

Portfolio Analysis Using Fama-French Five Factors Model And Its Relation With Behavioral Investor Theory: IDX-MES BUMN 17 Index

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Article Info	Abstract
Keywords: Behavioral Investor Types Model; Portfolio Analysis; Fama French Five Factors Model; IDX-MES BUMN 17	This study aims to analyze the performance of the sharia stock index named IDX-MES BUMN 17 on the Indonesia Stock Exchange (IDX) during the 2020–2024 period using the Fama-French Five Factor Model. This model evaluates the influence of five factors: company size, value factor, profitability factor, investment factor, and market risk. The data used are secondary data including historical stock prices, market index, and company fundamental data. Stocks are grouped into portfolios based on a combination of these factors. The analysis results indicate that investors with speculative and aggressive profiles should invest in SMBR and ELSA stocks. Young investors should invest in BRIS and TLKM stocks, while retirement/ institutional investors should invest in SMGR. Preserver investors are more suited to SMGR and IPCC, while Followers should invest in PTBA and TLKM. Independent/Individualists should choose ELSA, SMBR, PGAS, PTBA, BRIS, and TINS. Independent Active Accumulators can choose PTBA, ELSA, BRIS, ANTM, IPCC, TLKM, and PTPP. This study contributes to investors and investment managers in understanding the optimal portfolio structure that suits investors' risk preferences.
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1. Introduction

The capital market, represented in Indonesia by the Indonesia Stock Exchange (IDX), plays a crucial role in the economy by serving as a meeting place for investors and companies for financing and investment activities. Stocks, as the primary instrument, offer attractive profit opportunities but also carry risks, making optimal portfolio formation a key strategy. Although increasingly accessible to the public, investing in the capital market is still relatively new in Indonesia compared to other countries. Investment decisions are influenced by investor information and knowledge, which can be viewed from two perspectives: the ability to maximize economic wealth and behavioral motivation influenced by psychological factors.

The development of financial theory shows that investor behavior is not entirely rational as assumed by classical financial theory. Prospect Theory (Kahneman & Tversky, 1979) explains that investors tend to experience loss aversion, have reference dependence, and exhibit different risk preferences between gain and loss conditions. This theory later became the basis for Behavioral Portfolio Theory (Shefrin & Statman, 2000), which states that investors form portfolios based on multiple mental goals (multiple mental accounts), rather than solely maximizing a single utility as in the traditional approach. This second theory states that cognitive and emotional biases play a significant role in the investment decision-making process.

The influence of behavioral biases was further deepened by Pompian and Longo (2005), who grouped investor biases into two main groups: cognitive biases and emotional biases. This idea was further developed by Pompian (2012) into Behavioral Investor Types (BIT), which classifies investors into four main types—Passive Preserver, Friendly Follower, Independent Individualist, and Active Accumulator. Each type reflects a combination of behavioral biases that influence risk

preferences, decision-making patterns, and tendencies toward various investment instruments. Understanding these investor behavioral types is becoming increasingly important because it allows portfolio designers to tailor investment strategies to individual characteristics, experiences, and psychological responses to risk and uncertainty.

In practice, behavioral finance theories such as Prospect Theory, BPT, and BIT require the support of quantitative models to develop portfolios that not only align with investor psychology but also align with fundamental market characteristics. Fama and French (2015) introduced the Five-Factor Asset Pricing Model as a refinement of the previous three-factor model, encompassing market risk, firm size, book value to price, profitability, and investment intensity. This model is able to explain variations in stock returns more comprehensively and is widely used in empirical research to estimate portfolio performance and sensitivity to risk factors.

However, despite the growing development of behavioral theory and factor models, research integrating the two approaches still shows significant gaps. Studies on Prospect Theory and Behavioral Portfolio Theory focus more on investor psychology, while research on BIT generally stops at the classification stage without directly linking it to asset valuation models such as the Fama–French Five Factors. Conversely, studies on the five-factor model typically assume investors are rational agents and rarely consider the influence of behavioral biases on portfolio formation. As a result, there is little research explaining how investor behavior types—for example, risk-averse Preservers or aggressive Accumulators—influence their preferences and sensitivities to market factors, size, value, profitability, and investment.

Furthermore, empirical evidence on the integration of BIT and the Fama–French Five Factors remains very limited in the context of emerging markets, including Indonesia and the Asian region. Most studies in Asia only examine general behavioral biases or examine the performance of market factors without considering investor psychological characteristics. Thus, there is a crucial research gap to be filled: the need to examine how the combination of behavioral biases and fundamental market factors can be used to design more personalized, realistic portfolios that are aligned with local psychological conditions and market dynamics. This gap underpins the urgency of this research.

The research object in this study is the IDX-MES BUMN 17, a special sharia-compliant index that measures the stock price performance of 17 state-owned enterprises (SOEs) and their subsidiaries that observe to sharia principles, have high liquidity, large capitalization, and solid fundamentals. This index aims to provide a benchmark for halal-based SOE investments, support the development of sharia-compliant products such as index mutual funds and ETFs, and encourage improved corporate governance and transparency to ensure compliance with sharia standards.

The purpose of this study is to analyze the performance of stock portfolios in companies indexed in the IDX-MES BUMN 17 Index during the period 2021–2024. The analysis was conducted using a modern portfolio theory approach, which includes the concepts of stock returns and risks, as well as measurements using the method developed by Fama and French. The results of this portfolio performance are then linked to the Behavioral Investor Theory developed. This method aims to evaluate and compare the level of return obtained with the systematic risk borne and provide suggestions on which portfolios should be chosen by each type of investor.

Through these theoretical approaches, this research is expected to provide a comprehensive picture of the effectiveness of stock investment in the IDX-MES BUMN 17 Index and become a reference for investors in making more careful and data-based investment decisions.

Behavioral Investor Types Theory

Michael M. Pompian developed a behavioral investor classification framework (Behavioral Investor Types—BITs) to help advisors and investors identify bias patterns that shape investment decision-making. Each investor type has a distinct combination of cognitive and emotional biases, which influence risk preferences and responses to market fluctuations. This framework allows

investment strategies to be tailored to an investor's psychological profile, minimizing behavioral errors that can erode portfolio performance.

Pompian outlines four main types: Passive Preservers are typically heavily influenced by loss aversion and status quo bias, which makes them risk-averse and difficult to change their investment strategies even when necessary. Friendly Followers are susceptible to herd behavior and recency bias, tending to follow market trends or majority opinion without in-depth analysis. Independent Individualists are often influenced by confirmation bias and availability bias because they rely on their own research, but can become trapped only by information that supports their views. Active Accumulators suffer from overconfidence bias and the illusion of control, which leads them to overtrade or take excessive risks. This classification aims to help investors design asset allocation strategies and behavioral interventions that suit their type. Pompian emphasizes that determining investor type should not be rigid, as individuals can exhibit traits of more than one type at a time.

Fama-French 5-Factors Model

The Fama-French 5-Factor Model is an extension of the original Fama and French three-factor model. This model is used to explain stock returns by considering five key factors believed to influence investment performance: market risk, company size, and value investment profitability. This model helps explain differences in returns between stocks with certain characteristics (e.g., company size or value) that cannot be explained by traditional market models such as the Capital Asset Pricing Model (CAPM).

Market Factor (Excess Market Return) is the difference between the market return (R_m) and the risk-free return (R_f), which represents the market risk premium. Market return is typically calculated using the Jakarta Composite Index (JCI) as a proxy for R_m and the Bank Indonesia interest rate (BI-Rate) as a proxy for R_f . The higher the market factor value, the greater the volatility and risk, thus investors will demand higher returns; conversely, a low market factor value indicates lower risk and potential returns (Yuliyana & Sembiring, 2022; Darma & Lestari, 2022; Dewanto & Sumiati, 2022; Komara et al., 2020).

The Size Factor measures the difference in returns between small-cap and large-cap companies. This factor is based on the finding that stocks of small companies tend to provide higher returns than large companies due to greater risk. The SMB calculation is performed by subtracting the returns of large companies from those of small companies. Investors can use this information to tailor their portfolios to their risk profile and potential returns (Fama & French, 2015; Irawan & Purwanti, 2021).

The Value Factor represents the difference in returns between stocks with a high and low book-to-market (B/M) ratio. Value stocks typically generate higher returns than growth stocks with a low B/M ratio, as value stocks are often perceived as undervalued and higher risk. Investors who understand this factor can allocate funds to value stocks for potentially higher returns (Fama & French, 1993; Setiawan & Darma, 2020).

The Profitability Factor measures the difference in returns between companies with high (robust) and low (weak) profitability. Companies with high profitability tend to deliver higher stock returns because they are perceived to have better business prospects and a lower risk of bankruptcy. This factor highlights the importance of fundamental analysis in investment strategies (Fama & French, 2015; Dewi & Hermanto, 2021).

The Investment Factor indicates the difference in returns between companies that invest conservatively (low asset growth) and companies that invest aggressively (high asset growth). Empirical findings indicate that companies with a conservative investment strategy tend to generate higher returns due to being more selective in their expansion, while aggressive investments are often associated with greater risk (Fama & French, 2015; Haryanto & Wulandari, 2022).

The Relationship Between Behavioral Investor Types Theory and the Fama French Five Factors Model

The relation between the Behavioral Investor Types Theory proposed by Michael M. Pompian and the Fama-French Five Factors Model is that the Behavioral Investor Types (BIT) theory focuses on how behavioral biases influence investment decisions and individual risk preferences. This approach argues that although quantitative models such as the Fama–French model are able to explain variations in stock returns through risk factors, investors' final decisions are still influenced by behavior, emotions, and cognitive biases. Although the factors in the Fama–French Five Factors Model are objective and based on market data, investors' preferences for certain factors can be influenced by their behavioral types. Thus, the BIT can be used as a psychological framework to tailor Fama–French factor-based portfolio strategies to better suit investor behavioral profiles.

Portfolio strategies can be designed to an investor's psychological characteristics while considering empirical risk and return factors. Preserver investors, who tend to avoid risk due to loss aversion and status quo bias, should choose a portfolio with exposure to Big Value and Conservative Investment factors through stable, high-dividend defensive stocks. Followers, who are susceptible to herd behavior and recency bias, are better suited to portfolios that follow market trends with a combination of Small, Big Size, and Low Value, such as popular blue-chip stocks. Meanwhile, Independents, who rely on fundamental analysis but are potentially affected by confirmation bias, are suited to a balanced portfolio of High Value, Robust Profitability, and Conservative Investment factors for long-term investments. Active Accumulators, who tend to be overconfident and prone to excessive transactions, can be directed to a portfolio with high exposure to Big and Small Size, High Value, and Robust Profitability (RMW), specifically small-cap stocks with high profitability, while still implementing a rebalancing strategy for more disciplined investment activities. Thus, the combination of Pompian's BIT theory and the Fama–French 5 Factors is able to provide portfolio guidance that not only considers psychological aspects, but is also based on empirical evidence of market return factors (Kuo, 2022).

2. Research Method

The research objects in this study are companies listed on the IDX-MES BUMN 17 index, which is an index that measures the price performance of 17 shares of sharia BUMN and their affiliates that have good liquidity and large market capitalization and are supported by good company fundamentals.

The population used in this study was 22 companies listed in the IDX-MES BUMN 17 index during the 2021-2024 period. The sampling method used in this study was purposive sampling, with the sample criteria being companies listed on the IDX-MES BUMN 17 index on the Indonesia Stock Exchange for the 2021-2024 period, companies that consistently participated in the index throughout the study period.

Based on the sampling criteria, the research samples selected were 11 companies. They are Aneka Tambang Tbk. (ANTM), Bank Syariah Indonesia Tbk. (BRIS), Elnusa Tbk. (ELSA), Indonesia Kendaraan Terminal Tbk. (IPCC), Perusahaan Gas Negara Tbk. (PGAS), Bukit Asam Tbk. (PTBA), PP (Persero) Tbk. (PTPP), Semen Baturaja (Persero) Tbk. (SMBR), Semen Indonesia (Persero) Tbk. (SMGR), Timah Tbk. (TINS), and Telkom Indonesia (Persero) Tbk. (TLKM).

3. Results and Discussion

Table 1. BI Rate and JCI

BI Rate = Rf	JCI = Rm
2021 3.50%	2021 IDR 6,600.68
2022 5.75%	2022 IDR 6,850.53
2023 6%	2023 IDR 7,303.89
2024 6%	2024 IDR 7,105.07

Source: www.bi.go.id www.idx.co.id

BI Rate is a risk-free instrument from Bank Indonesia, so its interest rate is used as the risk-free rate (Rf) in calculating investment returns. The data shows that the Rf fluctuated from 2021 to 2024. There was a significant increase from 3.50% to 5.75% from 2021 to 2022, but the Rf tended to stabilize in the following years. An increase typically indicates a tightening of BI's monetary policy, typically to control inflation or maintain exchange rate stability. Consequently, when the Rf rises, the minimum expected return for investors also rises, making stocks relatively less attractive to some conservative investors.

The Jakarta Composite Index (JCI) reflects the overall performance of the Indonesian stock market. The data above shows an upward trend from 2021 to 2022 and from 2022 to 2024, but a decline occurred from 2023 to 2024. This increase was partly driven by the post-COVID-19 economic recovery (2021–2022) and infrastructure development programs. However, the weakening in 2024 is likely due to global factors such as high interest rates and a global economic slowdown.

In capital market analysis, the difference between the JCI (Rm) and BI Rate (Rf) returns is used to calculate excess market return, which is the risk compensation that investors expect above the risk-free rate—so that the BI Rate and JCI trends together provide an overview of market opportunities and risks from year to year.

There are 18 portfolio compositions formed based on the Fama French Five Factors Model theory, consisting of portfolios Small to High (S/H), Small to Medium (S/M), Small to Low (S/L), Big to High (B/H), Big to Medium (B/M), Big to Low (B/L), Small to Robust (S/R), Small to Medium (S/Mp), Small to Weak (S/W), Big to Robust (B/R), Big to Medium (B/Mp), Big to Weak (B/W), Small to Conservative (S/C), Small to Medium (S/Mi), Small to Aggressive (S/A), Big to Conservative (B/C), Big to Medium (B/Mp), and Big to Aggressive (B/A).

Table 2. Portfolio Composition Size-Value Factors

YEAR	PORTFOLIO					
	S/H	S/Mb	S/L	B/H	B/Mb	B/L
2021	ELSA	SMBR	PTBA	PGAS	ANTM	BRIS
	PTPP	TINS		SMGR		IPCC
						TLKM
2022	ELSA	SMBR		SMGR	ANTM	BRIS
	PGAS	TINS				IPCC
	PTPP					PTBA
						TLKM
2023	ELSA	SMBR		SMGR	ANTM	BRIS
	PGAS	TINS				IPCC
	PTPP					PTBA
						TLKM
2024	ELSA	TINS	PTBA	PGAS	ANTM	BRIS

YEAR	PORTFOLIO					
	S/H	S/Mb	S/L	B/H	B/Mb	B/L
	PTPP				SMGR	IPCC
	SMBR					TLKM

Source: Data Processing Result, 2025

The table above shows the composition of a stock portfolio grouped based on a combination of Size Factors and Value Factors. This category separates stocks based on their market capitalization and valuation levels, resulting in six portfolio groups: S/H, S/Mb, S/L, B/H, B/Mb, and B/L. The table shows that ELSA and PTPP stocks consistently fall into the S/H category, indicating that they have small capitalizations with relatively low valuations. PGAS and SMGR stocks fall into the B/H category, reflecting large companies with attractive valuations. Meanwhile, BRIS and TLKM stocks fall into the B/L category, representing large, growth-oriented companies with high valuations relative to their book value.

Throughout the observation period, most stocks maintained their factor positions, indicating stability in their market size and book-to-market ratios, particularly in 2022–2023. However, in 2024, a composition shift was observed, with SMBR moving to the B/L category due to increased capitalization or a decrease in the book-to-market ratio, and TINS moving from S/Mb to S/H, indicating an increase in value characteristics. These position changes may reflect stock price dynamics, changes in fundamental performance, or market sentiment. From a factor-based investment strategy perspective, the S/H and B/H groups are typically attractive to value-oriented investors, while the B/L group is more suitable for growth-oriented investors.

Table 3. Portfolio Composition Size-Profitability Factors

YEAR	PORTFOLIO					
	S/R	S/Mb	S/W	B/R	B/Mb	B/W
2021	PTBA	PTPP	ELSA	BRIS	IPCC	ANTM
	TINS		SMBR	PGAS	SMGR	TLKM
	TINS	ELSA	PTPP	BRIS	SMGR	ANTM
2022		PGAS	SMBR	IPCC		TLKM
				PTBA		
2023	ELSA	PGAS	PTPP	BRIS	SMGR	ANTM
		SMBR	TINS	IPCC		TLKM
				PTBA		
2024	PTBA	ELSA	PTPP	BRIS	PGAS	ANTM
	TINS	SMBR		IPCC		SMGR
						TLKM

Source: Data Processing Result, 2025

The table above shows the stock portfolio composition based on a combination of Size Factors and Profitability Factors. This classification separates stocks based on their market capitalization and profitability, as measured by the Return on Equity indicator. PTBA and TINS were in the S/R category in 2021, indicating small-cap companies with high profitability. BRIS shares consistently remained in the B/R category, reflecting a large company with strong profitability. Meanwhile, ANTM and TLKM shares were in the B/W category, indicating large companies with relatively low profitability during the period.

From year to year, there has been a shift in the stock positions in this portfolio, reflecting the dynamics of the companies' fundamental performance. TINS was in the S/R category in 2022, then moved to S/Mb, indicating a decline or fluctuation in profitability. Similarly, PGAS, which was in

the B/Mb category in 2021, moved to S/Mb in 2023, driven by changes in relative market size or earnings performance. These shifts are important for investors to analyze because profitability is closely related to long-term potential returns. Stocks with robust profitability tend to outperform stocks with weak profitability.

Table 4. Portfolio Composition Size-Investment Factors

YEAR	PORTOFOLIO					
	S/C	S/Mb	S/A	B/C	B/Mb	B/A
2021	ELSA	PTPP	PTBA	SMGR	ANTM	BRIS
	SMBR				IPCC	PGAS
	TINS					TLKM
2022	PGAS	PTPP	ELSA	TLKM	ANTM	BRIS
	SMBR				SMGR	IPCC
	TINS					PTBA
2023	PGAS	PTPP	ELSA	IPCC	SMGR	ANTM
	SMBR	TINS		PTBA		BRIS
						TLKM
2024	SMBR	PTPP	ELSA	PGAS	ANTM	BRIS
	TINS		PTBA	SMGR	IPCC	TLKM

Source: Data Processing Result, 2025

The table above shows the composition of a stock portfolio based on a combination of Size Factors and Investment Factors. This classification refers to a company's level of investment or asset growth, with the Conservative category indicating companies with low asset growth, Medium being in the middle, and Aggressive representing companies with high asset growth. ELSA's 2021 S/C ranking indicates a small-cap company with a low investment growth rate, while BRIS was in the B/A category in 2021, indicating a large company with relatively high asset expansion.

From year to year, there has been a shift in the stock positions within portfolios, reflecting changes in each company's asset growth strategy. PGAS, which was in the B/A category in 2021, shifted to S/C in 2022, indicating a significant shift in both relative market capitalization and investment levels. PTBA also experienced a shift, from S/A in 2021 to B/C in 2023, indicating a slowdown in asset expansion. This shift is important for investors because aggressive investment strategies are often associated with high potential for income growth but also carry greater risk, while conservative strategies tend to yield greater stability but with slower growth potential.

Discussion

Michael M. Pompian (2012) developed the Behavioral Investor Types (BITs) framework to classify investors based on their psychological characteristics and dominant behavioral biases. He divided investors into four types: Passive Preserver, Friendly Follower, Independent Individualist, and Active Accumulator. Based on the portfolio composition table of the Fama French 5 Factors Model, these four investors can choose stocks that suit their investment goals.

Preserver investors, according to Pompian's (2012) Behavioral Investor Types typology, are highly conservative, risk-averse, and prefer portfolio stability and guaranteed cash flows. Behavioral literature shows that investors with this profile consistently choose stocks that provide stable dividends, as dividends are considered a signal of fundamental strength and lower uncertainty (Baker & Wurgler, 2004; Hoberg & Prabhala, 2009). Research also finds that conservative investors prefer returns realized directly through dividends over riskier capital gains (Graham & Kumar, 2006). Therefore, stocks like SMGR and IPCC, which have large and stable dividend payments, are well-

suited for Preserver investors because they meet their preference for capital security and consistent investment income, in line with behavioral finance theory and the characteristics of dividend-paying stocks, which generally have lower volatility (Fama & French, 2015).

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Within the Behavioral Investor Types (BIT) framework, independent investors are described as individuals who rely on independent analysis, a deep understanding of fundamental data, and a high level of confidence in making investment decisions based on objective information (Pompian, 2012). This type of investor has been empirically shown to focus more on company profitability, good corporate governance (GCG), consistency of financial reporting, and long-term performance stability, rather than short-term market signals or investor sentiment (Barber & Odean, 2000; Wermers, 1999). Research shows that rational and analytical investors are more likely to choose stocks with strong fundamentals and high transparency, as these factors correlate with lower risk and the potential for more stable long-term returns (Fama & French, 2015; Chen et al., 2007). Therefore, stocks such as ELSA, SMBR, PGAS, PTBA, BRIS, and TINS, which boast solid profitability, good GCG practices, and consistent financial reporting, are well-suited for independent investors who prioritize data-driven decisions and disciplined fundamental analysis.

Within the Behavioral Investor Types (BIT) framework, Active Accumulator investors are aggressive, highly confident, and tend to combine in-depth fundamental analysis with accumulation strategies to maximize long-term growth (Pompian, 2012). Behavioral finance literature shows that these aggressive investors consistently seek stocks with potential undervaluation, high growth prospects, and strong fundamentals—characteristics often found in companies with stable profitability, healthy operational performance, and dividend-paying ability (Fama & French, 2015; Chan, Hamao, & Lakonishok, 1991). Empirical studies also confirm that undervalued stocks with positive momentum or growth prospects in a particular sector tend to be targeted by investors with high conviction and a preference for active accumulation (Barberis & Shleifer, 2003). Thus, stocks such as PTBA, ELSA, BRIS, ANTM, IPCC, TLKM, and PTPP, which exhibit a combination of potential undervaluation, stable fundamentals, and—in some cases—attractive dividends, align well with the Active Accumulator profile, which focuses on accumulating valuable assets to achieve optimal long-term returns.

4. Conclusion

The Behavioral Investor Types (BITs) framework helps guide portfolio selection based on investors' psychological characteristics and behavioral biases, thus aligning investment strategies with each type's risk profile and preferences. Preserver investors are more suited to defensive stocks with stable dividends, such as SMGR and IPCC, while Followers are drawn to popular stocks with a reputation for high dividends, such as PTBA and TLKM. Independent/Individualists should choose stocks with strong and transparent fundamentals, such as ELSA, SMBR, PGAS, PTBA, BRIS, and TINS. Independent Active Accumulators can utilize a combination of undervalued and growth-potential stocks, such as PTBA, ELSA, BRIS, ANTM, IPCC, TLKM, and PTPP. The advice is that each investor type needs to disciplined re-evaluate their portfolio periodically, adapting to market

dynamics and company fundamentals, and managing behavioral biases to prevent them from interfering with rational investment decision-making.

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