates that the main topics in the analyzed research relate to factor models in finance, investment performance, as well as factors affecting stock returns, with particular attention to the Fama-French model and its application in various market contexts.

Based on the results of its review of 27 studies published from 2015-2024. The following is a summary of the research studies presented in Table 2.

Table 2. Results of previous research studies 2015 – 2024

| No. | Researcher | Scope | Research Methods | Results |
|-----|----------------------------|--------------------------------|---|--|
| 1 | Altinay (2023) | Borsa İstanbul | Cross-sectional analysis | The FF5F Model has higher explanatory power for smaller companies. |
| 2 | Buditomo (2024) | Indonesian stock market | Multiple regression | Analyze the significance of the 5 FF5 factors in the short and long periods. |
| 3 | Chiah et al. (2016) | Australian stocks (1982-2013). | Cross-sectional analysis. | The FF5F Model explains more anomalies than competing models. Book-to-market remains important. |
| 4 | Cox & Britten (2019) | South African stocks. | Time-series and cross-sectional analysis. | The best measure-value and measure-profitability models for time-series. FF5F Model is best for cross-section. Profitability is more consistent than investment factors. |
| 5 | Dirkx & Peter (2018) | CDAX Constituents | Cross-sectional analysis | The FF5F Model does not add significant explanatory power compared to the three-factor model. |
| 6 | Dolarin et al. (2020) | Not applicable. | Cross-sectional analysis. | The FF5F Model explains most of the variation (54%) but only slightly more than the three-factor model. |
| 7 | Ekaputra & Sutrisno (2020) | Iranian stocks. | GRS test with different portfolio construction. | The three-factor model performed better. Profitability and investment factors do not improve performance. |
| 8 | Foye (2018a) | Emerging markets. | Cross-sectional analysis. | The FF5F Model provides a better explanation of stock returns in Eastern Europe and Latin America compared to the Three-Factor Model, but fails to do so in Asia |
| 9 | Foye (2018b) | UK equity returns | Cross-sectional analysis | The FF5F Model adjusted for gross profit improves the description of UK return on equity. |
| 10 | Guo (2024) | US stock market | Durbin-Watson test, correlation matrix, sub-period analysis | The FF5F Model has stronger explanatory power than the three-factor model. |
| 11 | Jan & Job (2019) | Indonesian and | Cross-sectional analysis. | The FF5F Model does not outperform the three-factor model. The book-to-market factor remains important in both markets. |

| | | | | | |
|----|--|------------------------------|----|-------------------------------------|---|
| | | Singaporean stocks. | | | |
| 12 | Leite et al. (2020) | US Data | | Macroeconomic variables and factors | Inflation innovation explains the cross-section of returns better than the FF5F Model. |
| 13 | Li & Duan (2021) | 30 industry portfolios | US | OLS estimation | The FF5F Model shows an increase in efficiency during COVID-19. |
| 14 | Liammukda et al. (2020) | Japan | | Time-varying coefficient model | Can capture the different effects at different times of the 5 factors, in contrast to the traditional FF5. Shows time-varying coefficients across all factors and portfolios. |
| 15 | Liu & Wang (2019) | - | | CO-AR estimation. | The FF5F Model captures lower average returns on small stocks, supporting market efficiency (contradicting Fama & French). |
| 16 | Mollaahmetoğlu (2020) | DAX30 and BIST30 indices | | Cross-sectional analysis | The FF5F Model is not robust for the DAX30, the four factor model is better for the BIST30. |
| 17 | Mosoeru & Kodongo (2022) | Emerging markets. | | GRS test. | Profitability factors are most useful. The FF5F Model performs less well on country-specific portfolios. |
| 18 | Musawa et al. (2018a) | Zambian stocks. | | Cross-sectional analysis. | FF5F Model explains variation in stock returns. Implications for cost of equity calculations. |
| 19 | Musawa et al. (2018b) | Zambia stock market | | Multiple regression | FF5 is better than CAPM in capturing variations in stock returns. |
| 20 | Oyedeko (2023) | Nigerian stock market | | Fama-MacBeth two-stage regression | The FF5F model has a higher moment and the CoFF5F model is superior to the FF5F model. |
| 21 | Ozkan (Istanbul Stock Exchange) (2018) | Turkish Stocks (2009-2015). | | Time-series analysis and GRS test. | The FF5F Model explains return variation, but factor returns are lower than the US. No mispricing was found. |
| 22 | Saleh (2020) | Indonesia's financial sector | | Multiple regression | Comparing CAPM, FF3, and FF5 in the financial sector, we found that FF5 has lower explanatory power than FF3. |
| 23 | Sutedja & Wijaya (2022) | Kompas100 Index Indonesia | | OLS multiple regression | FF5F Plus Momentum has a higher explanatory power than FF5F. |
| 24 | Wijaya (2018) | LQ-45 Index Indonesia | | Panel data multiple regression | Confirmation of the significant and negative influence of market factors on size and investment, but profitability is not significant. |
| 25 | Zada (2018) | Pakistan stocks (2000-2013). | | Fama-Macbeth two-stage regression. | The FF5F Model is suitable for explaining variations in risk-adjusted time-series portfolios. |
| 26 | Zhang (2022) | US stock market | | Cross-sectional analysis | The FF5F Model has a better degree of fit during the pandemic. |
| 27 | Zhang et al. (2018) | China stock market | | Multiple regression | Proving the viability of FF5 in the Chinese stock market, but its explanatory power is lower than FF3. |

Source: Processed Data, 2024

DISCUSSION

The Fama and French Five-Factor Model (FF5FM) introduced in 2015 is an extension of the earlier Fama and French Three-Factor Model (FF3FM). This model integrates two additional factors, namely profitability (RMW) and investment (CMA), into the existing framework involving market, firm size, and book-to-market value. In a study by Chiah et al. (2016), the five-factor model is shown to be superior in explaining various asset pricing anomalies compared to its competitors, especially in the context of Australian equities, indicating the superiority of the model in asset pricing in that market. Interestingly, this study also shows that while the book-to-market (HML) factor still has explanatory power, it remains relevant despite the addition of profitability and investment factors.

Another study conducted by Cox and Britten (2019) tested the effectiveness of the five-factor model in explaining returns on the Johannesburg Stock Exchange. They found that the five-factor model was better at explaining cross-return variation compared to the traditional three-factor model. Although both profitability and investment factors contributed significantly to the model, the profitability factor proved to be more consistent than the investment factor. This suggests that the addition of such factors does add value in explaining stock returns in the South African market.

However, not all studies show results consistent with these conclusions. Mosoeu and Kodongo (2022) find that in the context of emerging equity markets, the profitability factor is the most useful for explaining cross variation. However, the five-factor model was found to be poor at handling country-specific and geographically diversified portfolios, tested using the Gibbons-Ross-Shanken (GRS) test. These results are consistent with other studies using data from Australia, China, and South Africa, but differ from those examining data from the United States and Japan.

In another emerging market context, Foye (2018a) evaluated the performance of this five-factor model in emerging equity markets such as Eastern Europe and Latin America, where it consistently outperformed the three-factor model. However, it fails to provide a better description of equity returns in the Asian region, where profitability or investment premiums cannot be distinguished. These findings suggest that the effectiveness of the five-factor model may vary depending on the specific characteristics of the market under study. Research by Nguyen (2016) provides a more comprehensive overview of the effectiveness of asset pricing models, including the CAPM, the three-factor model, and the five-factor model. Although the five-factor model had the highest R-square value, its additions were not significant in explaining stock returns. The additional factors, profitability (RMW) and investment (CMA), were not significant in explaining the variation in stock returns, indicating that while the five-factor model offers a more complex framework, these factors may be less effective in improving the explanatory ability of the model.

In the context of the Indonesian market, Jan and Ayub (2019) conducted research on Fama and French's three-factor (FF3) and five-factor (FF5) models for the Indonesian and Singapore markets. They found that the FF5 model did not perform better in explaining portfolio excess returns compared to FF3. The study also shows that the book-to-market (HML) factor is not redundant in both markets despite the presence of profitability and investment factors. These results are consistent for equal-weighted and value-weighted portfolios, as well as for various factor construction methods. In a contemporary study by Buditomo (2024), inconclusive results were found regarding the significance of these five model factors, with results varying depending on shorter and longer observation periods. The SMB and CMA factors show mixed correlations with portfolio excess returns, underscoring the complexity in applying this five-factor model in the Indonesian market.

CONCLUSION

The results show that the Fama and French Five-Factor Model has been a consistent research topic in the academic literature, especially since 2018. Of the 205 articles identified, 27 were selected for in-depth analysis. Visualization results with VOSviewer revealed three main clusters covering research on investment performance, stock returns, as well as the explanatory power of the model. The research shows that while the FF5F Model has excelled in explaining variations in stock returns in some markets, such as Australia and South Africa, its effectiveness varies depending on the characteristics of the

markets studied. In the Indonesian market, for example, the results show that it is not always superior to the previous three-factor model.

RECOMMENDATIONS

This research implies that the FF5F Model may not be fully appropriate for all markets or portfolio types, especially in developing countries or markets with specific characteristics. This emphasizes the need to adapt the model or even develop a more contextualized model for various markets. Suggestions for future research are to conduct more in-depth studies in various markets with different characteristics, as well as consider longer and shorter observation periods to explore the long- and short-term dynamics of the factors in this model. In addition, researchers can explore combining the FF5F model with other variables that may be more relevant in certain contexts to improve its explanatory power for stock returns in various markets.

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