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Original Article

Evolution of the Fama and French Model in Measuring Market Risk: "From Three to Six"

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Abstract: *This research aims to examine the evolution of Fama and French's three- to six-factor models and analyze the most significant factors influencing stock Excess Returns. Through a Systematic Literature Review (SLR), it was found that among the six factors analyzed, the Market Risk Premium (MRP) factor and the Up Minus Down (UMD) factor had the most significant influence. In contrast, the Conservative Minus Aggressive (CMA) factor had the least impact. This research includes studies from various countries with the largest contributions from China, Indonesia, and the United States. Bibliographic analysis shows common topics such as the five-factor model, asset price anomalies, and portfolio investment. This research proves that Fama and French's contributions are global, with many articles indexed in international and national journals.*

Keywords*: Fama and French Models, Market Risk, Measurement, Systematic Literature Review.*

I. INTRODUCTION

In investors' efforts to achieve long-term financial goals and sustainably build wealth, stock investment is an important choice. Famous investor Warren Buffett said, "Risk comes from not knowing what you're doing" (Buffett & Cunningham, 2018). In addition to offering the potential for greater returns than other types of investment, shares also allow investors to contribute to business and economic growth. A famous writer, Burton Malkiel, said, "The stock market is a tool for sending money from people who are not sick to people who are sick" (Malkiel, 2019), emphasizing that long-term investing requires patience. Stocks can generate long-term wealth and protect the value of investments from inflation, as stated by Jeremy Siegel in his famous book, "In the long run, stocks are the best investment" (Siegel, 2014).

Additionally, investing in shares reduces overall risk and allows for better portfolio diversification. As shown by the study conducted by Dimson et al. (2020), shares have a strong track record of generating competitive returns compared to other investment instruments. This shows that shares are an important component of a successful investment strategy (Dimson et al., 2020).

Investing in shares requires careful analysis to understand the components that influence asset returns. The Fama-French model is very useful for this analysis because it can find systematic risk components that influence share value in the capital market. The Fama-French model allows investors to select stocks that suit their risk profile and investment goals and manage their portfolios more efficiently to achieve expected returns. The first model that linked return and risk was the Capital Asset Pricing Model (CAPM) before Fama and French (1992), introduced by Sharpe and Lintner (1964), Stattman (1980), Banz (1981), Bhandari (1983), Basu (1983) and Rosenberg et al. (1985). In general, these researchers continue Markowitz's modern portfolio theory. Many researchers focused on the CAPM model after its introduction. Although the CAPM is widely used in academic and empirical studies, the results of empirical studies emphasize that the CAPM is largely inadequate for explaining stock returns. In the CAPM model, only systematic risk, namely market beta, determines the return of an asset. The expected return of risky assets is positively correlated with beta.

Over the years, many researchers have competed to develop this method because researchers realized that other explanation factors could explain stock returns in addition to beta. In the end, researchers succeeded in developing a different asset forecasting model. One of the researchers who contributed to the development of this method was Fama & French (1992), who presented the empirical three-factor model (FF3F), which includes company size factors (small minus big, SMB) and book value to market value (high minus low, HML) apart from market risks. The results show that FF3F better explains variations in stock returns than CAPM (E. F. Fama & French, 2020)

The Fama and French model underwent development from three factors to five factors in 2015, which added two new factors, namely profitability (robust minus weak, RMW) and investment (conservative minus aggressive, CMA), to capture variations in profitability and investment policy Company (E. F. Fama & French, 2020). Once a five-factor model, it has evolved significantly to a six-factor model in 2018, indicating a greater degree of difficulty in understanding capital market returns. Apart

from taking into account market factors, company size, book value to market value, profitability and investment, the six-factor model also takes into account momentum (winners minus losers, WML) (F. E. Fama & French, 2018), based on research showing that stocks have good performance in the past tend to keep up their good work in the future. The Momentum Factor has been empirically proven to be an important component in explaining market behavior. By combining these factors, financial analysts can better discover and measure variations in asset returns. In this literature review, we will investigate the development of the Fama and French Three Factor Model (FF3F), Fama and French Five-Factor Model (FF5F) and Fama and French Six Factor Model (FF6F). The analysis was carried out by investigating various sources of scientific publications from various countries. The important argument for various countries is to know that the Fama and French model is consistently a suitable model for analyzing market risk so that the output can be used as a guide for investors in making transactions in the capital market.

II. LITERATURE REVIEW

A) Definition of Market Risk

When market prices shift in a way that is harmful to the company, market risk results. Market risk is a condition that a business faces as a result of events and circumstances beyond its control and changes in the market. Because it affects the entire organization and is all-encompassing, market risk is also known as comprehensive risk. For example, the world economic crisis in the 1930s, the Indonesian economic crisis in 1997 and 1998, the coup d'tat that occurred in the Philippines when People Power took over President Marcos until Corazon Aquino became president, the United States in 2007 Subrime Mortgage case, Thailand is when the Central Bank of Thailand carried out a Bath devaluation which caused shocks to the Thai economy as a whole, the Gulf war which caused several countries in the Middle East region such as Iraq and Kuwait to experience economic shocks, and various other comprehensive cases.

B) Forms of Market Risk

a. General market risk (market risk in general) This general market risk is experienced by all companies and is caused by a policy carried out by a related institution where this policy is able to have an influence on all business sectors. For example, when the central bank of a country implements a tight policy money policy (tight money policy) with various instruments such as increasing the BI rate. Where the policy of increasing the BI rate will have a comprehensive impact on all business sectors related to interest rate-related instruments (various instruments related to interest rates), one of the mutually urgent parties which is considered to be directly related to the interest rate-related instrument is banking. That way, they take out credit and deposit some of the money in the bank.
b. Particular risk associated with the market Specific market risk is a type of risk that is limited to one industry or area of the company and is not all-encompassing. For example, Statements made by an evaluation organization that is well-known and has earned the public's respect that they announced that PT. So, on this news, the company's shares and bonds immediately fell. And the fall in the company's shares and bonds was not followed by other companies. One of the companies where the management or commissioners of the company were involved in extraordinary criminal acts and were exposed by various media. So, public opinion has been formed that the company is bad and bad.

III. RESEARCH METHOD

This qualitative research uses the Systematic Literature Review (SLR) method. Qualitative methods do the opposite. This differs from quantitative approaches, which typically use deductive patterns by investigating theories about a particular topic. Research that relies mostly on qualitative tools such as descriptive analysis rather than high-level statistical methods is referred to as qualitative (Strijker et al., 2020). This research conducts a thorough review of previous publications and performs related descriptive analysis, which makes it fall into the category of qualitative research. Mapping the results in this research uses Excel and VOSviewer software applications to carry out analysis and help create a visual representation that displays the most prominent authors and frequently cited references in sample articles in bibliometric analysis (Ardito et al., 2019).

The database used to search for reference articles was taken from Semantic Scholar and Taylor and Francis using the keywords "Fama and French Three Factor Model", "Fama and French Five Factor Model", and "Fama and French Six Factor Model". Some of the article selection criteria used for research references include limiting the article research year to 2018-2024, choosing articles that are open access, and choosing quantitative journals to get the number of articles that are ready to be used as research references, namely 41 articles. To facilitate the synthesis of the content of literature samples included in the preparation of the SLR, the researcher used Microsoft Excel by mapping the number, name of the researcher, title of researcher, country of research, empirical test results for each variable, and journal index. Next, a Research Question (RQ) was prepared to clarify the objectives of this research. The questions are structured as follows:

RQ 1: What are the empirical test results of each variable in the Fama and French Three Factor Model that the author has researched in the article used as a reference?
RQ 2: How many countries are the research sources from the Fama and French Three Factor Model?

RQ 3: What are the empirical test results of each variable in the Fama and French Five-Factor Model that the author has researched in the article used as a reference?
RQ 4: How many countries are the research sources from the Fama and French Five-Factor Model?
RQ 5: What are the empirical test results of each variable in the Fama and French Six Factor Model that the author has researched in the article used as a reference?
RQ 6: How many countries are the research sources from the Fama and French Six Factor Model?
RQ 7: What journal indexes are used as references?
RQ 8: How many clusters are formed from the bibliometric results of the journals used as references?

Articles identified via database search: search keywords: "Fama and French Three Factor Model", "Fama and French Five Factor Model", and "Fama and French Six Factor Model". Semantic Scholar was 60 articles, and Taylor and Francis Online was 5 articles. The total sample was 65 and should be eliminated by 24. By screening the limitation of the research year to 2018-2024, choose a journal that has full access and a quantitative journal has collected 41 articles.

IV. RESULTS AND DISCUSSION

Fama and French's research is one of the important milestones in the world of modern finance. They change the way we understand stock market behavior and how stock prices are reflected in certain factors. The following is the mapping results from research on the Fama and French Three Factor Model, Fama and French Five Factor Model and Fama and French Six Factor Model:

A) Fama and French Three Factor Model (FF3F)

In 1992, Eugene Fama and Kenneth French introduced the three-factor model or what is usually called the Fama and French Three Factor Model (FF3F). This model expands existing financial asset pricing models, which generally only take into account systematic risk or beta. The first factor in the Fama and French Three Factor Model (FF3F) is proxied by Market Risk Premium (MRP) by including two additional factors: company size (size), which is proxied by Small Minus Big (SMB) and the book-to-market ratio which is proxied with High Minus Low (HML). The following is a mapping based on empirical test results (Table 1) for these three factors:

Table 1. Mapping of Articles Based on Empirical Test Results- Fama and French Three Factor Model (FF3F)

Empirical Test Results	Researchers (years)		
	MRP	**SMB**	**HML**
Positive Influence	(Ragab et al., 2019), (Subroto & Setyawan, 2021), (H. Chen, 2022) (Y. Zhang, 2023), (Gao, 2023), (Nuri Rohuma, 2022), (Khoa & Huynh, 2023), (Anuno et al., 2023), (Z. Wang, 2022), (Tondok et al., 2022), (Rahayu & Zahro, 2022), (Alqadhib et al., 2022), (Ewald et al., 2022)	(Ragab et al., 2019), (H. Chen, 2022), (Y. Zhang, 2023), (J. Chen, 2023), (Gao, 2023), (Nuri Rohuma, 2022), (Z. Wang, 2022), (Tondok et al., 2022), (Rahayu & Zahro, 2022), (Alqadhib et al., 2022), (Ewald et al., 2022)	(Ragab et al., 2019), (H. Chen, 2022), (Y. Zhang, 2023), (J. Chen, 2023), (Gao, 2023), (Nuri Rohuma, 2022), (Z. Wang, 2022), (Alqadhib et al., 2022), (Ewald et al., 2022)
Negative Influence	NA	(Khoa & Huynh, 2023), (Anuno et al., 2023), (Wedagama et al., 2022)	(Khoa & Huynh, 2023), (Anuno et al., 2023), (Tondok et al., 2022)
No Effect	(J. Chen, 2023), (Wedagama et al., 2022)	(Subroto & Setyawan, 2021)	(Subroto & Setyawan, 2021), (Wedagama et al., 2022), (Rahayu & Zahro, 2022)

Source: *Author's Processed Data 2024*

Next, the article samples were mapped based on the research-source country using the Fama and French Three Factor Model (FF3F). Based on the reference sources studied, there were a total of 15 countries where the research was conducted, consisting of 2 articles from the United States, 3 articles from China, 4 research articles from Indonesia, 1 from Malaysia, 1 from Egypt, 1 from Timor Leste and 1 from Vietnam.

B) Fama and French Five-Factor Model (FF5F)

In 2015, Fama and French introduced the five-factor model by adding the profitability factor. The profitability factor is proxied by Robust Minus Weak (RMW), and the investment factor is proxied by Conservative Minus Aggressive (CMA). RMW is a variable that describes the risk factor on the level of return related to the company's profitability, which can be measured by the Return On Equity (ROE) value. The investment factor proxied by Conservative Minus Aggressive (CMA) can be measured using Asset Growth to see the risk in the growth of the Company's assets and investments. The following is a mapping based on empirical test results and research source countries from FF5F, which consists of Market Risk Premium (MRP), Small Minus Big (SMB), High Minus Low (HML), Robust Minus Weak (RMW) and Conservative Minus Aggressive (CMA) in Table 2 as follow:

Table 2. Mapping Of Articles Based On Empirical Test Results- Fama and French Five-Factor Model (FF5F)

Empirical Test Results	Researchers (years)				
	MRP	**SMB**	**HML**	**RMW**	**CMA**
Positive Influence	(Jan & Ayub, 2019), (Z. Zhang et al., 2022), (Martinez-Blasco et al., 2023), (W. Huang et al., 2023), (Tondok et al., 2022), (Alqadhib et al., 2022), (Grobys et al., 2024), (Khudoykulov, 2020)	(Jan & Ayub, 2019), (Z. Zhang et al., 2022), (Martinez-Blasco et al., 2023), (W. Huang et al., 2023),(Azam, 2023), (Tondok et al., 2022), (Alqadhib et al., 2022), (Grobys et al., 2024), (Sharma et al., 2022), (Lu et al., 2024)	(Jan & Ayub, 2019), (Z. Zhang et al., 2022), (W. Huang et al., 2023), (Azam, 2023), (Alqadhib et al., 2022), (Grobys et al., 2024), (Sharma et al., 2022), (Lu et al., 2024)	(Jan & Ayub, 2019), (Liu, 2020), (Z. Zhang et al., 2022), (W. Huang et al., 2023), (Azam, 2023), (Grobys et al., 2024), (Lu et al., 2024)	(Jan & Ayub, 2019), (Li et al., 2021), (Z. Zhang et al., 2022), (Martinez-Blasco et al., 2023), (Grobys et al., 2024), (Sharma et al., 2022)
Negative Influence	(Sharma et al., 2022), (Lu et al., 2024)	(Liu, 2020), (Wedagama et al., 2022), (Khudoykulov, 2020)	(Liu, 2020), (Martinez-Blasco et al., 2023), (Tondok et al., 2022)	(Martinez-Blasco et al., 2023), (Tondok et al., 2022), (Alqadhib et al., 2022)	(Liu, 2020), (Tondok et al., 2022), (Lu et al., 2024)
No Effect	(Ragab et al., 2019), (Liu, 2020), (Li et al., 2021), (Azam, 2023), (Wedagama et al., 2022)	(Ragab et al., 2019), (Li et al., 2021)	(Ragab et al., 2019), (Li et al., 2021), (Wedagama et al., 2022), (Khudoykulov, 2020)	(Ragab et al., 2019), (Li et al., 2021), (Wedagama et al., 2022), (Sharma et al., 2022), (Khudoykulov, 2020)	(Ragab et al., 2019), (W. Huang et al., 2023), (Azam, 2023), (Wedagama et al., 2022), (Alqadhib et al., 2022), (Khudoykulov, 2020)

Source: *Author's Processed Data 2024*

From the results of the article mapping based on the empirical test results in Table 2, the Small Minus Big (SMB) factor, which is a proxy for company size, is able to explain Excess stock returns well for other factors that have a significant positive influence, namely the Market Risk Premium (MRP) factor. The Conservative Minus Aggressive (CMA) factor, which proxies the company's investment, obtained insignificant results in this case, and it can be concluded that the Conservative Minus Aggressive (CMA) factor is not able to explain stock Excess Returns well. The following is a mapping based on empirical test results and research source countries from FF5F, which consists of Market Risk Premium (MRP), Small Minus Big (SMB), High Minus Low (HML), Robust Minus Weak (RMW) and Conservative Minus Aggressive (CMA). Suppose the mapping results of the number of research source countries in the Fama and French Three Factor Model are dominated by Indonesia. In that case, this is different from the mapping results in the Fama and French Five Factor Model, where the United States dominates the country of origin of the research with a total of 3 articles, 2 articles from China, 2 from Europe, 2 from Indonesia and 2 from Pakistan, then 1 article from Arabic, 1 from Egypt and 1 from Spain and 1 article from India. So, if you combine the research source countries on the Fama and French Five-Factor Model (FF5F), there are 15 articles.

C) Fama and French Six Factor Model (FF6F)

In 2018, Fama and French announced the addition of a sixth factor, namely Momentum (MOM); the Momentum factor (MOM), according to research by Fama and French (2018), is the result of stock return calculations, which are updated monthly. The Momentum Factor (MOM), which is proxied by UMD (Up Minus Down), is a factor that measures the tendency of stock prices to continue moving in the same direction as the previous trend. The following is a mapping based on empirical test results and research source countries from FF6F, which consists of Market Risk Premium (MRP), Small Minus Big (SMB), High Minus Low (HML), Robust Minus Weak (RMW), Conservative Minus Aggressive (CMA) and UMD (Up Minus Down):

Table 3. Article Mapping Based on Empirical Test Results- Fama and French Six Factor Model (FF6F)

Empirical Test Results	Researchers (years)					
	MRP	**SMB**	**HML**	**RMW**	**CMA**	**MOM**
Positive Influence	(T. L. Huang, 2019), (Munawaroh & Sunarsih, 2020), (Azizi et al., 2020), (Roy & Shijin, 2018), (Van Meetelen, 2019), (Doğan et al., 2022), (Dirkx & Peter, 2020), (Hou et al., 2019), (S. Wang, 2020), (Younus, 2022), (Goo & Wang, 2024)	(T. L. Huang, 2019), (Azizi et al., 2020), (Roy & Shijin, 2018), (de Carvalho et al., 2021), (Van Meetelen, 2019), (Doğan et al., 2022), (Maciel et al., 2021), (S. Wang, 2020), (Younus, 2022), (Goo & Wang, 2024)	(Munawaroh & Sunarsih, 2020), (Azizi et al., 2020), (Roy & Shijin, 2018), (de Carvalho et al., 2021), (Doğan et al., 2022), (Maciel et al., 2021), (Hou et al., 2019), (S. Wang, 2020), (Younus, 2022), (Goo & Wang, 2024)	(Azizi et al., 2020), (Nagy & Dezméri, 2022), (Roy & Shijin, 2018), (Van Meetelen, 2019), (Doğan et al., 2022), (Ayub et al., 2020), (Hou et al., 2019), (S. Wang, 2020), (Younus, 2022), (Goo & Wang, 2024)	(Munawaroh & Sunarsih, 2020), (Azizi et al., 2020), (Nagy & Dezméri, 2022), (Roy & Shijin, 2018), (Doğan et al., 2022), (S. Wang, 2020), (Younus, 2022), (Goo & Wang, 2024)	(Munawaroh & Sunarsih, 2020), (Azizi et al., 2020), (Nagy & Dezméri, 2022), (Roy & Shijin, 2018), (Van Meetelen, 2019), (Doğan et al., 2022), (Dirkx & Peter, 2020), (Hou et al., 2019), (Younus, 2022), (Goo & Wang, 2024)
Negative Influence	(Nagy & Dezméri, 2022), (de Carvalho et al., 2021), (Maciel et al., 2021)	(Nagy & Dezméri, 2022)	(T. L. Huang, 2019), (Nagy & Dezméri, 2022)	(T. L. Huang, 2019)	(T. L. Huang, 2019)	(T. L. Huang, 2019)
No Effect	(Ayub et al., 2020)	(Munawaroh & Sunarsih, 2020), (Dirkx & Peter, 2020), (Ayub et al., 2020), (Hou et al., 2019)	(Van Meetelen, 2019), (Dirkx & Peter, 2020), (Ayub et al., 2020)	(Munawaroh & Sunarsih, 2020), (de Carvalho et al., 2021), (Maciel et al., 2021), (Dirkx & Peter, 2020)	(de Carvalho et al., 2021), (Van Meetelen, 2019), (Maciel et al., 2021), (Dirkx & Peter, 2020), (Ayub et al., 2020), (Hou et al., 2019)	(de Carvalho et al., 2021), (Maciel et al., 2021), (Ayub et al., 2020), (S. Wang, 2020)

Source: *Author's Processed Data 2024*

From the results of the article mapping based on the empirical test results in Table 3, the Market Risk Premium (MRP) factor dominates the empirical evidence with a significant influence and the Momentum (MOM) factor, which is proxied by UMD (Up Minus Down) is also no less significant. The Conservative Minus Aggressive (CMA) factor is the factor that has the least influence on stock Excess Returns compared to other factors. The source countries for research on the Fama and French Six Factor Model (FF6F) in the picture above are quite varied, where China dominates with 3 articles, while there are 2 articles from Pakistan and Turkey, and 1 article each from the United States, Brazil, Germany, Indonesia, Iran, Poland, Taiwan and the European Union. The total number of articles categorized based on research country sources is 15 articles.

Research related to Fama and French has been widely studied in international journals with the Scopus index. A total of 28 articles were included in the quartile category, including journal quartile 1 (Q 1) with 6 articles with the authors: (Ewald et al., 2022), (Martinez-Blasco et al., 2023), (T. L. Huang, 2019), (Roy & Shijin, 2018), (Hou et al., 2019) and (S. Wang, 2020). Journal Quartile 2 (Q 2) with 9 articles written by: (Subroto & Setyawan, 2021), (Nuri Rohuma, 2022), (Anuno et al., 2023), (Z. Wang, 2022), (Jan & Ayub, 2019), (Grobys et al., 2024), (Khudoykulov, 2020), (Lu et al., 2024), (Ayub et al., 2020). There are 9 articles indexed in Quatile 3 (Q 3), namely the results of research articles from (Ragab et al., 2019), (Khoa & Huynh, 2023), (Wedagama et al., 2022), (Alqadhib et al., 2022), (Li et al., 2021), (Sharma et al., 2022), (Azizi et al., 2020), (Doğan et al., 2022),

(Goo & Wang, 2024). The research of (Nagy & Dezméri, 2022), (de Carvalho et al., 2021), (Maciel et al., 2021) and (Dirkx & Peter, 2020) is included in the journal Quartile 4 (Q 4). Apart from being indexed in quartile journals, there are also several studies originating from international journals that are not indexed in quartile journals (international non Q), 10 articles consisting of: (H. Chen, 2022), (Y. Zhang, 2023), (J . Chen, 2023), (Gao, 2023), (Liu, 2020), (Z. Zhang et al., 2022), (W. Huang et al., 2023), (Azam, 2023), (Van Meetelen, 2019), (Younus, 2022). Likewise, research in Indonesia by many researchers is carried out in journals of national repute, which are indexed in Sinta 2 (S 2) (Rahayu & Zahro, 2022) (Munawaroh & Sunarsih, 2020) and which are indexed in Sinta 3 (S 3), namely (Tondok et al., 2022).

D) Analisisis Bibliometric.

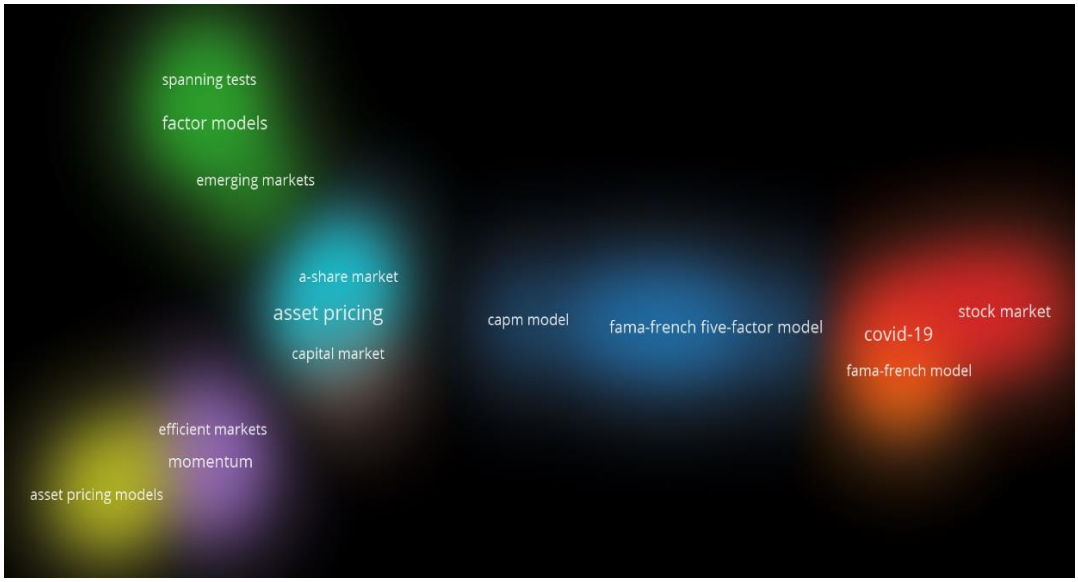

Figure 1. *Density Vizualitation* publikasi Fama and French

Source: *Author's Processed Data 2024*

The density visualization of research on Fama and French is shown in Figure 1. The color of the density visualization shows that the brighter the yellow color and the larger the circle diameter of a term, the more often the term appears. This means that interest in the term is increasing. The number of studies on the term decreases as the color of the term fades and approaches the background color.

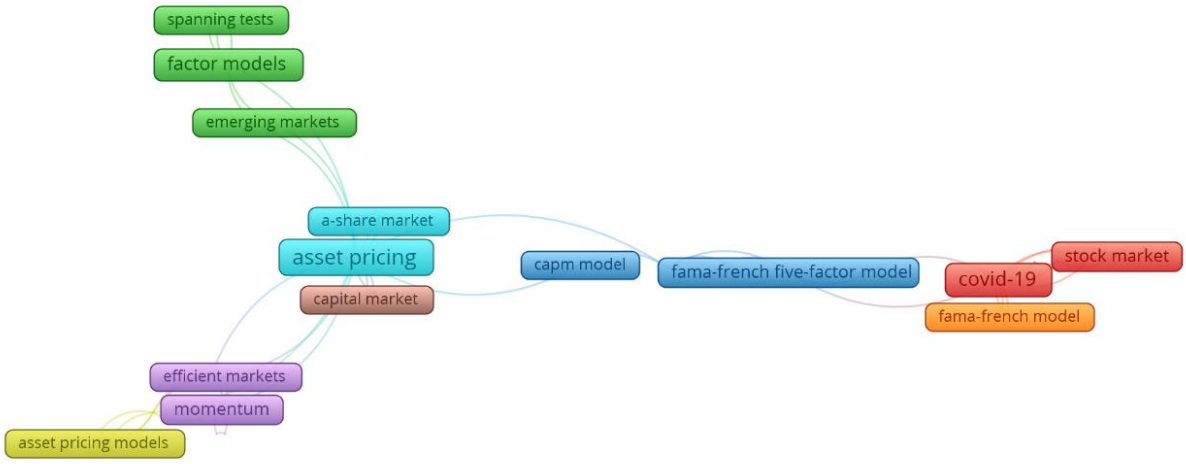

Figure 2. Network Visualization Fama and French Publication

Source: *Author's Processed Data 2024*

Keyword co-occurrence analysis examines author keywords to identify relevant trends in evidence that are already accessible for knowledge dissemination (Donthu et al., 2021). The keywords the author chooses are highly illustrative indicators

of the subject matter of the paper or the relevance of the article to the research question. The co-occurrence of author keywords may indicate that the documents share the same research theme, which may indicate general patterns in field research (Ardito et al., 2019). As a result, in Figure 2, the author has also used the author's keyword analysis to determine the direction of research on Fama and French from various factors. First, the author extracted author keywords from 41 relevant articles; then, using VOSviewer, the author built a network of author keywords. For this analysis, we need 'at least one co-occurring keyword. 42 keywords meet the criteria, of which the 42 keywords form 8 clusters. The following table shows the distribution of clusters in research analysis mapping regarding Fama and French and other factors obtained from research articles.

Table 4. Cluster Mapping Analysis

Cluster	Color	Total	Keywords
1	Red	8	Covid-19, Fama and French five-factor model, fama french five-factor, mutual fund performance, portfolio investment, Saudi Arabia, service industry, stock market
2	Green	8	Asset pricing anomalies, emerging markets, factor models, financial integration and pricing factors, spanning tests, the investment capm, valuation theory
3	Dark Blue	7	Brousseau five-factor model, capm model, carhart four-factor model, fama-french five-factor, fama-french three-factor, portfolio risk premium, us industries
4	Light Blue	4	Asset pricing models, Fama and French 5 factor, forecasting, stock markets
5	Purple	5	Efficient markets, momentum, multi-factor asset pricing, volatility effect, warsaw stock exchange
6	Yellow	4	A-share market, asset pricing, empirical research, five-factor model
7	Orange	3	Fama-french model, fun industry, us stock market
8	Brown	3	Capital market, the Chinese stock market, the fama and french

Source: *Author's Processed Data 2024*

V. CONCLUSION

This research aims to describe the evolution of Fama and French's research from three factors to five factors and then to six factors and analyze which factors work most significantly in influencing stock Excess Returns. Fama and French's research was a milestone in the world of contemporary finance. They change the way we look at stock market behavior and how the six factors consisting of Market Risk Premium (MRP), Small Minus Big (SMB), High Minus Low (HML), Robust Minus Weak (RMW), Conservative Minus Aggressive (CMA)) and UMD (Up Minus Down) affect stock prices. The results of data mapping from empirical evidence studied through a Systematic Literature Review (SLR) show that among the six Fama and French factors resulting from research from various parts of the world, the most significant influence is the Market Risk Premium (MRP) and UMD (Up Minus Down) factors.) while the least influential factor is Conservative Minus Aggressive (CMA). Most research was conducted from China, 8 researchers, 7 research from Indonesia and 6 research from the United States, totaling less than 5 research conducted in Pakistan, Arabia, Europe, Egypt, Turkey, Brazil, Germany, India, Iran, Malaysia, Norway, Poland, Spain, Taiwan, Timor Leste, European Union and Vietnam. Fama and French's research is proven to be global because, based on the results of journal index mapping, there are 28 articles indexed in Quartile 1 to 4 journals and 10 journals in the International non-Q category, as well as 3 national articles indexed in the journals Sinta 3 and Sinta 2. Topics that often appear in Fama and French's research are the French five-factor model, asset pricing anomalies, multi-factor asset pricing, and investment portfolios, which can be seen from the results of the bibliographic analysis of Density Visualization and Network Visualization. This research provides significant benefits for further research, the academic world, and stakeholders. For further research, this research provides a strong basis for developing or modifying asset pricing models based on the evolution of the Fama and French models. In the academic world, this research enriches the financial literature with empirical evidence about the factors that influence stock Excess Returns, as well as inspiring further studies on asset price anomalies and portfolio investment. For stakeholders, the findings of this research provide practical guidance for investment managers and financial analysts in making more effective decisions, as well as assisting regulators and policymakers in understanding complex market dynamics to develop better policies.

VI. REFERENCES

[1] Alqadhib, H., Kulendran, N., & Seelanatha, L. (2022). Impact of COVID-19 on mutual fund performance in Saudi Arabia. *Cogent Economics and Finance*, *10*(1). https://doi.org/10.1080/23322039.2022.2056361

[2] Anuno, F., Madaleno, M., & Vieira, E. (2023). Using the Capital Asset Pricing Model and the Fama–French Three-Factor and Five-Factor Models to Manage Stock and Bond Portfolios: Evidence from Timor-Leste. *Journal of Risk and Financial Management*, *16*(11).

https://doi.org/10.3390/jrfm16110480
[3] Ardito, L., Scuotto, V., Del Giudice, M., & Petruzzelli, A. M. (2019). A bibliometric analysis of research on Big Data analytics for business and management. *Management Decision*, *57*(8), 1993–2009. https://doi.org/10.1108/MD-07-2018-0754
[4] Ayub, U., Kausar, S., Noreen, U., Zakaria, M., & Jadoon, I. A. (2020). Downside risk-based six-factor capital asset pricing model (CAPM): A new paradigm in asset pricing. *Sustainability (Switzerland)*, *12*(17). https://doi.org/10.3390/SU12176756
[5] Azam, M. (2023). Fama and French (2015) five-factor model using SEM with a Mediating Role of Liquidity: Evidence from Pakistan. *Journal of Social Sciences and Management Studies*, *2*(4), 15–33. https://doi.org/10.56556/jssms.v2i4.437
[6] Azizi, R., Azizi, H. R., Pakmaram, A., Rezaei, N., & Abdi, R. (2020). Presenting a Model for Portfolio Risk Premium Assessment: Evidence from the Tehran Stock Exchange. *Int. J. Nonlinear Anal. Appl*, *11*(2), 2008–6822. https://doi.org/10.22075/ijnaa.2020.44439
[7] Buffett, W. E., & Cunningham, L. A. (2018). *The Essays of Warren Buffett: Lessons for Corporate America* (ketiga). The Cunningham Group.
[8] Chen, H. (2022). Tests on the explanatory and predictor power improvement on Fama and French Three Factor Model by the addition of VIX index. In *BCP Business & Management GEBM* (Vol. 2022).
[9] Chen, J. (2023). Can Volatility Risk Premia Improve Fama-French Three-Factor Model in the Explanation of Stock Index Returns? — Evidence from US Industrial Stock Indices. *Modern Economics & Management Forum*, *4*(3), 70. https://doi.org/10.32629/memf.v4i3.1376
[10] Carvalho, G. A., Amaral, H. F., Pinheiro, J. L., & Correia, L. F. (2021). The pricing of anomalies using factor models: A test in Latin American markets*. *Revista Contabilidade e Financas*, *32*(87), 492–509. https://doi.org/10.1590/1808-057X202111640
[11] Dimson, E., Marsh, P., & Staunton, M. (2020). Divergent ESG Ratings. *The Journal of Portfolio Management*, *47*(1), 75–87. https://doi.org/10.3905/jpm.2020.1.175
[12] Dirkx, P., & Peter, F. J. (2020). The Fama-French Five-Factor Model Plus Momentum: Evidence for the German Market. *Schmalenbach Business Review*, *72*(4), 661–684. https://doi.org/10.1007/s41464-020-00105-y
[13] Doğan, M., Kevser, M., & Leyli Demirel, B. (2022). Testing the Augmented Fama-French Six-Factor Asset Pricing Model with Momentum Factor for Borsa Istanbul. *Discrete Dynamics in Nature and Society*, *2022*. https://doi.org/10.1155/2022/3392984
[14] Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, *133*, 285–296. https://doi.org/10.1016/j.jbusres.2021.04.070
[15] Ewald, C. O., Haugom, E., Kanthan, L., Lien, G., Salehi, P., & Størdal, S. (2022). Salmon futures and the Fish Pool market in the context of the CAPM and a three-factor model. *Aquaculture Economics and Management*, *26*(2), 171–191. https://doi.org/10.1080/13657305.2021.1958105
[16] Fama, E. F., & French, K. R. (2020). Comparing Cross-Section and Time-Series Factor Models. *The Review of Financial Studies*, *33*(5), 1891–1926. https://doi.org/10.1093/rfs/hhz089
[17] Fama, F. E., & French, R. K. (2018). Choosing factors. *Journal of Financial Economics*, 234–252.
[18] Gao, R. (2023). The Research of Optimal Portfolio in Technology Industry Based on Arithmetic Average Return, CAPM, and Fama-French Three-factor Model. *Advances in Economics, Management and Political Sciences*, *55*(1), 260–264. https://doi.org/10.54254/2754-1169/55/20231020
[19] Goo, Y.-J., & Wang, C.-W. (2024). Do There Exist Nonlinear Phenomena of the Fama-French Six Factors on Stock Returns?— An Empirical Investigation on the Taiwan Stock Market. *Modern Economy*, *15*(04), 394–412. https://doi.org/10.4236/me.2024.154021
[20] Grobys, K., Fatmy, V., & Rajalin, T. (2024). Combining low-volatility and momentum: recent evidence from the Nordic equities. *Applied Economics*. https://doi.org/10.1080/00036846.2024.2337806
[21] Hou, K., Mo, H., Xue, C., & Zhang, L. (2019). Which factors? *Review of Finance*, *23*(1), 1–35. https://doi.org/10.1093/rof/rfy032
[22] Huang, T. L. (2019). Is the Fama and French five-factor model robust in the Chinese stock market? *Asia Pacific Management Review*, *24*(3), 278–289. https://doi.org/10.1016/j.apmrv.2018.10.002
[23] Huang, W., Wang, J., & Zhu, K. (2023). Analysis of U.S. industries based on Fama-French five-factor model under COVID-19. In *BCP Business & Management CMAM* (Vol. 2022).
[24] Jan, M. N., & Ayub, U. (2019). Do the fama and french five-factor model forecast well using ANN? *Journal of Business Economics and Management*, *20*(1), 168–191. https://doi.org/10.3846/jbem.2019.8250
[25] Khoa, B. T., & Huynh, T. T. (2023). A COMPARISON OF CAPM AND FAMA-FRENCH THREE-FACTOR MODEL UNDER MACHINE LEARNING APPROACHING. *Journal of Eastern European and Central Asian Research*, *10*(7), 1100–1111. https://doi.org/10.15549/jeecar.v10i7.1402
[26] Khudoykulov, K. (2020). Asset-pricing models: A case of Indian capital market. *Cogent Economics and Finance*, *8*(1). https://doi.org/10.1080/23322039.2020.1832732
[27] Li, Y., Teng, Y., Shi, W., & Sun, L. (2021). Is the Long Memory Factor Important for Extending the Fama and French Five-Factor Model: Evidence from China. *Mathematical Problems in Engineering*, *2021*. https://doi.org/10.1155/2021/2133255
[28] Liu, S. (2020). Analysis of COVID-19 on the service industry based on fama and French five-factor model. *Proceedings - 2020 Management Science Informatization and Economic Innovation Development Conference, MSIEID 2020*, 154–157. https://doi.org/10.1109/MSIEID52046.2020.00035
[29] Lu, Y., Reinert, G., & Cucuringu, M. (2024). Trade co-occurrence, trade flow decomposition and conditional order imbalance in equity markets. *Quantitative Finance*, *24*(6), 779–809. https://doi.org/10.1080/14697688.2024.2358963
[30] Maciel, C. F., Correia, L. F., Amaral, H. F., & Cavalcanti, J. M. M. (2021). Performance do modelo de cinco fatores de Fama e French na precificação de anomalias no mercado brasileiro. *Revista Contemporânea de Contabilidade*, *18*(49), 145–161. https://doi.org/10.5007/2175-8069.2021.e78962
[31] Malkiel, G. B. (2019). *A Random Walk Down Wall Street* (12th ed.). W. W. Norton & Company.
[32] Martinez-Blasco, M., Serrano, V., Prior, F., & Cuadros, J. (2023). Analysis of an event study using the Fama–French five-factor model: teaching approaches including spreadsheets and the R programming language. *Financial Innovation*, *9*(1). https://doi.org/10.1186/s40854-023-00477-3
[33] Munawaroh, U., & Sunarsih, S. (2020). The effects of the Fama-French five factor and momentum factor on Islamic stock portfolio excess return listed in ISSI. *Jurnal Ekonomi & Keuangan Islam*, *6*(2), 119–133. https://doi.org/10.20885/jeki.vol6.iss2.art4
[34] Nagy, B. Z., & Dezméri, T. (2022). A SIX-FACTOR EXTENSION OF THE FAMA-FRENCH ASSET PRICING MODEL – THE CASE OF THE POLISH STOCK MARKET. *Argumenta Oeconomica*, *2022*(2), 5–22. https://doi.org/10.15611/aoe.2022.2.01
[35] Nuri Rohuma, H. (2022). Fama and French (1993) Three-Factor Model: Evidence from Conventional and Shariah-Compliant Portfolios in Bursa Malaysia. *International Journal of Business and Management*, *17*(7), 66. https://doi.org/10.5539/ijbm.v17n7p66
[36] Ragab, N. S., Abdou, R. K., & Sakr, A. M. (2019). A Comparative Study between the Fama and French Three-Factor Model and the Fama and French Five-Factor Model: Evidence from the Egyptian Stock Market. *International Journal of Economics and Finance*, *12*(1), 52. https://doi.org/10.5539/ijef.v12n1p52
[37] Rahayu, R., & Zahro, M. (2022). Penilaian returns investasi saham dengan Augmented Three Factor model pada kondisi political uncertainty di Indonesia. *Jurnal Ekonomi Modernisasi*, *18*(1), 74–85. https://doi.org/10.21067/jem.v18i1.6601
[38] Roy, R., & Shijin, S. (2018). A six-factor asset pricing model. *Borsa Istanbul Review*, *18*(3), 205–217. https://doi.org/10.1016/j.bir.2018.02.001
[39] Sharma, G., Sehgal, S., & Mishra, A. V. (2022). Does financial integration impact performance of equity anomalies? *Cogent Economics and Finance*,

10(1). https://doi.org/10.1080/23322039.2022.2111802
[40] Siegel, J. J. (2014). *"Stocks for the Long Run: The Definitive Guide to Financial Market Returns & Long-Term Investment Strategies."* McGraw-Hill Education.
[41] Strijker, D., Bosworth, G., & Bouter, G. (2020). Research methods in rural studies: Qualitative, quantitative and mixed methods. *Journal of Rural Studies*, *78*, 262–270. https://doi.org/10.1016/j.jrurstud.2020.06.007
[42] Subroto, W., & Setyawan, I. R. (2021). The Determinants of Stock Return Using by Fama and French Three Factor Model (FF3FM) in IDX. *Advances in Economics, Business and Management Research*, *174*. https://doi.org/10.2991/aebmr.k.210507.032
[43] Tondok, K. R., Nugroho, S., Munawi, A. S., Siregar, H., & Tengah, K. B. (2022). Kristio Rapi Tondok, et al. / An Analysis on Risk Adjusted Performance and Asset Pricing Model Comparison in Indonesian Stock Market During. *International Journal of Business Studies*, *6*(2).
[44] Van Meetelen, S. J. R. (2019). *Performance of a Six-Factor Asset Pricing Model for Stocks of Developed Financial Markets Within the Eurozone*.
[45] Wang, S. (2020). Comparing Global Factor Models with Sharpe Ratios. *International Conference on Economic Management and Green Development (ICEMGD 2020)*. https://doi.org/DOI: 10.23977/ICEMGD2020.014
[46] Wang, Z. (2022). Study on the Applicability of the Fama-French Three- factor Model and Five-factor Model to the American Biopharmaceutical Industry during the COVID-19 Period. *Advances in Economics, Business and Management Research*, *211*. license -http://creativecommons.org/licenses/by-nc/4.0/
[47] Wedagama, D. N. W., Hakim, D. B., Juanda, B., & Andati, T. (2022). Implementation of Capm, Fama-French Three-Factor, and Five-Factor in Indonesia Stock Exchange and Cement Industry Sector. *International Journal of Economics and Financial Issues*, *12*(2), 52–60. https://doi.org/10.32479/ijefi.12805
[48] Younus, M. (2022). A better model? Testing of Fama and French six-factor model in Pakistan. *Business Review*, *17*(1), 1–24. https://doi.org/10.54784/1990-6587.1456
[49] Zhang, Y. (2023). An Empirical Study of China's Agriculture, Forestry and Fishery Industry Based on the Fama-French Three-Factor Model. *Advances in Economics, Management and Political Sciences*, *16*(1), 60–64. https://doi.org/10.54254/2754-1169/16/20230976
[50] Zhang, Z., Yu, Y., Ma, Q., Yao, H., & Zhang, Z. (2022). A revised comparison between Fama and French five-facto model and three-factor model based on China's A-share market. *Journal of Advances in Applied & Computational Mathematics*. https://doi.org/10.15377/2409-5761.2022.09.13.