DOI: 10.28934/ea.1936 First Online: January 21, 2025

ORIGINAL SCIENTIFIC PAPER

Navigating Sector Momentum: Evaluating Performance in the US and Global ETFs for Retail Investors

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ABSTRACT

Modern-day investing comes with numerous options and complexities for non-professional investors. An easy way for them to earn acceptable returns is by investing in market index exchange-traded funds (ETFs). Nonetheless, evidence points to the potential for achieving superior results through a simple sector momentum strategy. This study aims to test whether those results hold when applied to a different dataset and to assess the performance attribution of such a strategy. The analysis is based on two sets of sector ETFs, one focused on the US market and the other on the global market, to explore the applicability of the results in both contexts. For each dataset, performance measures were calculated, and factor analysis was conducted. The findings indicate that sector momentum strategies outperform the benchmark, although no single strategy is universally optimal for every investor or investment opportunity set. Factor analysis confirms that the strategy generates alpha and that its performance cannot be fully explained by traditional factors. Thus, the study reinforces the potential of sector momentum investing, particularly for retail investors, while acknowledging its limitations, such as the exclusion of transaction costs.

Keywords: *ETFs, sector investing, momentum strategy, geometrically decreasing weighted portfolio, investment performance evaluation, factor-based models*

JEL Classification: G110

INTRODUCTION

Investors nowadays are faced with a potentially intimidating number of investment opportunities. In order to optimize their investment process, finance theory suggests that they should consider all the possible investments in terms of their risks, returns, and correlations. However, most retail investors do not have enough expertise, or other resources (such as time and money) to perform those complex analyses.

To overcome this issue, retail investors may choose to invest in market index ETFs, as they are a time- and cost-efficient way of getting exposure to the market risk, while maintaining a certain level of diversification. In fact, data shows that ETFs are becoming an increasingly popular investment vehicle, with assets under management surpassing 11 trillion USD at the end of 2023 (PwC, 2024). While that approach may be satisfying for some investors, previous research showed that using simple sector momentum strategies could bring them better results (Korenak and Pavlović, 2023). Sector momentum strategies were based on choosing a certain number of winning sectors and investing in them as opposed to holding a benchmark market index ETF,

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which was represented by SPDR S&P 500 ETF Trust. This study covered the period starting at the beginning of 2010 and ending in June 2023.

The aim of this paper is to investigate whether similar results could be achieved by using different investment opportunity sets. One will be based on Fidelity Sector ETFs (similar to the previously mentioned study by Korenak and Pavlović that used 11 Fidelity sector mutual funds), and the other on iShares Global Sector ETFs, so that the analysis can be performed for the global market as well. The research will cover the results of the hypothetical portfolios in absolute and risk-adjusted terms. In addition to that, factor analyses will be performed to assess the performance attribution.

The conclusions will help us better understand the potential advantages of using sector momentum strategies. If the research further supports the previous findings, it could provide investors with more reliable information for decision-making. Additionally, it can further investigate the source of returns with factor analysis.

The rest of the paper is organized as follows: first, there will be a literature review to summarize the theoretical background of the paper; second, the used data and methodology will be described; third, the results of the portfolios will be presented together with the factor analysis; and lastly, the key findings will be outlined in the conclusion.

LITERATURE REVIEW

ETFs are relatively new instruments introduced during the 1990s. Their structure makes them an effective tool for passive index investing (Pavlović, Korenak and Stakić, 2024), therefore recommending them to investors who do not have enough time or expertise to invest in a different manner. Their increasing popularity led to significant research concerning this topic.

Some of the research focuses on the advantages of ETFs that are related to the way they were designed. For instance, introducing ETFs to the NYSE has led to significant improvement in their liquidity (Boehmer and Boehmer, 2003). Guedj and Huang (2008) examined whether ETFs are replacing index mutual funds and concluded that the role of ETFs becomes more prominent when the underlying index is narrower and less liquid. Aber, Li and Can (2009) demonstrated that ETFs are more likely to trade at a premium compared to mutual funds based on the same index. Sherrill, Shirley and Stark (2020) proved that the use of ETFs could be beneficial for the actively managed mutual funds.

Other research focuses on the relationship between ETFs and their underlying assets. Richie and Madura (2008) found that including stocks in an ETF improves their liquidity. Ben-David, Franzoni and Moussawi (2018) concluded that stocks with higher ETF ownership exhibit higher volatility, as well as a higher negative autocorrelation. The research also confirms that there is a migration from stocks to ETFs when it comes to retail investing (Meier and Maier, 2023). Additionally, ETFs are proven to be used to indirectly short stocks that are otherwise not available for short selling (Li and Zhu, 2022).

To better understand the source of the ETFs' performance, research papers often use factor-based models. The Capital Asset Pricing Model (CAPM) uses market risk as a factor that drives returns (Jensen, Black and Scholes, 1972). It was further expanded by Fama and French (2004) in their three-factor model that also included value and size factors. They later introduced two additional factors to form a five-factor model: operational profitability and approach to investing (Fama and French, 2016).

When it comes to momentum, Jegadeesh and Titman (1993) documented its presence in single stocks. Carhart (1997) included it in its model as an additional factor. Breloer, Scholz and Wilkens (2014) discovered that introducing country and sector momentum factors to the Fama-French three-factor model reduces the alpha of international and global equity funds, indicating that country and sector momentums are among the sources of returns. Moreover, they proved that adding a traditional stock momentum factor does not significantly change their results, i.e. that

the momentum contained in individual stocks' performance was already captured by the country and sector momentum. Wang and others (2017) claimed that momentum sector investing appears profitable even after taking into account potential transaction costs and systematic risk adjustments. Strategies based on sector momentum were analyzed with the conclusion that there is a potential for simple use of this phenomenon by retail investors in order to achieve better risk-adjusted performance than by holding a benchmark index ETF (Korenak and Pavlović, 2023). This conclusion was further supported by a study that was based on a different investment opportunity set and covered the period that started at the beginning of 2013 and ended in September 2024 (Korenak, Balaban and Pavlović, 2024).

There are many other examples of research that analyzed the performance of ETFs. For instance, Arampatiz and others (2020) examined 50 ETFs using the CAPM model. Rompotis (2020) compared the performance of actively and passively managed ETFs and confirmed the superiority of the latter. Lobato, Rodriguez and Romero (2021) used a volatility match to investigate the risk-adjusted returns of different ETFs. Furthermore, there is evidence that the returns of non-index tracking ETFs are highly correlated to the returns of index ETFs, making the former unjustifiably expensive (Brown, Cederburg and Towner, 2024).

Similarly to the approach taken in this paper, Korenak and Stakić (2022) used the Fama-French five-factor model to analyze the performance of the US small-size value mutual funds. That study was followed by the application of the same model for the performance attribution of US ETFs (Korenak, Stakić and Vesić, 2023). This paper will focus on using the same principles, though the examined portfolios will be based on the sector momentum strategies.

DATA AND METHODOLOGY

The research is based on two investment opportunity sets that consist of 11 sector ETFs and a benchmark market index ETF each. The first set is presented in Table 1 and encompasses Fidelity Sector ETFs (ETFs 1 to 11 in the table) and is paired with SPDR S&P 500 ETF Trust (ETF number 12) which serves as a benchmark. The other set is shown in Table 2 and is made of iShares Global Sector ETFs (ETFs 1 to 11 in the table) and uses Vanguard Total World Stock ETF as a benchmark (ETF number 12).

Table 1. Investment opportunity set based on Fidelity Sector ETFs

	Ticker	**Name of the ETF**
1.	FBMPX	Fidelity Select Communication Services Portfolio
2.	FSCPX	Fidelity Select Consumer Discretionary Portfolio
3.	FDFAX	Fidelity Select Consumer Staples Portfolio
4.	FSENX	Fidelity Select Energy Portfolio
5.	FIDSX	Fidelity Select Financials Portfolio
6.	FSPHX	Fidelity Select Health Care Portfolio
7.	FCYIX	Fidelity Select Industrials Portfolio
8.	FSPTX	Fidelity Select Technology Portfolio
9.	FSDPX	Fidelity Select Materials Portfolio
10.	FRESX	Fidelity Real Estate Investment Portfolio
11.	FSUTX	Fidelity Select Utilities Portfolio
12.	SPY	SPDR S&P 500 ETF Trust

Source: Authors

Table 2. Investment opportunity set based on iShares Global Sector ETFs

	Ticker	Name of the ETF
1.	IXP	iShares Global Communication Services ETF
2.	RXI	iShares Global Consumer Discretionary ETF
3.	KXI	iShares Global Consumer Staples ETF
4.	IXC	iShares Global Energy ETF
5.	IXG	iShares Global Financials ETF
6.	IXJ	iShares Global Healthcare ETF
7.	EXI	iShares Global Industrials ETF
8.	MXI	iShares Global Materials ETF
9.	IXN	iShares Global Tech ETF
10.	JXI	iShares Global Utilities ETF
11.	IFGL	iShares International Developed Real Estate ETF[1]
12.	VT	Vanguard Total World Stock ETF

Source: Authors

We constructed 13 hypothetical portfolios for every set. Eleven of them were portfolios that followed the sector momentum strategy. This strategy picks the winning sectors by finding those that achieved the highest return over the previous three months. Once those sectors are identified, the assets are invested in an adequate number of sector ETFs (from 1 to 11), with geometrically decreasing weights in accordance with the sector's performance ranking. These portfolios are rebalanced monthly. Additionally, there is an equally weighted portfolio that consists of all 11 sector ETFs. It is rebalanced monthly as well as the momentum portfolios. Lastly, the benchmark portfolio was constructed by investing all the available assets in the benchmark market index ETF and holding that position over the entire observed period.

The study covers the period starting from the beginning of 2009 and ending in September 2024. This period follows the Global Financial Crisis which led to significant changes in the world of finance. Additionally, the ETFs became more popular in this millennium, which assured the data availability for the mentioned period.

For all the portfolios the performance measures were calculated. They included the absolute return, risk, and risk-adjusted return metrics. The risk-free return is represented by the return on 3-month Treasury Bills. The risk-adjusted measures that were used are the following:

$$Sharpe\ ratio = \frac{Annualized\ arithmetic\ mean\ return - Annualized\ risk\ free\ return}{Annualized\ standard\ deviation\ of\ returns} \quad (1)$$

$$Sortino\ ratio = \frac{Annualized\ arithmetic\ mean\ return - Annualized\ risk\ free\ return}{Annualized\ downside\ deviation\ of\ returns} \quad (2)$$

$$Treynor\ ratio = \frac{Annualized\ arithmetic\ mean\ return - Annualized\ risk\ free\ return}{Beta} \quad (3)$$

$$Calmar\ ratio^{2} = \frac{Annualized\ arithmetic\ mean\ return}{Maximum\ drawdown} \quad (4)$$

$$Information\ ratio = \frac{Active\ return}{Tracking\ error} \quad (5)$$

[1] Because of the data availability, we chose the ETF that covers only developed markets for real estate sector.
[2] Calmar ratio is calculated over the last 36 months.

The performance attribution was performed through the use of the Fama-French five-factor model (Fama and French, 2016). Finally, we examined the validity of choosing the five-factor model over the original three-factor model of Fama and French (Fama and French, 2004) for these data sets. All the used factors are from the database provided on Professor French's webpage (Fama and French, 2024).

The three-factor model (equation 6) expands the CAPM (Jensen, Black and Scholes, 1972), which only uses a market premium as the explanatory variable, by introducing two additional factors that are based on a company's size and its categorization as a company with value or growth stocks. The company size is measured by its market capitalization, and the ratio of book to market value is used to determine whether a stock is considered a value or a growth stock. Equation 7 shows the five-factor model, which also includes factors that are based on the operational profitability and on the approach to investing. All the factors introduced by Fama and French are designed as long-short portfolios. E.g. the size factor "buys the small companies", and "shorts the big companies" (SMB – Small Minus Big). Small companies are distinguished as those that comprise 10% of the market, while the rest are considered big. The value (HML – High Minus Low), operational profitability (RMW – Robus Minus Weak) and approach to investing (CMA - Conservative Minus Aggressive) factors follow the same logic, though they are based on the 30th and 70th percentiles of the adequate measures.

$$R_{it} - R_{ft} = a_i + b_i\left(R_{Mt} - R_{ft}\right) + s_i SMB_t + h_i HML_t + e_{it} \quad (6)$$

$$R_{it} - R_{ft} = a_i + b_i\left(R_{Mt} - R_{ft}\right) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + e_{it} \quad (7)$$

RESULTS AND DISCUSSION

Portfolio Performances

Performances of Portfolios Based on Fidelity Sector ETFs

The performance of all 13 portfolios based on the first investment opportunity set (Fidelity Sector ETFs and SPDR S&P 500 ETF Trust) is illustrated in Figure 1. This figure shows the values of every portfolio at different points in time which would have been achieved if the appropriate strategies were implemented with the starting invested capital of $10,000. It is clear that the sector momentum strategy with one winning sector would have achieved the highest ending value of the portfolio. Other sector momentum strategies would have earned lower returns over the observed period, but they would have been quite similar, though generally slightly decreasing with the increase in the number of winning sectors. The lowest ending value would have been related to the equally weighted portfolio, followed by the benchmark portfolio (investment in SPDR S&P 500 ETF Trust).

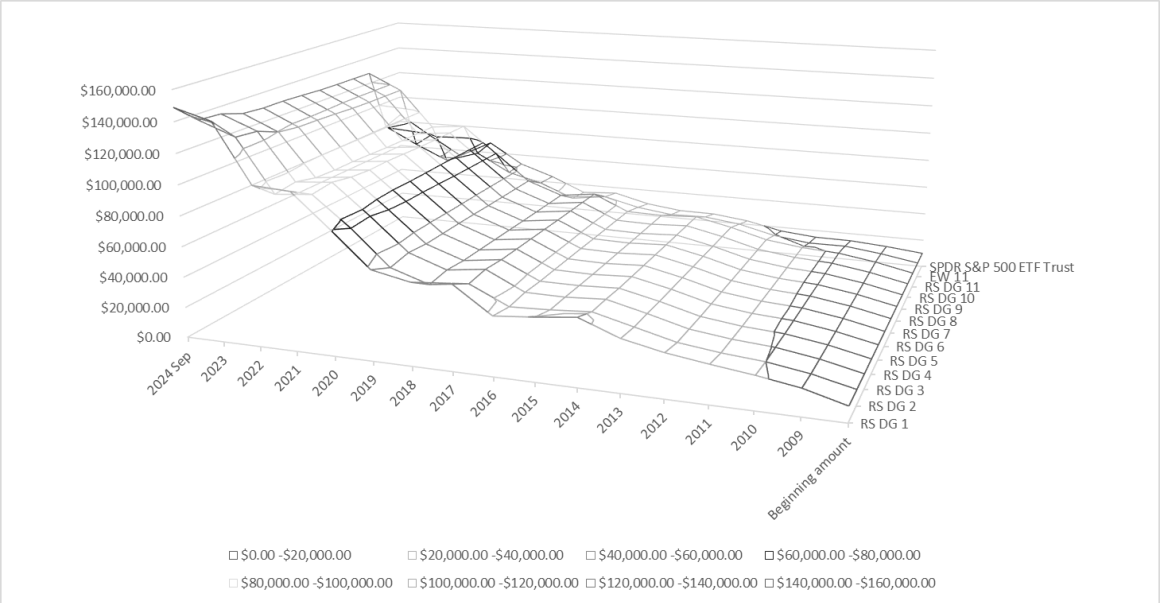

Figure 1. Value of portfolios based on Fidelity Sector ETFs

Source: Authors

However, these results only illustrate absolute returns, and do not account for the undertaken risk. Therefore, we present more comprehensive measures in Table 3, though every other sector momentum strategy has been omitted for greater legibility, as these strategies achieved similar results.

In addition to the returns (presented as arithmetic and geometric means), this table also presents several risk measures. When it comes to risk, there is no clear answer to the question of which portfolio is the riskiest, as different metrics rank the portfolios differently. Still, the sector momentum strategy with one winning sector has the highest standard deviation, downside deviation, and value at risk, as well as the lowest percentage of positive periods. Its excess kurtosis and maximum drawdown were also among the highest (in absolute terms). However, this portfolio had the highest positive skewness (only the portfolio with 2 winning sectors had the positive skewness as well, which is not shown in the table), and the highest gain-to-loss ratio, and therefore was able to overcome the losses. The other sector momentum strategies were generally less risky, but did not have the same ability to overcome the losses. The equally weighted portfolio had a lower standard deviation, yet it had the highest maximum drawdown and excess kurtosis. The benchmark portfolio achieved lower standard deviation and downside deviation, but it had a high maximum drawdown, the highest negative skewness, and the lowest gain-to-loss ratio. Still, it had the highest percentage of the positive periods.

The question of whether the higher risk was adequately compensated with the higher return remains. As in the previous part of the analysis, the answer is not clear, and it depends on the risk aspect that is the most important to the investor. For instance, the Treynor ratio is the highest for the one-winner strategy, which might be relevant for investors who already have a well-diversified portfolio that they want to expand. The value of all the ratios (Sharpe, Sortino, Treynor, Calmar and information ratio) are similar among the other sector momentum strategies, and they indicate that it might be optimal to choose a strategy with a low number of winners (e.g. three), as the trade-off between risk and return, as well as the simplicity of implementation might be the highest in that case. All of these indicators were lower for the equally weighted portfolio and for the benchmark portfolio, as their risks were followed by lower returns.

Table 3. Performance measures of portfolios based on Fidelity Sector ETFs

	RS DG 1	RS DG 3	RS DG 5	RS DG 7	RS DG 9	RS DG 11	EW 11	SPDR S&P 500 ETF Trust
Arithmetic Mean (monthly)	1.59%	1.50%	1.48%	1.47%	1.47%	1.47%	1.22%	1.24%
Arithmetic Mean (annualized)	20.84%	19.61%	19.22%	19.17%	19.11%	19.11%	15.65%	15.90%
Geometric Mean (monthly)	1.44%	1.39%	1.36%	1.36%	1.36%	1.36%	1.11%	1.14%
Geometric Mean (annualized)	18.70%	17.97%	17.65%	17.62%	17.56%	17.56%	14.19%	14.60%
Standard Deviation (monthly)	5.56%	4.86%	4.76%	4.74%	4.73%	4.73%	4.64%	4.37%
Standard Deviation (annualized)	19.25%	16.83%	16.49%	16.41%	16.39%	16.38%	16.09%	15.13%
Downside Deviation (monthly)	3.00%	2.75%	2.70%	2.69%	2.69%	2.69%	2.83%	2.70%
Maximum Drawdown	-19.93%	-16.32%	-16.49%	-16.58%	-16.67%	-16.68%	-24.15%	-23.93%
Beta	0.83	0.9	0.91	0.91	0.91	0.91	1.03	1
Sharpe Ratio	0.93	1.01	1.01	1.01	1.01	1.01	0.84	0.91
Sortino Ratio	1.71	1.75	1.75	1.75	1.75	1.75	1.36	1.45
Treynor Ratio	21.69	18.89	18.28	18.18	18.11	18.1	13.14	13.77
Calmar Ratio	0.78	0.96	1.01	1	1	1	0.55	0.49
Active Return	4.11%	3.38%	3.05%	3.02%	2.97%	2.96%	-0.41%	N/A
Tracking Error	14.81%	10.04%	9.17%	8.96%	8.90%	8.88%	3.92%	N/A
Information Ratio	0.28	0.34	0.33	0.34	0.33	0.33	-0.1	N/A
Skewness	0.18	-0.09	-0.11	-0.12	-0.12	-0.12	-0.28	-0.43
Excess Kurtosis	1.01	0.71	0.64	0.61	0.61	0.61	1.19	0.46
Historical Value-at-Risk (5%)	7.67%	6.65%	6.67%	6.65%	6.66%	6.66%	6.91%	6.93%
Positive Periods	60.32%	66.67%	65.08%	65.08%	65.08%	65.08%	66.67%	69.31%
Gain/Loss Ratio	1.39	1.11	1.18	1.18	1.18	1.18	0.99	0.9

Source: Authors

Performances of Portfolios Based on iShares Global Sector ETFs

In the same manner as for the previous investment opportunity set, the results for iShares Global Sector ETFs and Vanguard Total World Stock ETF are presented in Figure 2 and Table 4. As in the previous set, the one-winner strategy earned the highest return, and was followed by other sector momentum strategies that achieved similar, though generally lower results as the number of winners increased. Once again, the lowest return was achieved by the equally weighted portfolio, and then by the benchmark portfolio.

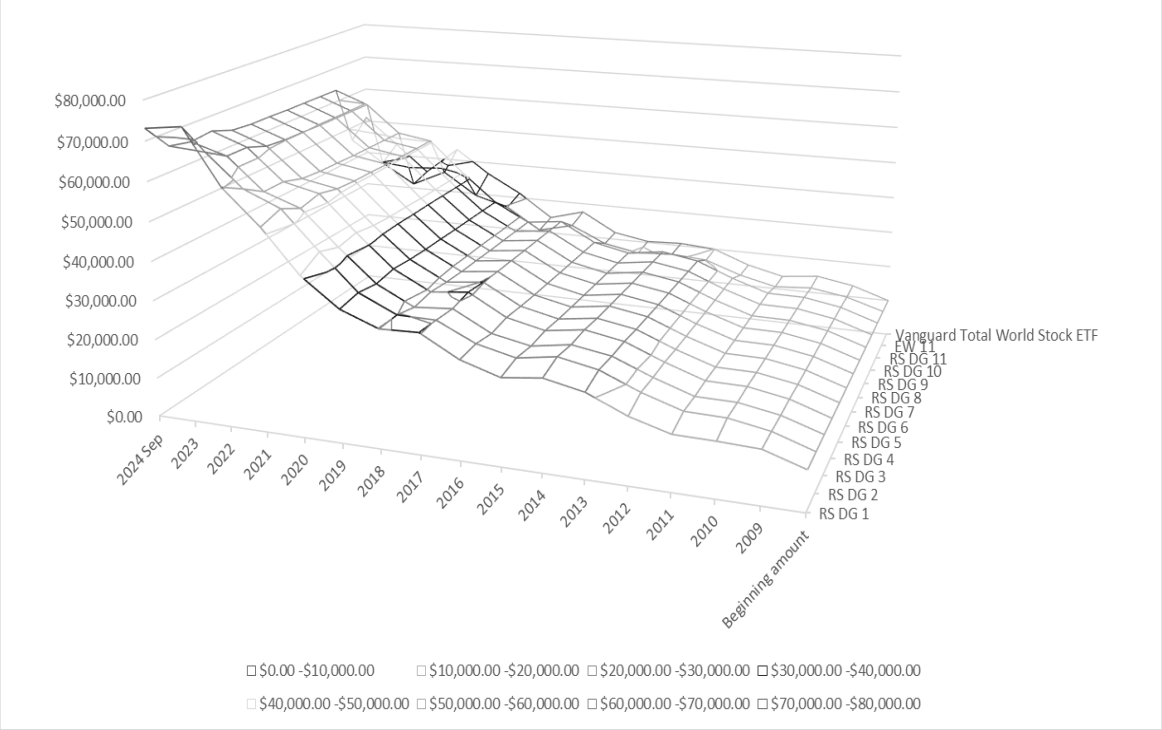

Figure 2. Value of portfolios based on iShares Global Sector ETFs
Source: Authors

When it comes to the risk measures, the results are somewhat different in comparison to the previous set. Among the sector momentum strategies, the one-winner strategy again seemed to be the riskiest. It had the highest standard deviation, downside deviation, maximum drawdown, excess kurtosis and value at risk, as well as the lowest percentage of positive periods. Still, it once more had the highest positive skewness and the highest gain-to-loss ratio and was therefore able to recover from the losses. The equally weighted portfolio behaved differently. Again, it had a lower standard deviation than the momentum portfolios, but it also had the lowest number of positive periods and was the most negatively skewed. Still, its gain-to-loss ratio was the highest, which helped offset some of the losses. The benchmark portfolio had a relatively high standard deviation, the highest maximum drawdown and value at risk, as well as the lowest gain-to-loss ratio. It was also quite negatively skewed and had a relatively low number of positive periods.

Overall, risk and return results are more uniform among the sector momentum strategies in this set, making it more difficult to distinguish "the best" approach. The values of all the ratios (Sharpe, Sortino, Treynor, Calmar and information ratios) are quite similar for all the sector momentum strategies, with the exception of Treynor and Calmar ratios for the one-winner strategy. In this case, those values are a little bit higher, which suggests that this strategy could be the best for investors who already have well-diversified portfolios that they would like to expand, or for those who would like to earn the highest reward for the maximum drawdown that they have to bear. As this portfolio might be too risky for some investors, others might be more appropriate, but there is not a clear winner, as different ratios rank them differently, though with very small differences. Based on the results, investors could choose any strategy from two to four winners to achieve similar performance and retain simplicity. The conclusion remains even when the equally weighted portfolio and the benchmark portfolio are considered, as they underperformed the sector momentum strategies on a risk-adjusted basis.

Table 4. Performance measures of portfolios based on iShares Global Sector ETFs

	RS DG 1	RS DG 3	RS DG 5	RS DG 7	RS DG 9	RS DG 11	EW 11	Vanguard Total World Stock ETF
Arithmetic Mean (monthly)	1.19%	1.10%	1.09%	1.08%	1.08%	1.08%	0.91%	0.97%
Arithmetic Mean (annualized)	15.29%	14.07%	13.88%	13.82%	13.80%	13.79%	11.47%	12.33%
Geometric Mean (monthly)	1.06%	1.00%	0.99%	0.98%	0.98%	0.98%	0.81%	0.87%
Geometric Mean (annualized)	13.46%	12.66%	12.52%	12.47%	12.45%	12.44%	10.19%	10.91%
Standard Deviation (monthly)	5.23%	4.60%	4.53%	4.51%	4.50%	4.50%	4.41%	4.63%
Standard Deviation (annualized)	18.13%	15.94%	15.68%	15.61%	15.59%	15.59%	15.27%	16.04%
Downside Deviation (monthly)	3.09%	2.74%	2.72%	2.71%	2.71%	2.71%	2.80%	2.94%
Maximum Drawdown	-17.96%	-17.52%	-17.52%	-17.45%	-17.45%	-17.46%	-23.07%	-25.52%
Beta	0.87	0.87	0.88	0.88	0.88	0.88	0.94	1
Sharpe Ratio	0.73	0.76	0.76	0.76	0.76	0.76	0.64	0.66
Sortino Ratio	1.22	1.26	1.25	1.25	1.25	1.25	1	1.03
Treynor Ratio	15.24	13.92	13.68	13.6	13.58	13.56	10.46	10.61
Calmar Ratio	0.83	0.66	0.61	0.61	0.61	0.61	0.4	0.31
Active Return	2.55%	1.75%	1.61%	1.56%	1.54%	1.53%	-0.72%	N/A
Tracking Error	11.79%	7.86%	7.18%	7.02%	6.96%	6.95%	2.53%	N/A
Information Ratio	0.22	0.22	0.22	0.22	0.22	0.22	-0.28	N/A
Skewness	0.09	-0.05	-0.11	-0.12	-0.12	-0.12	-0.34	-0.33
Excess Kurtosis	1.23	0.49	0.48	0.46	0.46	0.46	0.83	0.67
Historical Value-at-Risk (5%)	7.12%	7.08%	7.04%	7.03%	7.03%	7.03%	6.69%	7.59%
Positive Periods	61.90%	64.55%	62.96%	63.49%	63.49%	63.49%	59.79%	62.96%
Gain/Loss Ratio	1.12	1.02	1.09	1.06	1.06	1.06	1.14	0.98

Source: Authors

Performance Attribution

Performance Attribution of Portfolios Based on Fidelity Sector ETFs

In order to better understand the source of the returns for the sector momentum strategies, we performed factor analyses. We chose the strategy with three winning sectors, as it achieved interesting results in both investment sets. The analysis was carried out through the use of the Fama-French five-factor model and presented in Table 5 (for the Fidelity Sector ETFs).

The factor that had the highest influence over the achieved returns was the market premium (R_m-R_f), as expected. Our portfolio is a long-only portfolio composed of stock ETFs, and therefore it is logical that it would follow the market. This factor had a positive performance over the observed period and our portfolio had a positive exposure to it, so the overall results were positive. On top of that, it was the only statistically significant factor at the level of 5%.

The SMB (Small Minus Big) factor is the size factor, to which our portfolio was positively exposed, as it favored smaller companies (based on market capitalization). However, over the

observed period the larger companies outperformed the smaller ones, and therefore the overall influence of this factor on our portfolio's return was negative.

The HML (High Minus Low) factor is the value factor based on the book-to-market value. Our portfolio favored the value companies over the growth companies, but they achieved lower returns, so the total effect of this factor on our portfolio was negative.

The RMW (Robust Minus Weak) factor is related to operational profitability. Our portfolio was tilted towards companies that had higher profitability and they did outperform the less profitable ones over the observed period. The overall influence on our strategy's performance was positive.

The CMA (Conservative Minus Aggressive) factor is based on the companies' approach to investing. Our portfolio had a slight bias towards companies that invest aggressively, but they underperformed over the observed period, which led to a total negative effect on the strategy's returns.

The model had an R2 of 66.52% and a positive annual alpha of 5.25%. It is not surprising that R2 was not higher, as our strategy is based on sector momentum and therefore should not be fully explained by the factors used in the Fama-French model. The same is true for alpha – it was expected that the higher returns of this strategy could not be fully explained by exposures to the used factors, which would lead to the alpha that remains in the model. Furthermore, it is statistically significant at the level of 5%.

Table 5. Factor analysis of portfolio based on Fidelity Sector ETFs with three winning sectors

Factors	**Rm-Rf**	**SMB**	**HML**	**RMW**	**CMA**	**Annual Alpha**	**R^2**
Coefficient	0.85	0.07	0.07	0.02	-0.04	5.25%	66.52%
t-stat	16.596	0.726	0.845	0.207	-0.330	1.982	
p-value	0.000	0.469	0.399	0.836	0.742	0.049	
Factor Premiums (BPS)	115.82	-1.79	-12.22	29.53	2.79		
Factor Return	98.51	-0.12	-0.89	0.72	-0.13		

Source: Authors

Performance Attribution of Portfolios Based on iShares Global Sector ETFs

Just like in the case of Fidelity Sector ETFs, we did a factor analysis based on the Fama-French five-factor model and a sector momentum strategy for three winning sectors, now for the iShares Global Sector investment opportunity set. It is presented in Table 6.

Again, the market risk factor had the highest influence on the returns of our portfolio, as expected. Our strategy was positively related to the stock market, which consistently earned higher returns than the risk-free asset, and determined that our portfolio would achieve positive returns. This factor was statistically significant at the level of 5%.

When it comes to the other factors, the portfolio had a negative exposure to the SMB factor, however, it achieved negative returns, so the overall effect was positive. Exposures to all the remaining factors were positive, but only the RMW factor earned a positive return and led to an overall positive impact on our portfolio, while the effects of the HML and the CMA factors were negative. The HML factor was statistically significant at the level of 5%, the others were not.

R^2 of the model was 78.67%. As mentioned before, this result was expected, because the strategy relies on an idea that is not fully grasped by the traditional factors. In addition to that, alpha reached the value of 1.93%, though it was not statistically significant at the level of 5%.

Table 6. Factor analysis of portfolio based on iShares Global Sector ETFs with three winning sectors

Factors	Rm-Rf	SMB	HML	RMW	CMA	Annual Alpha	R^2
Coefficient	0.90	-0.15	0.26	0.15	0.03	1.93%	78.67%
t-stat	23.159	-1.321	2.428	0.987	0.207	0.952	
p-value	0.000	0.188	0.016	0.325	0.836	0.342	
Factor Premium (BPS)	92.30	-10.76	-10.77	33.41	-3.73		
Factor Return	83.07	1.57	-2.77	5.11	-0.12		

Source: Authors

Comparison of Different Factor Models

Concerning our factor analysis, one can ask a question: was the Fama-French five-factor model the most appropriate choice? As mentioned before, we were expecting that the model would not perfectly explain the results that our portfolios achieved and that was particularly noticeable in the case of our US portfolio. We opted for a model with more factors so that there would be more opportunities to explain the attained results. However, the other options were also valid, especially because not many factors were statistically significant, so we decided to compare the five-factor model to the three-factor model, i.e. the original Fama-French model (presented in Table 7).

As it is clear from the data shown, the R^2 adjusted was only slightly different than the R^2 in all cases. The two models had virtually the same R^2 adjusted, though it was somewhat higher in the case of the three-factor model for both sets, which confirms that the RMW and CMA factors could have been omitted. This model also showed a higher level of alpha for the second set, but just like in the five-factor model, it was not statistically significant (the related p-value was 0.217, which is not shown in the table). However, the interpretation of results in the first set might have been affected by using a three-factor model, as it lowered the value of alpha and made it statistically insignificant at the level of 5% (it increased the p-value to 0.094).

Table 7. Comparison of Different Factor Models

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
RS GD 3 – Fidelity U.S.	5.14%	66.4%	65.9%	5.25%	66.5%	65.6%
RS GD 3 – iShares Global	2.40%	78.6%	78.3%	1.93%	78.7%	78.1%

Source: Authors

CONCLUSION

Performance evaluation results of momentum portfolios relative to the equally weighted portfolio and the benchmark portfolio were similar in both investment opportunity sets. The sector momentum strategies outperformed the other two, as they achieved higher absolute returns. This conclusion remained the same even when the risk was taken into account, which was supported by the risk-adjusted measures. Therefore, these strategies could be used by investors to enhance their returns (assuming that the previous prevailing market conditions persist), whether they are focusing on the US market or prefer global investing.

However, the results do not suggest that any specific momentum strategy is the optimal one. Rather, it depends on the investment opportunity set that is used to form a strategy, as well as on the preferences of individual investors, e.g. the risk aspects that are the most important to them.

The factor analyses helped us understand the source of the achieved returns for the sector momentum strategies with three winning sectors. As expected, the market premium had the most significant role in influencing these returns. Furthermore, the Fama-French five-factor model did not fully attribute the performance of our portfolios to its factors, as they are not perfectly related to the sector momentum that was behind the strategy. Therefore, the model confirms that alpha was generated, especially in the first investment set.

The lack of statistical significance of some of the factors in the five-factor model led us to examine if the three-factor model was more appropriate. The results generally do not indicate that different models would have affected our previous conclusions significantly.

The findings are in line with the studies that were previously performed (Korenak and Pavlović, 2023 and Korenak, Balaban and Pavlović, 2024). In addition to that, the factor analysis further supported that a part of the returns cannot be tied to traditional factors, which suggests that sector momentum can be seen as a separate factor that could easily be deployed by investors through the use of sector ETFs.

Still, the study has certain limitations. First of all, it does not take into account the effects of transaction costs and taxes. Secondly, it is based on two limited investment opportunity sets, as well as on a limited time period. Thirdly, the study used geometrically decreasing weights, but did not examine whether that is the optimal approach. These limitations leave room for additional research in the future.

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Article history:	Received: 5.11.2024.
	Revised: 13.1.2025.
	Accepted: 16.1.2025.