UNDERSTANDING THE DYNAMICS OF INVESTMENT FACTORS AND EXCHANGE-TRADED FUNDS PERFORMANCE IN THE U.S. MARKET 2018-2022

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ABSTRACT

The increasing popularity of exchange-traded funds (ETFs) among retail and professional investors necessitates a deeper understanding of their value-creation process. Recognizing inconsistencies between stated investment strategies and portfolio exposures is crucial for appropriate rebalancing in accordance with investment policy statements. Against the backdrop of evolving investment factors during the pandemic and changing geopolitical circumstances, the performance of ETFs has undergone significant shifts. Analyzing the directional changes of prevailing investment factors within specific macro environments is essential for optimizing portfolios composed out of ETFs. This study has a dual objective: firstly, to comprehend the dominant investment factors and their dynamics in the U.S. market, and secondly, to evaluate the performance of ETFs that adhere to specific investment philosophies and strategies. To achieve these objectives, the Fama-French three and five-factor models were employed to analyze a dataset comprising 72 U.S. ETFs. These ETFs were then categorized into four portfolios based on investment style and size. Performance appraisal measures were utilized to compare portfolios on a risk-adjusted basis relative to the benchmark. The bear market that commenced in early 2022 had a universally negative impact on observed ETFs due to their long-only exposures. This inflection point also marked a shift in the relative performance between value and growth styles, as well as the outperformance of more conservative investing approaches, underscoring the importance of adapting to changing market conditions. Additionally, the absence of a size premium throughout the observed period confirms investors' preference for large-cap stocks as a resilient factor. Furthermore, the size effect exerted a universal negative influence due to the size drift of ETFs employing a stated large-size investment strategy. During the observed period, the value style experienced a significant recovery, characterized by higher book-to-price ratios, operating profits, and more conservative investment policies that produced superior results compared to the previous longer period. The findings of this research enhance our understanding of the influence of investment factors on U.S. ETF performance, providing valuable insights for investors and portfolio managers who may need to adjust their strategies in response to observed changes in market dynamics.

Keywords*: Exchange-traded funds, Investment factors, Financial markets, Investment performance, Performance attribution*

INTRODUCTION

To fully understand the complexities and dynamics of financial markets, engaging in continuous analysis and monitoring is necessary. Financial markets are constantly evolving, reacting to new information and reflecting the behavioral biases of the investment community. Over time, markets can experience shifts in trends and changes in the factors that drive returns and risk. Therefore, it is important to recognize that the impact and direction of investment factors may not remain constant over time and may vary based on market conditions and other factors.

This research focuses on understanding and explaining the market factor dynamics at play in financial markets. However, the study does not stop there. It also provides insights into the performance attribution of individual exchange-traded funds (ETFs) and hypothetical portfolios that are constructed in line with specific investment philosophies and strategies. By examining the sources of returns and risk for these funds and portfolios, the study aims to provide a more comprehensive understanding of investment performance and provide insight into the investment decision-making process. By understanding the dynamics of market factors and the ways in which they influence the performance of different funds and portfolios, it is possible to optimize investments and make more informed decisions about portfolio construction and risk management.

The main objective of this study is to examine the key investment factors that have affected the performance of ETFs in the United States over the 2018-to-2022-year period, as well as to provide insights into the evaluation of ETFs' performance. This is a two-part goal, with the first aim being to understand the dominant investment factors and their dynamics in the U.S. market, and the second aim being to analyze the performance of ETFs that follow particular investment philosophies and strategies. By examining the sources of returns and risk for ETFs in the context of market conditions, the study aims to provide a more comprehensive understanding of investment performance. Adequate investment performance evaluation is essential for decision-makers, as it can help to explain the drivers of returns and risk and inform the optimization of portfolio exposures. By providing a feedback loop mechanism for investment decision-makers, the study aims to help them align their portfolio exposures with their economic expectations and goals.

Factor- and holdings-based models are essential tools for the process of investment performance attribution. These models allow for the decomposition and attribution of the sources of returns and risks in an investment portfolio. Without the use of these models, it may be difficult to accurately understand the drivers of performance and identify opportunities for improving portfolio construction and risk management. For this reason, it is important for investment managers to make use of factor- and holdings-based models on an ongoing basis as part of their investment decision-making process. By using these models to analyze the sources of returns and risk, managers can gain a better understanding of the factors that are driving portfolio performance and identify areas for improvement.

Current and prospective investors also need to be aware of the potential for inconsistency between stated investment policies and the actual exposures of their portfolios. This is because drift in investment style and other factors can occur over time, leading to deviations from the intended investment strategy. By being aware of these potential issues, investors can take steps to ensure that their portfolios are aligned with their stated investment policies and goals. Overall, the use of factor- and holdings-based models is a critical component of the investment performance attribution process, and it is important for both investment managers and investors to make use of these tools to improve the quality of their investment decision-making.

LITERATURE REVIEW

The seed of the methodological background of the deployed models is laid decades ago. Since then, it has been the keystone of mainstream finance theory and it has been extended in a few major instances by research papers that have shaped the investment performance evaluation framework.

Factor-based models are commonly used in research papers for performance attribution because they provide a systematic way of understanding the sources of returns for a particular investment. The Capital Asset Pricing Model (CAPM)[1] is a popular factor model that attempts to explain expected returns using market risk as a factor. However, it has been shown to be unreliable in empirical tests. The Fama-French three-factor model[2] is an extension of the CAPM that identifies three factors that influence stock returns: the market factor, a factor related to firm size (SMB), and a factor related to the book-to-market ratio (HML). The model suggests that there are premiums for stocks with small market capitalizations and those with a high book-to-market ratio, which are referred to as value-style stocks. [2]

The Carhart four-factor model is another extension of the original CAPM, which includes momentum as an additional factor [3]. A study on the South African stock market (Boamah, 2015) found that the Fama-French and Carhart models were able to capture size, book-to-market, and momentum effects on the mentioned market. The study also found that small, high-book-to-market stocks were riskier than large, low-book-to-market stocks. [4]

The Fama-French five-factor model [5] is an extension of the three-factor model that adds two additional factors: robust-minus-weak profitability (RMW) and conservative-minus-aggressive investment (CMA). This model suggests that there are additional returns for companies with high levels of profitability and those that invest conservatively. The authors also found that the value factor in the three-factor model was not necessary for describing average returns in the sample they examined when the profitability and investment factors were included [5]. In a subsequent paper (Fama & French), the same authors demonstrated that positive exposures to RMW and CMA (returns from profitable, conservatively investing firms) were associated with high average returns, low market beta, share repurchases, and low stock return volatility, and vice versa. [6]

Focusing on the most recent research papers, there are a few noticeable trends when it comes to ETF investing:

- ETFs popularity and cash-inflow in the retail investor realm. [7]
- ETFs inclusion in professionally managed institutional portfolios. [8]
- Growing interest in ETFs' investment performance evaluation. [9] [10]
- ETF's investment style, -size, and other investment characteristics performance evaluation research topics growing interest. [11] [12]
- Possibility to draw certain conclusions based on the mutual funds' long track record for various investment styles, sizes, and other investment characteristics. [13] [14]

As a relatively new form of investment, ETFs have drawn the attention of investors, and the process of the cash flow migrations from traditional investments, such as direct investment to stocks or indirect via mutual funds have been gradually replaced by ETF investments. In an effort to explain why some investors migrated partially from stocks to ETFs while others migrated completely Meier & Maier [7] conducted the study.

The findings showed that both migration behavior were subject to the same perceptions, but the configurations that formed the behaviors were different. It was revealed that perceived investment possibilities, perceived risk reduction, administrative effort, expensiveness, and monetary loss costs influenced the migration from stocks to ETFs. In addition, they showed that three configurations of perceptions resulted in partial migration intention and one configuration resulted in complete migration intention. A complete migration required retail investors to sell their stocks and accept the costs incurred to invest in ETFs instead, while only some identified perceptions had to be present for a partial migration. [7]

Raising ETFs' popularity was not only specific to the retail investors' domain, but it has also naturally expanded to the professionally managed portfolios realm. Sherrill et al. [8] indicated that it is well-known that passively managed mutual funds use ETFs, although current research at the time had yet to establish the benefits of these positions. Focusing on ETF type, the authors investigated whether ETFs impacted portfolio management. Funds using benchmark ETFs saw reductions in cash holdings, particularly during periods of large flows, and lower tracking error. In contrast, non-benchmark ETF positions improved the performance of large mutual funds investing in micro-cap stocks while also reducing portfolio risk. While studies cautioned against the extensive use of ETFs, the authors concluded that ETFs could provide tangible benefits for funds when considering the type of ETF used. [8]

ETFs' investment performance evaluation draws the attention of the academic community. Arampatzis et al. [9] performed a study that examined the performance of fifty global ETFs traded on US stock exchanges. The specific time frame for the analysis was the period following the end of quantitative easing in 2014 to mid-2018, with data recorded on a weekly basis. The Capital Asset Pricing Model (CAPM) was employed to evaluate the performance of the ETFs based on their Morning Star ratings, using Sharpe and Treynor ratios, Jensen's alpha, and betas and a/b measures. The results indicated that the ETFs demonstrated selection skills and exhibited bearish behavior in relation to the market during the period of quantitative easing tapering. [9] In our research, we expand this approach further, by using three- and five-factor models, as well as additional investment performance appraisal measures. The reason behind it is the potential higher explanatory power of additional factors. Moreover, the reason is not to rely solely on the usage of any specific appraisal measure, but rather use them in a common perspective.

Investment performance evaluation in the context of investment style and other investment factors is well-established in academic research when it comes to mutual funds. Korenak (2022) demonstrated the predominance of investment drivers and their dynamics across the studied period, beginning with the financial crisis-induced recovery in the US mortgage market. The highly cyclical sectors started to perform worse than the defensive sectors in the most recent period, characterized by COVID-19 and geoeconomic events, as the dominant growth style lost its momentum. The results, however, provide a far more in-depth understanding of the dynamics of many market investing elements and their impacts on mutual funds' performance and alignment with their declared investment philosophies and strategies. When appropriate benchmarks were introduced, smart money did not live up to its reputation, and the statistically significant alphas diminished. [10] Due to the similarity of the variety of investment styles and size exposures in investment policies of mutual funds and ETFs, the same approach can be used for ETFs' performance evaluation.

Size exposure of the ETF is one of the factors that is researched for the previous period. Rompotis (2019) pointed out that there is a well-documented pattern in the literature concerning the outperformance of small-cap stocks relative to their larger-cap counterparts. His paper aimed to address the small-cap versus large-cap issue using data from the ETF industry. Several raw returns and risk-adjusted return metrics were estimated over the period 2012-2016. Results were partially supportive of the size effect. Small-cap ETFs outperformed large-cap ETFs in overall raw return terms, even though they failed the risk test. However, outperformance was not consistent on an annual basis, and this is also the focus of our research. When risk-adjusted returns were taken into consideration, small-cap ETFs were inferior to their large-cap counterparts. A possible generalization of the findings implied that profitable investment strategies could be based on the different performance and risk characteristics of small- and large-cap ETFs. [11] This is also a matter that we further explore in our research.

The popularity of the ESG topic in recent years was the trigger for ETFs performance study. The Lobato et al. (2021) study examined the risk-adjusted performance of socially responsible ETFs in comparison to conventional ETFs. The main empirical result was based on a risk-adjusted performance metric that did not rely on a linear framework. It measured the difference between the returns of an ETF and the returns of a volatility-match and efficient portfolio. In addition, performance was measured using alpha based on single and multifactor formulations. The results showed that the performance of socially responsible ETFs was not different from the performance of conventional ETFs. Given the results of the study, socially aware investors could choose to invest in socially responsible ETFs without sacrificing performance. [12]

Utilization of the Five-Factor Fama-French model for the investment performance of the mutual funds was deployed in the study conducted by Korenak & Stakic (2022). The results indicated that the original three factors were in line with expectations and there was no evidence of style drift. The operating profit factor had a causal relationship with the returns. However, the exposure to the investing factor was slightly negative, which may be unexpected given the value orientation of the mutual funds. The performance of the portfolio was found to be statistically significantly underperforming, with positive contributors including the market premium, a tilt towards stocks with strong operating profits and small capitalizations, and an aggressive investing strategy. The value-style tilt, on the other hand, led to negative performance because it was out of favor for the period 2010-2021 year. [13]

Lastly, Korenak (2022) conducted research using two types of models for determining the performance of investments: factor models and asset-based models. The factor models used included the capital asset valuation model, the three-factor Fama-French model, the Carhart model, and the five-factor Fama-French model. The asset-based models used were the Brinson-Hood-Beebower and Brinson-Fachler models, as well as geometric models. The research focused on thematic mutual funds in the United States, analyzing 240 individual funds at both the individual and portfolio levels, based on market capitalization and investment style. By using these models, the research was able to determine the impact of various factors on mutual fund portfolios and individual funds and found that certain aspects of investment philosophy were reflected in the investment strategies. The results also revealed that portfolio rebalancing can significantly improve returns when a dominant market investment style is predicted. The study also found that there is a high level of consistency at the portfolio and individual level based on the influence of factors from the applied models and that asset-based models provided more useful results for investment decision-making. The use of geometric models also helped overcome the shortcomings of arithmetic models for investment performance attribution over multiple periods. [14]

In our research, we make an effort to explain the ETFs' returns and their components. This includes investment-style and -size investment statement policy. In addition, we examine the exposures to different investment factors and their relation to the realized returns. Finally, we make an appraisal on a risk-adjusted basis using an appropriate benchmark.

DATA AND METHODOLOGY

The research utilized factor-based models to examine the performance of ETFs. Fama-French three and five-factor models were deployed. The study used a sample of 72 individual ETFs, and four hypothetical portfolios were also constructed from these funds based on their stated investment style and size tilt.

The Large-Value portfolio (LV_PORT) is composed of the following ETFs: SPDV, SURE, OUSA, SDOG, ESGS, ERM, FDRR, FDVV, FVAL, EDOW, FTA, FDL, RDVY, RNDV, FVD, QDEF, QDYN, QDF, LVHD, ROUS.

The Large-Growth portfolio (LG_PORT) is composed of the following ETFs: AIEQ, ILCG, CACG, MTUM, QQQE, ENTR, FDMO, ONEQ, QQEW, QQXT, FPX, GURU, MILN, GVIP, PDP, PWB, QQQ, SPMO, RPG, IUSG.

The Small-Value portfolio (SV_PORT) is composed of the following ETFs: VBR, FDM, FYT, SDVY, ROSC, RFV, RWJ, RZV, XSHD, XSVM, CSML, ISCV, IWN, IJS, CALF, DEEP, SQLV, SLYV, VTWV, VIOV.

The Small-Growth portfolio (SG_PORT) is composed of the following ETFs: FYC, DWAS, RZG, XSMO, ISCG, IWO, IJT, JSML, SLYG, VTWG, VIOG, VBK.

Only 12 Small-Growth ETFs from the Morning Star database have a 5-year track record. All four portfolios were constructed using equal weighting.

The study analyzed the monthly returns of four hypothetical portfolios made up of different style-size ETFs. The observed period for the study was from January 2018 to December 2022, although the track record for the portfolios is limited due to their inception date. Also, the shorter time horizon was analyzed to make a comparison of the present market dynamics.

The Fama-French model was originally an extension of the CAPM, a single-factor model that only considered the difference between market and risk-free returns.

$$R_{it} - R_{ft} = a_i + b_i(R_{Mt} - R_{ft}) + s_i SMB_t + h_i HML_t + e_{it}$$

The Fama-French extended model added two additional factors: company size, based on market capitalization, and the book-to-market ratio as a proxy for value investing. The inclusion of these factors was motivated by the belief that small companies and companies with high book-to-market ratios tend to outperform their counterparts.

$$R_{it} - R_{ft} = a_i + b_i(R_{Mt} - R_{ft}) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + e_{it}$$

To compare the performance of different factors, certain breakpoints were established. Big stocks are those that make up the top 90% of the market by capitalization, while small stocks make up the bottom 10%. The 30th and 70th percentiles of relevant ratios, such as the book-to-market, operating profit, and investment ratios, are used as breakpoints for a given market.

The results of the study were presented monthly for the factor premiums and on an annual basis for the excess returns. Overall, this research provides a detailed analysis of the performance of ETFs and the factors that have influenced their performance over time.

RESULTS AND DISCUSSION

The results provide a detailed understanding of the investment factors that have produced the United States ETFs' performance over a given period. The study period covers the pandemic period, and which was also shaped in a later period by the geo-political events, and the results show the changing dynamics of various investment factors during this time. In particular, the study found that the growth style of investing lost momentum and underperformed in comparison to the value style in more recent periods. This might indicate that the investors became more conservative and less willing to pay high multiples in exchange for expectations of growth in the future.

However, the results of the study offer more than just a snapshot of the performance of different investment styles. They also provide insight into the underlying dynamics of various investment factors

in the market and their effects on ETFs' performance. Moreover, the study found that smart money did not always live up to its name, and when appropriate benchmarks were introduced, the alphas with statistical significance diminished. This highlights the importance of considering a wide range of factors when evaluating ETFs' performance and the need to take a comprehensive approach to investment analysis. Overall, the results of the study provide valuable insights into the dynamics of investment factors in the U.S. market and the ways in which these factors influence ETFs' performance and consistency with stated investment philosophies and strategies.

The Fama-French five-factor model was applied to four hypothetical portfolios composed of ETFs, and the results are presented in Tables 1 to 4. The coefficients of determination for the five-factor model ranged from 98.0% to 99.0%. The F-statistic had a high value for all the tested ETFs' portfolios, indicating that the model was a good fit for the data. No significant autocorrelation or heteroscedasticity was found in the results.

The results suggest that the most prominent factor, with a high statistical significance based on t-stat values, that explains the ETFs' performance is the market premium. Due to the long-only exposure of the individual ETFs within the portfolios, it is not surprising that the coefficient for the market premium tends towards 1 for all four hypothetical portfolios. The rest of the factors will be discussed on a self-standing basis. Additional four factors for LV_PORT [Table 1] are only partially in line with the expectations as per their stated investment strategy. The size factor is slightly positive even though ETF exposure should be a tilt toward the stocks with relatively large market-cap. On another hand findings regarding the exposure to stocks that have high book-to-price ratios are in accordance with the expectations, the coefficient is positive with a high statistical significance. This is in line with the value-style stated investment ETFs policy. Two more factors need to be considered. The operating profit factor shows a relatively low coefficient but with statistical significance in the case of, meaning when the returns on the highly profitable stocks outperform their peers the impact is negative for the observed hypothetical ETFs portfolio. The investing factor indicates that LV_PORT has exposure toward the stocks of the companies that pursue more conservative investing policies, at the same time, the t-stat value suggests statistical significance. Apart from the size factor, all factors are in line with the ETFs' investment-stated strategy.

Table 1. *Large-Value Portfolio (LV_PORT) Fama-French Five-Factor Model Results (Jan 2018-Nov 2022)*

Factors	Rm-Rf	SMB	HML	RMW	CMA	Annual Alpha	R^2	F-stat
Coefficient	0.90	0.07	0.24	0.17	0.20	-2.55%	98.0%	507.9
t-stat	40.499	1.402	6.537	3.097	3.496	-1.907		
p-value	0.000	0.167	0.000	0.003	0.001	0.062		

Source: own study, based on
(https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html)

The study [Table 2] found that the LG_PORT ETF confirmed a growth-style investing strategy, as indicated by its exposure to stocks with low book-to-price ratios. It also appears to have an aggressive investing policy, as indicated by its exposure to stocks of companies that pursue less conservative investing policies. The size factor was the only factor that did not align with the stated investment strategy, as the portfolio had a neutral exposure to stocks with a relatively large market cap rather than a tilt towards larger stocks. The operating profit factor showed a negative coefficient with statistical significance, meaning that when high-profit stocks outperform their peers, the impact is negative for the LG_PORT portfolio. Overall, it seems that the study found that the LG_PORT mostly aligns with its stated investment strategy, apart from the size factor that is neutral.

Table 2. *Large-Growth Portfolio (LG_PORT) Fama-French Five-Factor Model Results (Jan 2018-Nov 2022)*

Factors	Rm-Rf	SMB	HML	RMW	CMA	Annual Alpha	R^2	F-stat
Coefficient	1.04	0.01	-0.18	-0.14	-0.05	-0.01%	99.0%	1015.44
t-stat	60.876	0.177	-6.400	-3.371	-1.130	-0.013		
p-value	0.0000	0.860	0.000	0.001	0.263	0.989		

Source: own study, based on
(https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html)

The study also found [Table 3] that the SV_PORT is in line with a value-style investing strategy, as it is composed of stocks with high book-to-price ratios and in companies with conservative investing policies. The operating profit factor had a high coefficient with statistical significance, meaning that the SV_PORT portfolio performs well when high-profit stocks outperform their peers. Overall, the study found that the SV_PORT fully aligns with its stated investment strategy. However, the portfolio had only slight positive exposure to small-cap stocks rather, without statistical significance.

Table 3. *Small-Value Portfolio (SV_PORT) Fama-French Five-Factor Model Results (Jan 2018-Nov 2022)*

Factors	Rm-Rf	SMB	HML	RMW	CMA	Annual Alpha	R^2	F-stat
Coefficient	0.90	0.07	0.24	0.17	0.19	-2.44%	98.0%	532.49
t-stat	41.505	1.455	6.605	3.182	3.378	-1.861		
p-value	0.000	0.152	0.000	0.002	0.001	0.068		

Source: own study, based on
(https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html)

Finally, the analysis discovered [Table 4] that the SG_PORT does not adhere to a growth-style investing approach since it makes investments in stocks with high book-to-price ratios and in businesses with conservative investment practices. The portfolio performs well when high-profit stocks beat their peers because the operational profit component has a high coefficient and statistical significance, and this is opposite to the growth style. According to the study's findings overall, the SG_PORT does not match its declared investment strategy. However, the portfolio's exposure to small-cap equities was present and statistically significant. We can conclude that there is a possible style drift but not a size drift. It is important to stress that due to the inception date limitation of the ETFs that stated to follow a small-growth strategy the ETFs sample size was limited for this portfolio.

Table 4. *Small-Growth Portfolio (SG_PORT) Fama-French Five-Factor Model Results (Jan 2018-Nov 2022)*

Factors	Rm-Rf	SMB	HML	RMW	CMA	Annual Alpha	R^2	F-stat
Coefficient	1.02	0.85	0.38	0.18	0.06	-2.09%	99.3%	399.9
t-stat	58.690	22.869	13.308	4.243	1.481	-2.004		
p-value	0.000	0.000	0.000	0.000	0.145	0.050		

Source: own study, based on
(https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html)

None of the four portfolios [Table 5] was able to produce a positive excess return on an annual basis utilizing both Fama-French models. The explanation power of the five-factor model was higher in all cases, and that is true even after the penalty factor introduction. It can be concluded that the five-factor model was more suitable for the ETFs' investment performance attribution.

Table 5. Multifactor models comparison (Jan 2018-Nov 2022)

Name	Fama-French Three-Factor model			Fama-French Five-Factor model		
	Annual Alpha	R^2	R^2 Adjusted	Annual Alpha	R^2	R^2 Adjusted
LV_PORT	-0.84%	97.2%	97.1%	-2.55%	98.0%	97.8%
LG_PORT	-0.87%	98.7%	98.7%	-0.01%	99.0%	98.9%
SV_PORT	-0.78%	97.4%	97.2%	-2.44%	98.0%	97.9%
SG_PORT	-1.22%	98.9%	98.8%	-2.09%	99.3%	99.3%

Source: own study, based on
(https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html)

The results [Table 6] were confirmed when the factor-model benchmark was replaced with Vanguard 500 Index. All the portfolios underperformed in relation to the newly introduced benchmark. The appraisal measures suggest that LV_PORT and LG_PORT had the best performance in the group, as per the most risk-adjusted ratios. This is for the most part to the lower self-standing and relative volatility. At the same time, these portfolios exhibit the lowest expected losses according to Value-at-Risk, with the exception of analytical Value-at-Risk for the benchmark that is slightly lower.

Table 6. Investment' Performance Appraisal for ETFs in relation to Vanguard 500 Index (Jan 2018-Dec 2022)

Measure	LV_PORT	LG_PORT	SV_PORT	SG_PORT	Vanguard 500 Index
Arithmetic Mean (monthly)	0.72%	0.80%	0.70%	0.68%	0.89%
Arithmetic Mean (annualized)	9.03%	10.02%	8.78%	8.42%	11.17%
Geometric Mean (monthly)	0.58%	0.63%	0.43%	0.44%	0.74%
Geometric Mean (annualized)	7.16%	7.80%	5.24%	5.42%	9.28%
Standard Deviation (monthly)	5.39%	5.88%	7.38%	6.85%	5.40%
Standard Deviation (annualized)	18.67%	20.38%	25.57%	23.73%	18.69%
Downside Deviation (monthly)	3.71%	3.89%	5.21%	4.76%	3.59%
Maximum Drawdown	-26.51%	-30.92%	-40.61%	-30.45%	-23.95%
Beta	0.95	1.05	1.20	1.15	1.00
Alpha (annualized)	-1.44%	-1.61%	-4.35%	-3.50%	0.00%
R Squared	90.68%	93.17%	77.35%	86.41%	100.00%
Sharpe Ratio	0.40	0.41	0.28	0.29	0.50
Sortino Ratio	0.57	0.61	0.39	0.41	0.74
Treynor Ratio (%)	7.80	7.91	5.98	5.97	9.38
Calmar Ratio	0.25	0.16	0.18	0.12	0.31
Active Return	-2.12%	-1.48%	-4.04%	-3.18%	n/a
Tracking Error	5.77%	5.42%	12.75%	9.20%	n/a
Information Ratio	-0.37	-0.27	-0.32	-0.36	n/a
Skewness	-0.54	-0.22	-0.62	-0.42	-0.37
Excess Kurtosis	1.19	-0.17	2.48	0.86	-0.19
Historical Value-at-Risk (5%)	-9.28%	-9.11%	-10.45%	-11.86%	-8.75%
Analytical Value-at-Risk (5%)	-8.08%	-8.81%	-11.35%	-10.51%	-7.99%

Source: own study, based on Bloomberg terminal

Decomposing the tracking record is required to have a better understanding of the ETFs' investing performance. The performance attribution findings [Table 7] for the period of five years are offered to achieve that. The market conditions were generally favorable for ETFs with the stock market outperforming a risk-free proxy on a cumulative level for the last five years. However, there was a negative trend to size factor for all observed portfolios due to their universal exposure towards small-cap stocks and the underperformance of small-cap to large-cap stocks at the same time. These results do not align with the predictions of the initial research using the Fama-French model, which suggests that small-cap stocks tend to outperform large-cap stocks. Additionally, the growth style outperformed the value style, as measured by the book-to-market ratio. This trend had a positive impact on the value of all portfolios with the exception of SV_PORT. The performance of stocks from companies with strong operating profits and a conservative investing approach also affected the value of the portfolios. In the case of LG_PORT, negative exposure to these types of stocks resulted in lost value, while in the case of all other portfolios, positive exposure to these stocks had a positive impact on their value.

Table 7. ETFs Portfolio Performance Attribution (Jan 2018-Nov 2022)

Name	Rm-Rf	SMB	HML	RMW	CMA	Total	Annual Alpha	R^2
Large-Value Portfolio (LV_PORT)	78.41	-0.50	-1.46	8.37	6.90	70.45	-2.55%	97.96%
Large-Growth Portfolio (LG_PORT)	90.91	-0.05	1.10	-7.03	-1.72	83.09	-0.01%	99.00%
Small-Value Portfolio (SV_PORT)	78.77	-0.51	-1.45	8.43	6.53	71.43	-2.44%	98.05%
Small-Growth Portfolio (SG_PORT)	88.65	-6.38	-2.32	8.95	2.28	73.73	-2.09%	99.34%
Factor Premiums (BPS)	*8 7.31*	*- 7.53*	*- 6.08*	*5 0.56*	*3 5.22*			

Source: own study, based on
(https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html)

The observed period in question is the one that started at the beginning of 2022 [Table 8] due to the geopolitical global setting and economic conditions. The period was chosen for comparison because it represents a meaningful or relevant benchmark for evaluating the performance of different portfolios. During this period, the market as a whole underperformed compared to the risk-free rate, which is typically assumed to be the return on a zero-risk investment such as a US Treasury bond. This means that the overall return on the market was lower than the return that investors could have obtained by simply holding a safe asset without any risk. The impact of this underperformance was felt across all portfolios, as the value of their holdings declined relative to the risk-free rate. In addition to underperforming compared to the risk-free rate, the market also showed different dynamics between small-cap and large-cap stocks. Specifically, the performance of small-cap stocks was worse than that of large-cap stocks, as measured by some appropriate benchmark index. This could be due to a variety of factors, such as the relative riskiness or liquidity of small-cap stocks, the state of the sector or the industries in which they operate, or the specific characteristics of the companies in question.

Despite the overall negative performance of the market and the underperformance of small-cap stocks, the value style made a comeback in a big way during the observed period. Strategies that involved overweighting stocks with higher book-to-price ratios outperformed those that focused on growth stocks (i.e., those that are expected to have higher future earnings growth). This suggests that investors who were able to identify and invest in value stocks were able to capture higher returns, despite the challenging market conditions. Furthermore, assigning higher weights towards stocks of companies that have higher operating profits and more conservative investment policies also delivered better results than was the case for the previously observed longer period. This could be because these companies were better able to weather the market downturn and maintain their profitability, or they were more cautious and avoided making risky or speculative investments that may have backfired.

Table 8. ETFs Portfolio Performance Attribution (Jan 2022-Nov 2022)

	Rm-Rf	SMB	HML	RMW	CMA	Total	Annual Alpha	R^2
Large-Value Portfolio (LV_PORT)	-118.07	-0.29	31.29	15.85	60.10	-21.14	-1.20%	99.68%
Large-Growth Portfolio (LG_PORT)	-143.81	-0.43	-36.28	-6.49	-4.82	-211.48	-2.37%	99.60%
Small-Value Portfolio (SV_PORT)	-118.07	-0.29	31.29	15.85	60.10	-21.14	-1.20%	99.68%
Small-Growth Portfolio (SG_PORT)	-139.65	-6.19	81.80	15.79	18.02	-40.12	-1.19%	99.88%
Factor Premiums (BPS)	**-134.91**	**-7.45**	**257.27**	**69.27**	**203.64**			

Source: own study, based on
(https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html)

CONCLUSIONS

For the longer-term period, which accounts for the emergence of the pandemic environment, the market premium, operating profitability, and conservative investing policy delivered positive factor premiums. In contrast, during the same period, exposure to the low book-to-market and small-cap size effects had the opposite impact. After the inflection point, marked by the bear market that commenced in early 2022 the dynamics of the investment factors have changed. The market premium sharply declined due to the market index decline and treasury bill yield increase, as a part of monetary tightening. Value book-to-market factor had re-emerged in dramatical fashion, by being the prevailing contribution component based on factor premiums. When it comes to the size effect for raw unadjusted returns, the results are inconsistent with Rompotis (2019) results. During both short and long-term periods, the investors' preference was in favor of large-cap stocks that showed a higher level of resilience during the turbulent macro environment in comparison to their small-cap peers. However, the changing market dynamics in observing periods can explain the differences. On the other hand, the results are in line with Fama & French (2015), when it comes to value factors for the most recent period, after market inflection moment. This is demonstrated by the short-term most recent observed period that was characterized by significantly different market dynamics compared to the longer period, with the value style outperforming the growth style, and more conservative investing strategies delivering better results. Appraisal on a risk-adjusted basis showed that large-cap ETFs have outperformed their small-cap peers. This can be for the most part explained by their lower self-standing and relative volatility. The findings are consistent with Rompotis (2019) study claiming that on a risk-adjusted basis, small-cap stocks underperform large-cap peers. The explanatory power of the five-factor model was higher in all cases, and that is true even after the penalty factor introduction. This is consistent with Fama & French (2015) and Fama & French (2004). The investment alpha for portfolios composed out of ETFs was not present both for multi-factor models and appraisal measures. These results are in line with the mutual funds study findings Korenak (2022). In addition to the findings mentioned above, it may be useful to consider the implications of the size drift observed in some of the ETFs. This can affect the risk and return characteristics of the ETF and may lead to divergences from the index performance. It is important for investors to be aware of any size drift in ETFs they are considering, as it may impact the expected returns and risk profile of the investment. On the other hand, the absence of pure-style drift in the ETFs studied suggests that they were able to maintain a consistent investment strategy and closely track the performance of the underlying index. These findings are not in line when it comes to size-drift presence but in line with size-drift absence Korenak & Stakic (2022).

The study provided valuable insights and tools for a variety of stakeholders within the investment community. For professional investment decision-makers, the results of the attribution models presented in the study can serve as a useful resource for optimizing portfolios according to their expectations and goals. By analyzing the sources of returns and risk for ETFs in the context of market conditions, the study may provide a feedback mechanism for decision-makers to fine-tune their portfolio exposures and make more informed investment decisions. Further studies can be developed in the direction of

understanding specific ETFs' performance based on investment strategies, themes, and exposures, that go beyond the investment factors within mainstream multifactor models.

REFERENCES

[1] Black, F., Jensen, M. C., & Scholes, M. (1972). The capital asset pricing model: some empirical tests, Studies in the theory of capital markets: New York, NY [u.a.], pp. 79–121. Available at: https://ezproxy.nb.rs:2076/login.aspx?direct=true&db=edszbw&AN=EDSZBW379448416&site=eds-live (Accessed: 01 January 2023).

[2] Fama, E. F., & French K. R. (2004). The Capital Asset Pricing Model: Theory and Evidence, The Journal of Economic Perspectives, 18(3), pp. 25–46. Available at: https://ezproxy.nb.rs:2076/login.aspx?direct=true&db=edsjsr&AN=edsjsr.3216805&site=eds-live (Accessed: 20 March 2022).

[3] Carhart, M. (1997). On Persistence in Mutual Fund Performance, The Journal of Finance, 52(1), pp. 57–82. doi: 10.2307/2329556

[4] Boamah, N. A., (2015). Robustness of the Carhart four-factor and the Fama-French three-factor models on the South African stock market, Review of Accounting and Finance, 14(4), pp. 413–430. doi: 10.1108/RAF-01-2015-0009

[5] Fama, E. F., & French, K. R. (2015). A five-factor asset pricing model, Journal of Financial Economics, 116(1), pp. 1–22. doi: 10.1016/j.jfineco.2014.10.010

[6] Fama, E. F., & French, K. R. (2016). Dissecting Anomalies with a Five-Factor Model, The Review of Financial Studies, 29(1), pp. 69–103. Available at: https://ezproxy.nb.rs:2076/login.aspx?direct=true&db=edsjsr&AN=edsjsr.43866012&site=eds-live (Accessed: 28 December 2022).

[7] Meier, M., & Maier, C. (2022). From stocks to ETFs: explaining retail investors' migration behavior. Internet Research, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/INTR-09-2021-0695

[8] Sherrill, E., Shirley, S., & Stark, J. (2020). ETF use among actively managed mutual fund portfolios. Journal of Financial Markets, Volume 51, 2020, 100529, ISSN 1386-4181, https://doi.org/10.1016/j.finmar.2019.100529

[9] Arampatzis, M. Daskolou, K., Papaioannou, E., & Prassa, P. (2020). Performance Evaluation of Global High-rated ETFs During the Taper Tantrum. Journal of Central Banking Theory and Practice, vol.9, no.1, pp.23-44. https://doi.org/10.2478/jcbtp-2020-0002

[10] Korenak, B. (2022) Dynamics of Prevailing U.S. Equity Market Investment Factors and Insight into the Mutual Funds Performance Attribution, Global Economic Trends – Challenges and Opportunities, Belgrade Banking Academy, Belgrade, Serbia ISBN 978-86-7852-070-9

[11] Rompotis, G. (2019). Large-cap vs small-cap portfolio performance: new empirical evidence from ETFs. Review of Accounting and Finance, Vol. 18 No. 1, pp. 71-94. https://doi.org/10.1108/RAF-03-2017-0056

[12] Lobato, M., Rodriguez, J., & Romero, H. (2021). A volatility-match approach to measure performance: the case of socially responsible exchange traded funds (ETFs). Journal of Risk Finance, Vol. 22 No. 1, pp. 34-43. https://doi.org/10.1108/JRF-04-2020-0066

[13] Korenak, B., & Stakic, N. (2022). Investment performance attribution of the U.S. small-size value mutual funds using Fama-French five-factor model. International Review, 1-2, 17-23. https://doi.org/10.5937/intrev2202021K

[14] Korenak B., (2022). Investment Performance Evaluation of the United States Equity Thematic and Sector Mutual Funds' Portfolios, (Doctorial dissertation), University Singidunum, Belgrade, 10.13140/RG.2.2.30616.26886