Does Value Investing Strategy Still Have Value? A Ten-Year Performance Analysis of iShares

S&P 500 Value Exchange-Traded Fund Under the Impact of the COVID-19 Pandemic

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Acknowledgements

Abstract

Value investing was established as a smart beta strategy twenty years ago. However, empirical evidence suggested that it might have lost attractiveness in the recent ten years. This study applied the Capital Asset Pricing Model and the Fama-French-Carhart Four Factors Model to evaluate the ten-year performance of iShares S&P 500 Value ETF (IVE), which tracks the performance of large capitalization value stocks in the United States, using the S&P 500 Index as a benchmark and IVE's major competitor, Vanguard S&P 500 Value ETF (VOOV), as a comparison. This study found that value investing has lost its value in the past decade, especially under the impact of the COVID-19 pandemic.

Keywords: value, factor investing, smart beta, COVID-19, Exchange-Traded Fund, portfolio management

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Does Value Investing Strategy Still Have Value? A Ten-Year Performance Analysis of iShares S&P 500 Value Exchange-Traded Fund Under the Impact of the COVID-19 Pandemic

Factor investing, also known as smart beta investing, is a popular practice in portfolio management. By tilting towards certain risk factors, investors aim to harvest the risk premiums associated with these factors. Starting from the arbitrage pricing theory by Ross (1976), the famous single factor model is the Capital Asset Pricing Model (Sharpe, 1964) which used the market factor to explain stocks' return. Later, with the identification of the size factor and the value factor, Fama and French (1993) constructed a three-factor model, introducing multifactor analysis involving characteristic factors of companies (Bessler et al., 2021). Following them, Carhart (1997) incorporated the momentum factor and developed the four-factor model. The Fama-French-Carhart Four Factor Model thus became widely used in explaining past returns and predicting future performance.

Among these factors, value has been long recognized as an established factor as empirical tests have proven the superior performance of stocks exhibiting value characteristics, e.g., having higher book-to-market ratio, over stocks exhibiting growth characteristics, e.g., having lower book-to-market ratio (Chan & Lakonishok, 2019). However, in the past decade, value investing strategy appeared to fail (Lev & Srivastava, 2019; Israel et al., 2021). There is also evidence that value stocks may be severely impacted during periods of severe financial crises (Fama & French, 2007). Since the COVID-19 pandemic has heavily struck the United States stock market and potentially induced a financial crisis (Yousfi et al. 2021), it is meaningful to re-evaluate the attractiveness of value investing. To date, no study has investigated the value investing strategy under the COVID-19 pandemic context. This study aimed at fulfilling this research gap by using

the Capital Asset Pricing Model and the Fama-French-Carhart Four Factors Model to evaluate

the ten-year performance of an exchange-traded fund—iShares S&P 500 Value ETF—which

tracks the performance of U.S. large capitalization value stocks, in comparison with S&P 500

Index and one of its major competitors—the Vanguard S&P 500 Value ETF.

Theoretical Framework

The Capital Asset Pricing Model (CAPM)

The Capital Asset Pricing Model (CAPM) invented by William Sharpe (1964) symbolized

the birth of asset pricing theory. From Modern Portfolio Theory (Markowitz, 1952), we know

that each investor should invest a fraction of their portfolio in the risk-free security and the rest

in the tangency portfolio. Under the CAPM assumption, the market portfolio is a value-weighted

portfolio consisting of all assets, and it is the tangency portfolio. Therefore, the CAPM implies

that the expected excess return of an asset is linear in its beta, and the beta measures the asset's

sensitivity to market movements. As the following equation shows:

$$\mathrm{E}[r_i - r_f] = \beta_i \mathrm{E}[r_M - r_f]$$

where $\mathrm{E}[r_i - r_f]$ is the expected excess return of asset i, β_i is a measure of asset i's

systematic risk, $\mathrm{E}[r_M - r_f]$ is the expected market risk premium. The total risks of an asset

consist of systematic risks and idiosyncratic risks (Sharpe, 1963). While idiosyncratic risks can

be diversified away in a portfolio, systematic risks cannot. Therefore, investors need to be

compensated with higher return for holding a riskier asset, and thus a higher β is associated

with higher return.

However, in reality, the efficient market assumption of CAPM does not hold, so individual

assets have a portion of risks that cannot be explained by the market. Therefore, the real excess

return of an asset can be explained by the following equation:

$$r_{i,t} - r_{f,t} = \alpha_i + \beta_i\left(r_{M,t} - r_{f,t}\right) + e_{i.t}$$

where $r_{i,t}$ refers to the real return of asset i at time t, $r_{f,t}$ refers to the risk-free rate at time t, α_i refers to the portion of asset i's return unexplained by the market, β_i is a measure of asset i's systematic or market risk, $r_{M,t}$ is the market return at time t, and $e_{i,t}$ refers to the error term.
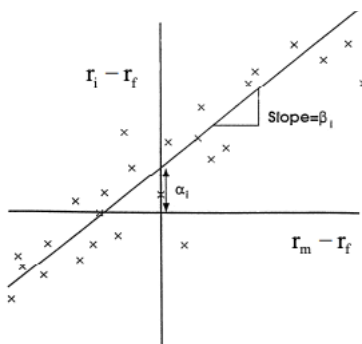
Therefore, the CAPM constitutes the one-factor model that can be used to explain the performance of an asset. As illustrated by the above figure by Professor Robert Whitelaw, while regressing the asset return on the market return, we can obtain the alpha and the beta coefficients. If CAPM holds, the systematic risks should be able to account for all the risks, leaving $\alpha_i = 0$. When explaining real returns, α_i therefore implies how much the asset outperformed or underperformed the prediction from its association with the market.

The Fama-French-Carhart Four Factors Model

Fama and French (1993) found that stocks with small market capitalization and high book-to-market ratio exhibited higher average returns, and such findings suggested that variables associated with the fundamentals of the companies have caused risks not captured by the market factor. To better predict the return, Fama and French (1993) proposed a three-factor model to capture the relation between average return and two factors other than the market—size and value. Size was measured by market capitalization, which equals price times shares outstanding.

Value was measured by the book-to-market price ratio. Value stocks have high book-to-market ratio while growth stocks have low book-to-market ratio. Their three-factor model was based on the following equation:

$$E(R_{it}) - R_{ft} = \beta_{iM}[E(R_{Mt}) - R_{ft}] + \beta_{is}E(SMB_t) + \beta_{ih}E(HML_t)$$

where SMB_t (Small Minus Big) measures the size factor, and HML_t (High Minus Low) measures the value factor. SMB_t and HML_t were constructed by Fama and French in the way documented in French's online data library. For instance, they would construct six value-weighted portfolios based on size and book-to-market ratio for time t, namely, Small Value (stocks with small market capitalization and high book-to-market ratio), Small Neutral, Small Growth, Big Value, Big Neutral, and Big Growth. SMB_t would be the average return on the three Small portfolios minus the average return on the three Big portfolios, and HML_t would be the average return on the two value portfolios minus that on the two growth portfolios, as demonstrated by the following equations:

SMB =1/3 (Small Value + Small Neutral + Small Growth)
- 1/3 (Big Value + Big Neutral + Big Growth).

HML =1/2 (Small Value + Big Value)
- 1/2 (Small Growth + Big Growth).

According to French in his data library, the market excess return was calculated by subtracting the one-month Treasury bill rate from the value-weighted return of all CRSP companies listed in New York Stock Exchange (NYSE), American Stock Exchange (AMEX), and National Association of Securities Dealers Automated Quotations (NASDAQ). To summarize, the Fama-French Three Factors Model (1993) can predict and explain the return of an ETF from its relationship with the market, its size, and value.

Carhart (2012) developed the Fama-French Three Factors Model by incorporating a momentum factor as he found that investors preferred stocks that had been performing well, and such preference continued to drive high the prices of the winners, and such cycle formed the persistence in fund performance. Hence, WML (Winners Minus Losers) became the fourth factor in the Fama-French-Carhart Four Factors Model. As documented in the data library, Fama and French selected stocks in the first 30th NYSE percentiles and those below the 70th to construct the High Prior Return Portfolio and the Low Prior Return Portfolio. They then constructed the WML (also called as "Mom") factor by subtracting the average return on the two Low Prior Return Portfolios from that on the two High Prior Return Portfolios, as shown in the below equation:

$$Mom = 1/2 \; (Small\;High + Big\;High)$$
$$- 1/2(Small\;Low + Big\;Low).$$

Hereby the "High" and "Low" refers to the portfolios abovementioned constructed on prior returns from the past 12 months to the past month. Hence, the complete equation of the Fama-French-Carhart Four Factors Model is:

$$r_{i,t} - r_{f,t} = \alpha_i + \beta_{i,M}(r_{M,t} - r_{f,t}) + \beta_{i,Size}(SMB_t) + \beta_{i,Value}(HML_t) + \beta_{i,Momentum}(WML_t) + e_{i.t}$$

By regressing the returns of an ETF on the Fama-French-Carhart four factors, we can obtain the alpha and the beta coefficients to explain its performance. For instance, a positive $\beta_{i,Size}$ indicates that the ETF is tilted towards small market capitalization stocks, while a negative $\beta_{i,Size}$ indicating that the ETF is tilted towards large market capitalization stocks. The absolute value of the beta coefficient can reflect the extent of such tilt.

Value Investing Before and Under The COVID-19 Pandemic

Value stocks have been proven more attractive in return compared to growth stocks two decades ago. Fama and French (1997) established that value stocks outperformed growth stocks in markets across the globe. According to them, the average return on global portfolios of high

book-to-market ratio stocks was 7.6% higher than low book-to-market ratio stocks. Chan and Lakonishok (2019) reviewed the data in late 1990s to 2002 and corroborated the superiority of value investing strategy.

However, in the past decade, value investing strategy appeared to fail (Lev & Srivastava, 2019; Israel et al., 2021). There is also evidence that value stocks may be severely impacted during periods of severe financial crises (Fama & French, 2007). Rahman et al. (2021) examined the reaction of Australian stock market to the COVID-19 pandemic and found that value portfolios suffered more. Harjoto and Rossi (2021) also corroborated the inferiority of value stocks in the emerging markets, impacted by the COVID-19 pandemic. Since the COVID-19 pandemic has heavily struck the United States stock market and potentially induced a financial crisis (Yousfi et al. 2021), it is meaningful to re-evaluate the attractiveness of value investing.

Introduction of the Products for Analysis

This study aimed at generating insights of value investing by evaluating the ten-year performance of an exchange-traded fund—iShares S&P 500 Value ETF (Ticker: IVE)—who tracks the performance of U.S. large capitalization value stocks, in comparison with S&P 500 Index and one of its major competitors—the Vanguard S&P 500 Value ETF. The following section will introduce the products included in the analysis.

The Benchmark for Comparison —S&P 500 Index

Instead of using the actual benchmark IVE tracks (S&P 500 Value Index), which will be introduced later, this study used S&P 500 Index to evaluate the performance of IVE. S&P 500 Index is one of the most referred to index, widely regarded as the best singe gauge of large-capitalization U.S. equities (S&P Global, 2022). According to D&P Dow Jones Indices annual report, $13.5 trillion was indexed or benchmarked to the S&P 500 Index, among which, indexed

assets comprised $5.4 trillion as of December 31, 2020. The S&P 500 Index represented over 80% of available market capitalization of U.S. equities, and therefore it is regarded as an important indicator of the U.S. economy. It was launched on March 4, 1957, as the first U.S. market-cap-weighted stock market index, and it is float-adjusted market capitalization weighted, rebalanced quarterly in March, June, September, and December.

As of March 31, 2022, S&P 500 held 505 equities, reaching a total market capitalization of $40,296,094.33 million. The largest constituent had a market capitalization of $2,849,537.59 million, and the mean market capitalization of all constituents reached $79,794.25 million. The top constituents by index weight included Apple Inc., Microsoft Corp., Amazon.com Inc., Tesla, Inc., and Alphabet Inc A, etc. S&P 500 was mainly exposed to Information Technology, Health Care, Consumer Discretionary, Financials, and Communication Services sectors, together accounting for 74.1% of the total index weight. Details of the top ten holdings and sector exposure breakdown can be found in Tables 1 & 2.

The Benchmark IVE Tracks—S&P 500 Value Index

The benchmark IVE tracks is the S&P 500 Value Index, launched on May 30, 1992 by S&P Global. This index draws constituents from the S&P 500 Index and selects value stocks based on three factors: book value to price ratio, earnings to price ratio, and sales to price ratio. As introduced in the methodology (S&P Global, 2022), each constituent of the S&P 500 Index receives a growth score and a value score based on factors such as the three mentioned above. Then the companies in the S&P 500 Index are sorted in ascending order of the Growth Rank/Value Rank ratio. Those companies ranked at the bottom and comprised 33% of the total index market capitalization are categorized to the Value Basket, and vice versa. The middle 34% stocks exhibit similar growth and value characteristics, and this group is called the Blended

Basket. The S&P 500 Value Index contains all the stocks in Value Basket and some in the Blended Basket based on their distance from the midpoint of the Growth Basket and the Value Basket. This index is float-adjusted market capitalization weighted and rebalanced quarterly in March, June, September, and December.

As of March 31, 2022, it constituted 449 U.S. equities, reaching a total market capitalization of $26,178,078.57 million. Among the constituents, Berkshire Hathaway B had the largest total market capitalization of $788,183.55 million, accounting for 3.4% of the index. The mean total market capitalization was $58,303.07 million. The top 10 weighted equities accounted for 17.7% of the index, including Berkshire Hathaway B, Johnson & Johnson, Procter & Gamble, Exxon Mobil Corp, and Chevron Corp, etc. Sector-wise, the index was heavily tilted toward Healthcare, Financials, Industrials, Information Technology, and Consumer Staples, which together weighted 56.2%. The details can be found in Tables 1 & 2.

The Competitor—Vanguard S&P 500 Value ETF (Ticker: VOOV)

One of the major competitors of IVE is VOOV, issued by Vanguard Equity Index Group in 2010, and it also tracks the performance of S&P 500 Value Index. As of March 31, 2022, it invested in 450 stocks, reaching a total net asset of $3.3 billion. The top ten largest holdings accounted for 17.6% of the total net assets, following the same order as the benchmark S&P 500 Value Index. The expense ratio of VOOV is 0.1%.

The Product of Interest—iShares S&P 500 Value ETF (Ticker: IVE)

Overview. The main product this paper evaluated was the iShares S&P 500 Value ETF (IVE), incepted on May 22, 2000, at NYSE Arca Exchange. As of April 21, 2022, the Net Assets of IVE was $25,706,714,095, with 163,950,000 shares outstanding. Its Asset Under Management (AUM) was seven times greater than VOOV. According to the Prospectus issued by Blackrock

on March 31, 2022, the investment objective of IVE is to track the investment results of the S&P 500 Value Index, which is composed of large-capitalization U.S. equities that shows value characteristics.

Portfolio Characteristics. As of April 21, 2022, IVE held 447 equities. The top ten largest holding comprised of 17.89% of the total net assets, including Berkshire Hathaway B, Johnson & Johnson, Procter & Gamble, Exxon Mobil Corp., and Chevron Corp., etc. Details of its top ten holdings and the comparison with the benchmark (S&P 500 Value Index) and the major competitor fund (VOOV) can be found in Table 1. By holding these equities, IVE was mainly exposed to sectors including Health Care, Financials, Industrials, Information Technology, and Consumer Staples, as shown in Table 2. The above five major sectors accounted for 66.6% of the total holdings. Details of sector exposure breakdown of IVE is displayed in Figure 1. The sector exposure of IVE did not change much from where it was at the end of the first quarter in 2022.

Fees and Expenses. As of current prospectus, the gross expense ratio, which is the fund's total annual operating expense ratio incurred by IVE, only include 0.18% management fee. The expense ratio is four times lower compared to the average expense ratio of similar funds, which is 0.92%, according to Vanguard.

Investor Profile. IVE provides a convenient way for institutional and individual investors to replicate the performance of the S&P 500 Value Index. Investors of IVE may want to invest in IVE because large capitalization value U.S. equities are potentially undervalued relative to growth companies, and thus the return may be higher. Moreover, investors who prefer low cost and tax efficiency compared to the market may be interested in IVE. Finally, investors can also use IVE as part of their portfolio to hedge risks.

Table 1

Top Ten Holdings of IVE, VOOV, and S&P 500 Value Index

Ticker	Name	Sector	IVE (as of April 21, 2022)		IVE (as of March 31, 2022)		VOOV (as of March 31, 2022)		S&P 500 Value Index (as of March 31, 2022)
			Weight (%)	Rank	Weight (%)	Rank	Weight (%)	Rank	Rank
BRKB	Berkshire Hathaway Inc Class B	Financials	3.29	1	3.41	1	3.40	1	1
JNJ	Johnson & Johnson	Health Care	2.53	2	2.46	2	2.50	2	2
PG	Procter & Gamble	Consumer Staples	2.04	3	1.93	3	1.90	3	3
XOM	Exxon Mobil Corp	Energy	1.93	4	1.84	4	1.80	4	4
CVX	Chevron Corp	Energy	1.66	5	1.66	5	1.70	5	5
UNH	Unitedhealth Group Inc	Health Care	1.54	6	1.47	6	1.50	6	6
KO	Coca-Cola	Consumer Staples	1.35	7	1.27	8	1.30	8	8
VZ	Verizon Communications Inc	Communication	1.21	8	1.13	10	1.10	10	10
WMT	Walmart Inc	Consumer Staples	1.18	9	-	-	-	-	-
DIS	Walt Disney	Communication	1.16	10	1.32	7	1.30	7	7
JPM	Jpmorgan Chase & Co	Financials	-	-	1.15	9	1.10	9	9

Note. The top ten holdings of the products changed from March 31, 2022, to April 21, 2022. The blanks were intentionally left because certain equities did not rank among the top ten at the report time. Data for the weights of each of the top ten holdings for S&P 500 Value Index was unavailable.

Figure 1

Sector Exposure Breakdown of IVE as of April 21, 2022
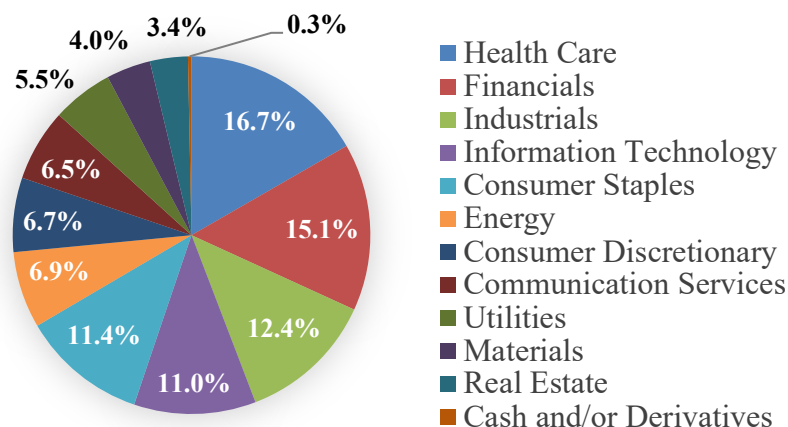
Table 2

Sector Exposure Breakdown

Sector	Weight (%)				
	IVE (as of April 21, 2022)	IVE (as of March 31, 2022)	VOOV (as of March 31, 2022)	S&P 500 Value (as of March 31, 2022)	S&P 500 (as of March 31, 2022)
Health Care	16.7	16.4	16.4	16.4	13.6
Financials	15.1	15.7	15.7	12.7	11.1
Industrials	12.4	12.6	12.6	12.6	7.9
Information Technology	11.0	11.5	11.4	11.5	28.0
Consumer Staples	11.4	10.7	10.8	10.7	6.1
Energy	6.9	6.8	6.9	6.8	3.9
Consumer Discretionary	6.7	6.7	6.7	6.7	12.0
Communication Services	6.5	6.7	6.7	6.7	9.4
Utilities	5.5	5.5	5.5	5.5	2.7
Materials	4.0	4.0	4.0	4.0	2.6
Real Estate	3.4	3.3	3.3	3.3	2.7
Cash and/or Derivatives	0.3	0.2	-	-	-

Note. The classification of sectors is based on GICS® (Global Industry Classification Standard) sectors. The weights for each sector are rounded to the nearest tenth of a percent, and thus the weights may not sum up to 100%. From "iShares S&P 500 Value ETF Factsheet", "Vanguard S&P 500 Value ETF Factsheet", and "S&P 500 Value Index Factsheet".

The Current Study

To conclude, the universe of IVE is large capitalization U.S. equities exhibiting value characteristics. This ETF with giant AUM and low expense ratio has been providing investors with a concentrated exposure to the U.S. large-capitalization value companies with good standing for over 20 years, and therefore, it is meaningful to evaluate IVE's performance to generate insights on the attractiveness of value investing strategy, especially since the COVID-19 pandemic has heavily struck the U.S. stock market.

The current study aimed to address the following research questions: 1) How was the performance of IVE compared to VOOV and S&P 500 Index in the past ten years? 2) How did the COVID-19 pandemic influence the performance of IVE compared to VOOV and S&P 500 Index? 3) Is value investing a smart beta strategy in the past ten years and during the COVID-19 pandemic? Answering these questions will update the evidence for the attractiveness of value investing strategy and direct future studies to refine the portfolio management models to better align with the reality.

Method

This study used S&P 500 Index as the benchmark and VOOV as the competitor to evaluate the performance of IVE. This study further applied the CAPM model and the Fama-French-Carhart Four Factors model to explain such performance. This paper used S&P 500 Index instead of the actual benchmark IVE tracks, the S&P 500 Value Index, due to the lack of access to the data. However, comparing against S&P 500 Index is still meaningful because the constituents of S&P 500 Value Index are drawn from the S&P 500 Index. Moreover, since both indices are weighted by market capitalization, the constituents of S&P 500 Value Index also constituted the majority of the S&P 500 Index.

Data Collection

This study collected 10-year monthly price data of IVE, VOOV, and S&P 500 Index from Yahoo Finance.com from December 2011 to December 2021. The Fama-French-Carhart Four Factors data was retrieved from the Kenneth R. French data library on March 31, 2022.

Data Analysis

The author conducted data analysis individually in Excel. This study calculated the monthly excess return of the three products for three periods of time: in ten years from December 2011 to December 2021, at pre-COVID-19 (from December 2011 to December 2019), and during COVID-19 (from December 2019 to December 2021). The excess return was calculated by subtracting the risk-free rate (retrieved from the data library) from the monthly return data. The study conducted the same data analysis procedure for each period of time.

For the first part of analysis, this study calculated the mean and standard deviation of the annualized access return for each of the Fama-French-Carhart factors and the three products, including the Mkt-RF (Market excess return), SMB (Small Minus Big), HML (High Minus Low), WML (Winners Minus Losers), IVE, VOOV, and S&P 500. Sharpe ratio of each factor was calculated by dividing the annualized mean excess return by the annualized standard deviation. Sharpe ratio was developed by William F. Sharpe in 1966. The Sharpe ratio measures the expected return per unit of risk for a zero-investment strategy (Sharpe, 1994). This ratio of expected added return per unit of added risk enables comparison between products. A product with high Sharpe ratio is good because it has higher return for the same amount of risk. This study used Sharpe ratio as an indicator for better performance. After computing Sharpe ratio, this study further calculated the correlation between the monthly excess return of all the factors and products.

For the second part of analysis, this study used CAPM model and Fama-French-Carhart Four Factors Model to explain the performance of IVE, VOOV, and S&P 500 Index. First, the study regressed the monthly excess return data of IVE, VOOV, and S&P 500 on that of the Market. Then the study regressed the monthly excess return data of IVE, VOOV, and S&P 500 on that of the Fama-French-Carhart Four Factors. For all the regressions, alpha coefficients, beta coefficients, the corresponding standard errors, and t-statistics were recorded.

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Results

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Overall Performance of IVE

For the past ten years, the performance of IVE moved closely with VOOV and well tracked the S&P 500 Index as hypothesized. As shown in Figure 2 and Table 3, the correlation between IVE and VOOV reached one. The correlation between IVE and S&P 500 Index was 0.95, and that between VOOV and S&P 500 Index was also 0.95. Figure 2 shows the excess return of IVE, VOOV, and S&P 500 Index throughout ten years. It can be observed that IVE and VOOV began to deviate from S&P 500 Index more after January 2020 when the pandemic struck the U.S. stock market. At pre-COVID-19, the correlation between IVE and S&P 500 Index was 0.96, but during COVID-19, the correlation reduced to 0.95. Although the difference was minimal, it reflected that during COVID-19, the constituents of IVE had less impact on the S&P 500 Index, or the other constituents of the S&P 500 Index such as growth stocks had relatively stronger performance and thus gained greater weight in the S&P 500 Index.

From the analysis of annualized excess return, standard deviation, and the Sharpe Ratio, we can also conclude that the performance of IVE was heavily disrupted by the COVID-19. Details were documented in Table 3. During the past ten years, investing in IVE generated on average 12.85% more return annually compared to investing in risk-free assets, and 12.94% for VOOV.

Such difference was likely due to the difference in fees. S&P 500 Index outperformed IVE and VOOV by having an annualized mean excess return of 13.68%. During the ten-year period, the Sharpe ratio of IVE and VOOV was 0.91 and 0.93, respectively, while the S&P 500 had a Sharpe ratio of 1.05. Although, before the COVID-19 pandemic, IVE (12.63%) and VOOV (12.75%) both outperformed S&P 500 (11.81%) in annualized mean excess return, the Sharpe ratio of IVE (1.08) and VOOV (1.09) were at the same level with S&P 500 (1.08). During COVID-19, IVE and VOOV underperformed S&P 500 with visible differences in both annualized excess mean returns and Sharpe ratio. IVE's annualized excess mean return was 14.3% compared to the 21.66% of the S&P 500, and IVE's Sharpe ratio was 0.68 compared to 1.13 of the S&P 500.

From the above analysis, we can conclude that IVE and VOOV were very similar in performance for the past ten years, both before COVID-19 and during COVID-19, and the minimal differences between them were mainly due to the fee rate. Moreover, IVE and VOOV did not outperform S&P 500 much before COVID-19, and they largely underperformed S&P 500 during COVID-19. This suggested that value investing strategy was not superior in the past decade, and it was struck heavily by the pandemic.

Figure 2

Ten-Year Excess Return of IVE, VOOV, and S&P 500 Index
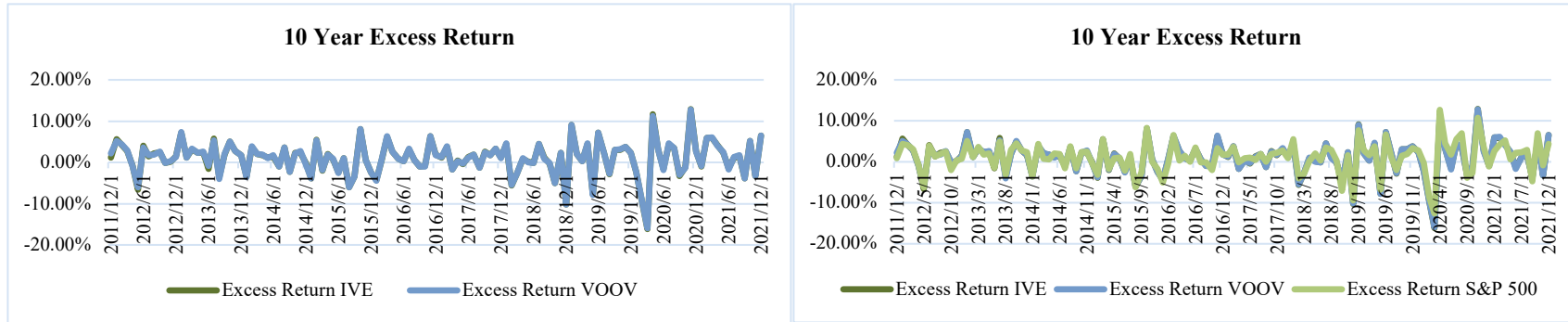
Table 3
Ten-Year (201112-202112) Performance and Correlation

		Mkt-RF	SMB	HML	WML	IVE	VOOV	S&P 500
Annualized Excess Return	Mean	15.74%	-0.63%	-2.33%	1.93%	12.85%	12.94%	13.68%
	SD	13.61%	9.07%	10.48%	12.57%	14.07%	13.97%	13.05%
	SR	1.16	-0.07	-0.22	0.15	0.91	0.93	1.05
Correlation	Mkt-RF	1.00	0.34	0.15	-0.42	0.95	0.94	0.99
	SMB		1.00	0.35	-0.37	0.32	0.32	0.25
	HML			1.00	-0.51	0.37	0.37	0.15
	WML				1.00	-0.55	-0.54	-0.40
	IVE					1.00	1.00	0.95
	VOOV						1.00	0.95
	S&P 500							1.00

Pre-COVID-19 (201112-201912) Performance and Correlation

		Mkt-RF	SMB	HML	WML	IVE	VOOV	S&P 500
Annualized Excess Return	Mean	13.87%	-1.44%	-1.26%	2.50%	12.63%	12.75%	11.81%
	SD	11.40%	7.93%	8.03%	11.45%	11.69%	11.65%	10.93%
	SR	1.22	-0.18	-0.16	0.22	1.08	1.09	1.08
Correlation	Mkt-RF	1.00	0.31	0.04	-0.37	0.96	0.96	0.99
	SMB		1.00	0.20	-0.24	0.23	0.23	0.21
	HML			1.00	-0.50	0.22	0.22	0.03
	WML				1.00	-0.50	-0.49	-0.35
	IVE					1.00	1.00	0.96
	VOOV						1.00	0.96
	S&P 500							1.00

During COVID-19 (201912-202112) Performance and Correlation

		Mkt-RF	SMB	HML	WML	IVE	VOOV	S&P 500
Annualized Excess Return	Mean	23.72%	3.00%	-5.54%	-1.24%	14.30%	14.29%	21.66%
	SD	19.99%	12.64%	17.08%	16.34%	21.04%	20.83%	19.20%
	SR	1.19	0.24	-0.32	-0.08	0.68	0.69	1.13
Correlation	Mkt-RF	1.00	0.38	0.28	-0.50	0.94	0.93	0.99
	SMB		1.00	0.56	-0.60	0.44	0.44	0.30
	HML			1.00	-0.54	0.53	0.54	0.29
	WML				1.00	-0.63	-0.63	-0.49
	IVE					1.00	1.00	0.95
	VOOV						1.00	0.94
	S&P 500							1.00

Note. SD refers to standard deviation, SR refers to Sharpe ratio, Mkt-RF refers to the market excess return. This data was retrieved from Data Library of Kenneth R. French in March 2022.

Performance Analysis Under Capital Asset Pricing Model

This study first fitted the CAPM model to explain IVE's return. The alpha and beta

coefficients can be retrieved in Table 4. The high R-squared suggested good model fitness: the

CAPM model explained 89.56% of the variance in the monthly excess return of IVE, 89.03%

for VOOV, and 98.55% for S&P 500 Index. The annualized alpha coefficients suggested the

amount of average annual return not explained by the CAPM market factor. In the past ten

years, as the alpha coefficient of IVE was -2.56%, this suggested that IVE was overpriced

relative to the prediction of CAPM, indicating that IVE on average underperformed the

prediction of CAPM by 2.56% annually. Similarly, the alpha coefficient of VOOV was -2.31%,

also suggesting an underperformance, although slightly better than IVE. Among the three

products, S&P 500 exhibited the best performance, with an alpha coefficient of -1.32%. To

conclude, for the past ten years, the performance of IVE and VOOV were inferior to that of the

S&P 500 Index, suggesting that value investing strategy was not attractive.

Excluding the impact from the COVID-19, the pre-COVID-19 data suggested that IVE

slightly outperformed the S&P 500 Index, and this lacked statistical significance. IVE

underperformed the prediction of CAPM by 1%, while VOOV underperformed by 0.81%, and

S&P 500 underperformed by 1.39%. During COVID-19, however, IVE underperformed the

CAPM prediction by 9.09%, worse than VOOV (-8.75%), and much worse than S&P 500 (-

0.93%). From the contrast of pre-COVID-19 and during COVID-19, it can be observed how

IVE and VOOV were heavily influenced by the pandemic. Hence, stocks with value

characteristics did not appear to outperform the other stocks (such as growth and blended) at

pre-COVID-19, but they largely underperformed the other stocks during the COVID-19

pandemic.

Table 4

Ten-Year Performance under CAPM

		IVE			VOOV			S&P 500		
		coeff	std err	t-stat	coeff	std err	t-stat	coeff	std err	t-stat
Alpha (annualized)		-2.56%	1.52%	-1.69	-2.31%	1.54%	-1.50	-1.32%	0.52%	-2.51
Betas	Mkt-RF	0.98	0.03	31.95	0.97	0.03	31.08	0.95	0.01	89.95
	R-sq	89.56%			89.03%			98.55%		

Pre-COVID-19 Performance under CAPM

		IVE			VOOV			S&P 500		
		coeff	std err	t-stat	coeff	std err	t-stat	coeff	std err	t-stat
Alpha (annualized)		-1.00%	1.25%	-0.80	-0.81%	1.27%	-0.64	-1.39%	0.47%	-2.92
Betas	Mkt-RF	0.98	0.03	32.69	0.98	0.03	32.11	0.95	0.01	83.51
	R-sq	91.84%			91.56%			98.66%		

During COVID-19 Performance under CAPM

		IVE			VOOV			S&P 500		
		coeff	std err	t-stat	coeff	std err	t-stat	coeff	std err	t-stat
Alpha (annualized)		-9.09%	5.52%	-1.65	-8.75%	5.65%	-1.55	-0.93%	1.83%	-0.51
Betas	Mkt-RF	0.99	0.08	12.83	0.97	0.08	12.35	0.95	0.03	37.51
	R-sq	87.75%			86.90%			98.39%		

Note. "coeff" refers to coefficients, "std err" refers to standard errors, "t-stat" refers to t-statistics, "Mkt-RF" refers to the market return in excess of risk-free rate, and "R-sq" refers to R^2.

Performance Analysis Under Fama-French-Carhart Four Factors Model

This study further fitted Fama-French-Carhart Four Factors Model to explain the performance of IVE, in comparison to VOOV and S&P 500. Fama-French-Carhart factors included market excess return, SMB (Small Minus Big), HML (High Minus Low), WML (Winner Minus Loser). SMB measures size; HML measures value or growth; and WML measures momentum. The results for ten-year period, pre-COVID-19, and during COVID-19 can be found in Table 5.

In the ten-year period, the Fama-French-Carhart model well explained the variance of the past performance of IVE, VOOV, and S&P 500, with an R^2 of 96.17%, 95.77%, and 99.46%, respectively. The sign of beta coefficients reflected the direction of how each factor impacted the performance of the product. The absolute value of the beta coefficients suggested the effect size. The larger the absolute value of a beta coefficient, the stronger impact this factor had on the performance of the product. Therefore, IVE was found to be tilted towards to some extent big market capitalization ($\beta_{SMB} = -0.15, \text{t} = -4.85$), more towards value ($\beta_{HML} = 0.31, \text{t} = 10.47$), and a little towards the opposite of momentum ($\beta_{WML} = -0.10, \text{t} = -3.81$). This finding corroborated IVE's advertisement of exposing to large market capitalization equities with value characteristics, and it also indicated that value equities underperformed growth equities (as it tilted towards losers in prior returns). The beta coefficients for VOOV were similar to IVE. For S&P 500, it was tilted towards large market capitalization equities and a little towards value, but it had no tendency in momentum. This finding also corroborated S&P 500's strategy as an index weighted by market capitalization but did not select constituents by momentum. It can also be observed that value stocks had a slightly larger impact on S&P 500, probably due to their larger market capitalization on average, compared to growth stocks.

At pre-COVID-19 period, the factors exhibited similar patterns with the above analysis, except for the alpha coefficients. At pre-COVID-19, IVE and VOOV performed slightly better than the S&P 500, but the alpha coefficients lacked statistical significance. During COVID-19, it is worth noting that the market factor accounted for a smaller proportion in explaining the variance of the returns for IVE and VOOV, from 0.98 for both at pre-COVID-19 to 0.88 and 0.87, respectively, during COVID-19. This suggested that during COVID-19, equities with value characteristics deviated from the average market performance, as the market might have been dominated by growth stocks.

To conclude, the Fama-French-Carhart Four Factors Model confirmed IVE's advertised strategy of investing in large-capitalization equities exhibiting value characteristics. Secondly, at each analysis period, the products tilting towards value also tilted towards losers in prior returns, suggesting the underperformance of value stocks. Moreover, IVE drastically underperformed the S&P 500 and the market during the COVID-19 pandemic. This finding indicated that value investing appeared no superiority when the stock market was in good condition, and it failed significantly when the market condition was challenged by shocks, i.e., the COVID-19 pandemic.

Table 5
Ten-Year Performance under Fama-French-Carhart Model

		IVE			VOOV			S&P 500		
		coeff	std err	t-stat	coeff	std err	t-stat	coeff	std err	t-stat
Alpha (annualized)		-1.15%	0.95%	-1.21	-0.99%	0.99%	-1.00	-1.78%	0.33%	-5.36
Betas	Mkt-RF	0.94	0.02	44.03	0.94	0.02	41.98	0.98	0.01	131.82
	SMB	-0.15	0.03	-4.85	-0.16	0.03	-4.87	-0.15	0.01	-13.83
	HML	0.31	0.03	10.47	0.32	0.03	10.36	0.04	0.01	4.33
	WML	-0.10	0.03	-3.81	-0.09	0.03	-3.22	0.00	0.01	-0.04
	R-sq	96.17%			95.77%			99.46%		

Pre-COVID-19 Performance under Fama-French-Carhart Model

		IVE			VOOV			S&P 500		
		coeff	std err	t-stat	coeff	std err	t-stat	coeff	std err	t-stat
Alpha (annualized)		-0.61%	0.84%	-0.73	-0.52%	0.87%	-0.60	-2.00%	0.29%	-7.02
Betas	Mkt-RF	0.98	0.02	44.24	0.98	0.02	42.61	0.98	0.01	130.37
	SMB	-0.16	0.03	-5.37	-0.17	0.03	-5.38	-0.14	0.01	-13.48
	HML	0.23	0.03	7.05	0.24	0.03	7.04	0.01	0.01	0.56
	WML	-0.09	0.02	-3.81	-0.08	0.03	-3.20	0.00	0.01	0.29
	R-sq	96.69%			96.40%			99.56%		

During COVID-19 Performance under Fama-French-Carhart Model

		IVE			VOOV			S&P 500		
		coeff	std err	t-stat	coeff	std err	t-stat	coeff	std err	t-stat
Alpha (annualized)		-4.19%	3.00%	-1.40	-3.80%	3.16%	-1.20	-0.18%	0.87%	-0.21
Betas	Mkt-RF	0.88	0.05	18.63	0.87	0.05	17.48	0.97	0.01	70.52
	SMB	-0.19	0.09	-2.22	-0.20	0.09	-2.24	-0.23	0.03	-9.00
	HML	0.37	0.06	6.08	0.38	0.06	6.01	0.09	0.02	5.15
	WML	-0.16	0.07	-2.25	-0.15	0.07	-2.00	-0.04	0.02	-2.04
	R-sq	97.00%			96.61%			99.70%		

Note. "coeff" refers to coefficients, "std err" refers to standard errors, "t-stat" refers to t-statistics, and "R-sq" refers to R^2.

Discussion

This paper evaluated the ten-year performance of IVE, using S&P 500 Index as a benchmark and its major competitor VOOV as a comparison. This paper found that IVE did not outperform the S&P 500 Index before COVID-19, and IVE drastically underperformed the S&P 500 Index during COVID-19. Through the analysis using the CAPM Model and Fama-French-Carhart Four Factors Model, this paper verified that IVE conformed to its advertised strategy of investing in large capitalization stocks with value characteristics. Combining the above evidence, this paper further concluded that value strategy appeared no longer valuable, especially under the COVID-19 pandemic.

The finding of this paper supplemented the evidence from Lev & Srivastava (2019) and Israel et al. (2021) that the value of value investing has decreased in the past decade. The finding of the drastic underperformance of value stocks during the COVID-19 pandemic contrasted the evidence from Patel & Swensen (2007) that value stocks tend to outperform growth stocks when the overall market condition is bad, and this study supported Fama & French (2007) that value investing is severely impacted during financial crisis. This paper provided preliminary evidence that value investing is no longer a smart beta strategy, and investors should reconsider the validity of value investing, especially under shocks to the market.

This study has several limitations. First, the products this study analyzed were composed of value stocks with large capitalization, so the findings of this study may not be generalizable to small value companies. Secondly, this study did not compare value stocks with growth stocks directly, and future studies can make such comparison to verify the findings. Lastly, future studies can explore the reasons for the failure of value investing strategy in the past ten years and modify the existing models to reflect the changing reality.

Conclusion

This study analyzed the ten-year performance of iShares S&P 500 Value ETF before and during the COVID-19 pandemic using the CAPM Model and Fama-French-Carhart Four Factors Model. This study found that value investing strategy is no longer superior in the past decade, especially under the impact of the COVID-19 pandemic. Investors should re-evaluate the value investing strategy and incorporate the recent findings into portfolio management models.

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