Risky Business: Value versus Momentum

Momentum and value are two of the most prominent factors in investing due to their significant premiums over the long term. Still, their long-term outperformance doesn't mean that they don't go through periods of underperformance that test even the most tenured investors. Without risk, there is no reward. But we find that most investors typically associate momentum as the 'riskier' choice between the two. However, using nearly 100 years of data and under numerous risk measures, our analysis suggests that a momentum strategy has lower realized risk than value, while outperforming meaningfully.

Travis Prentice
Chief Investment Officer
Portfolio Manager

David Wroblewski
Director of Applied Research

Data and Portfolio Construction

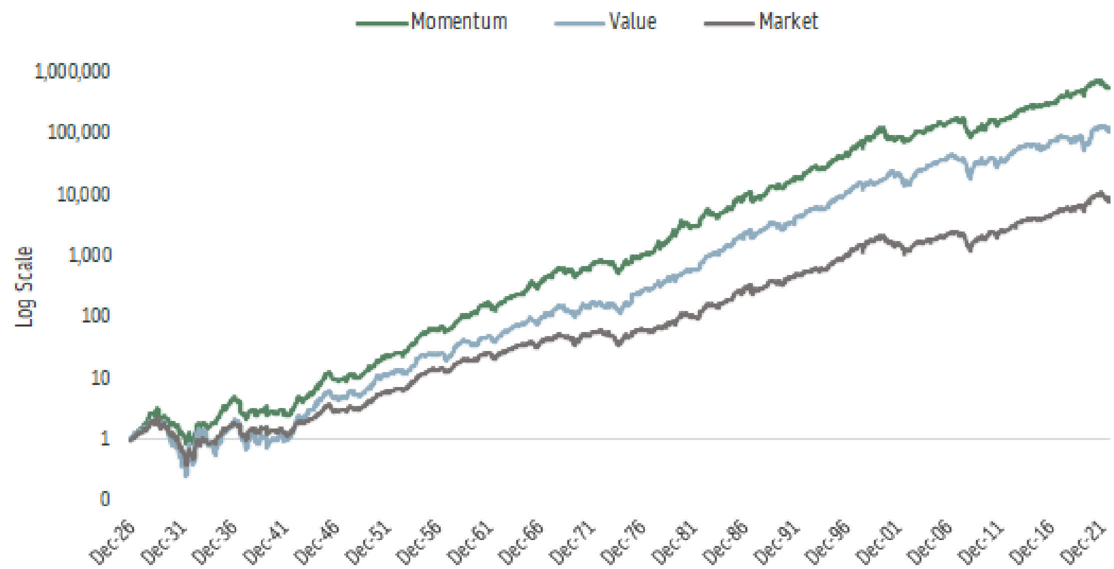
For the analysis, we construct U.S. long-only, market cap-weighted, top quintile portfolios for momentum and value. The market portfolio is also cap-weighted and consists of all available U.S. stocks. The momentum sorts are based on the trailing 1-year return excluding the most recent month, and the value sorts are based on book-to-market ratios. The data is from the Fama-French website[1] and spans the time-period of January 1927 through September 2022.

Factor Performance and Risk Statistics

Plotting the long-term performance of momentum, value, and the market over nearly 100 years illustrates that investors are well-served over the long term by maintaining an exposure to both momentum and value. Figure 1 shows that both momentum and value performed well above market returns over the last century.

Figure 1: Growth of the Strategies

January 1927 – September 2022



The Market portfolio and Momentum and Value strategies referenced above are calculated using Fama-French monthly data. The Momentum and Value strategy returns are formed as the cumulative return of the top characteristic quintile. Please see Important Disclosures at the end of this document.

[1] https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

Table 1 below summarizes the returns and characteristics of the complete data set for each of the strategies: momentum, value, and the market. As shown, momentum has the highest annualized return of the strategies at +14.76%, outperforming the market by nearly 500bps annualized. Value's performance is nothing to sneeze at, with an annualized return of +12.88%, over 300bps better than the market. However, perhaps surprisingly, momentum outperforms with a lower standard deviation (20.23% versus 27.83%), lower tracking error (8.45% versus 14.39%), and with a lower BETA (0.99 versus 1.33) than that of value. Further, momentum outperforms value with a higher Sharpe ratio, information ratio, and with a higher t-stat. Lastly, momentum has more positive excess return months at 60% versus value at 52%. Objectively, looking at this data set, it is hard to suggest that momentum is 'riskier' than value.

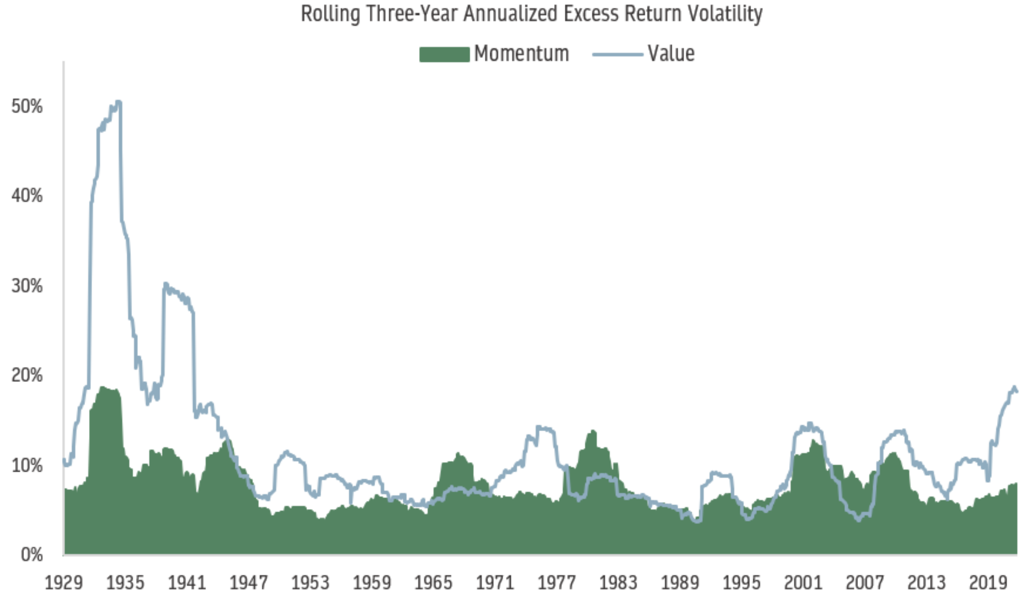
Table 1: Performance and Characteristics Comparison

January 1927 – September 2022

	Momentum	Value	Market
Return (Annualized)	**14.76%**	12.88%	9.83%
Trailing 1-Year Return (Annualized)	-24.06%	**-9.94%**	-18.83%
Trailing 3-Year Return (Annualized)	4.91%	**10.44%**	7.95%
Trailing 5-Year Return (Annualized)	**9.01%**	6.33%	8.73%
Volatility (Annualized)	**20.23%**	27.83%	18.54%
Tracking Error (to Market)	**8.45%**	14.39%	--
Beta (to Market)	**0.99**	1.33	1.00
Sharpe Ratio	**0.57**	0.35	0.36
Information Ratio (to Market)	**0.58**	0.21	--
T-Stat (Excess Returns)	**5.55**	3.19	--
Batting Average (Excess Returns)	**60%**	52%	--

To that point, Figure 2 compares the annualized three-year monthly excess return volatility for momentum with that of value. As can be seen in Figure 2, value experienced extreme volatility during the beginning of the sample period (circa 1929-1950), but there are only three material periods of time in the total sample period where the volatility of momentum's excess returns exceeded that of value. Again, further indication of momentum realizing less variability over the long-term and thus realizing less risk than value.

Figure 2: Volatility Comparison
January 1927 – September 2022



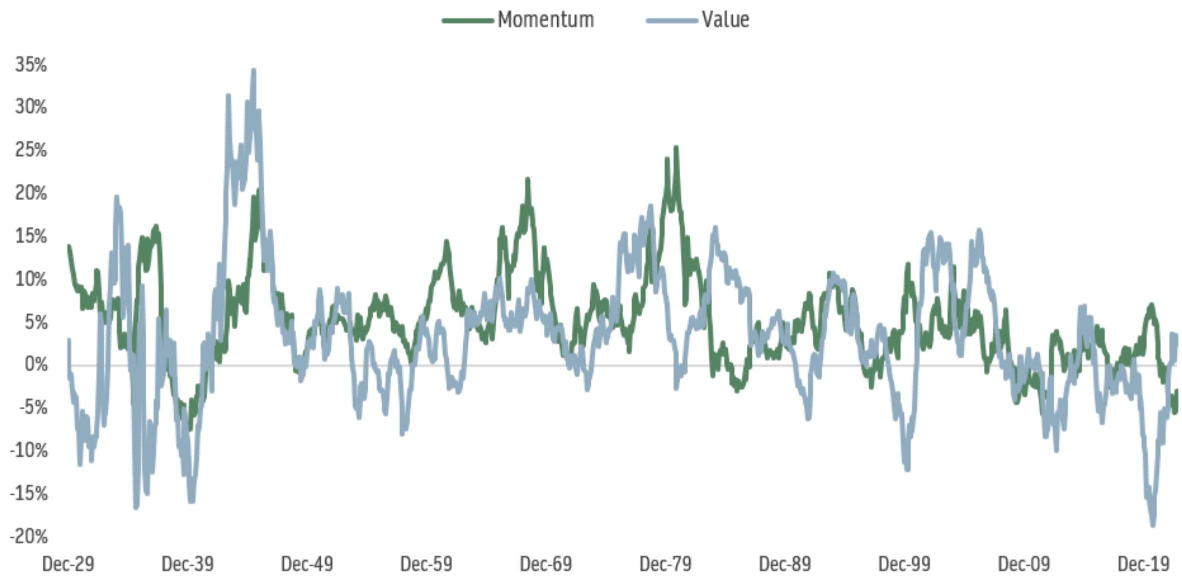
The Market portfolio and Momentum and Value strategies referenced above are calculated using Fama-French monthly data. The Momentum and Value strategy returns are formed as the cumulative return of the top characteristic quintile. Excess returns are excess of the Market portfolio. Please see Important Disclosures at the end of this document.

Return Distributions of the Three-Year Excess Return Processes

One of the most important point estimates for active managers and the plan sponsors that hire them is the three-year alpha or excess return[2]. We find that the payoff structure of the three-year excess return process is different for that of momentum compared with value. Figure 3 plots the monthly time series of the three-year annualized excess returns for the momentum and value strategies over the sample period.

[2] Goyal, Amit, and Sunil Wahal. "The Selection and Termination of Investment Management Firms by Plan Sponsors." The Journal of Finance 63, no. 4 (2008): 1805–47.

Figure 3: Rolling Three-Year **Annualized** Excess Returns for Momentum and Value
January 1927 – September 2022



From Figure 3, two observations stand out. First, momentum spends many more periods outperforming (above the x-axis) than value. In fact, momentum has a positive three-year number for 85% of the periods in the sample versus 67% for value. Amazingly, for the 35 years from late 1949 through late 1983, the month-end three-year excess return for momentum dipped below zero on only two occasions! Second, when value experiences a valley (or period of negative excess return), momentum tends to experience a peak (moving upward in the excess return space). This dynamic is evidence of a beneficial pairing that occurs when combining momentum with value. Further, dissecting the data associated with Figure 3, we find that the average three-year annualized excess return for momentum is 5.08% compared to 3.26% for value, with the volatility in the monthly three-year annualized excess return series again smaller for momentum at 5.26% versus 7.75% for value.

Another point from Figure 3 is the extreme volatility of the 3-year rolling excess returns in the beginning of this data set from 1929 until about 1950. As a robustness check, we computed returns and risk characteristics of the sub-sample period from January 1950 until September 2022 (displayed in Table 2, and in Figure 4). We see the same basic dynamics repeated in this sub-sample, albeit with value exhibiting a lower standard deviation and tracking error than in the full data set. Still, momentum exhibits a higher return and lower risk than value over the sample period.

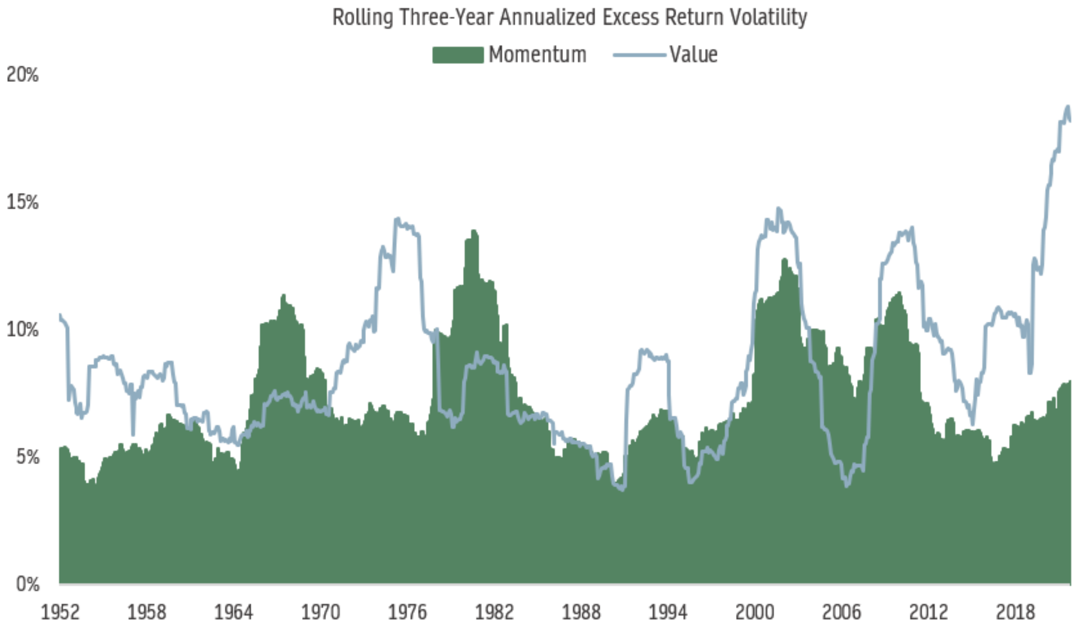
Table 2: Sub-Sample Performance and Characteristics Comparison

January 1950 – September 2022

	Momentum	Value	Market
Return (Annualized)	**15.72%**	14.34%	11.07%
Volatility (Annualized)	**17.59%**	18.28%	14.94%
Tracking Error (to Market)	**7.60%**	9.38%	--
Beta (to Market)	1.06	**1.05**	1.00
Sharpe Ratio	**0.67**	0.57	0.47
Information Ratio (to Market)	**0.61**	0.35	--
T-Stat (Excess Returns)	**5.14**	3.17	--
Batting Average (Excess Returns)	**60%**	53%	--

Figure 4: Sub-Sample Volatility Comparison

January 1950 – September 2022

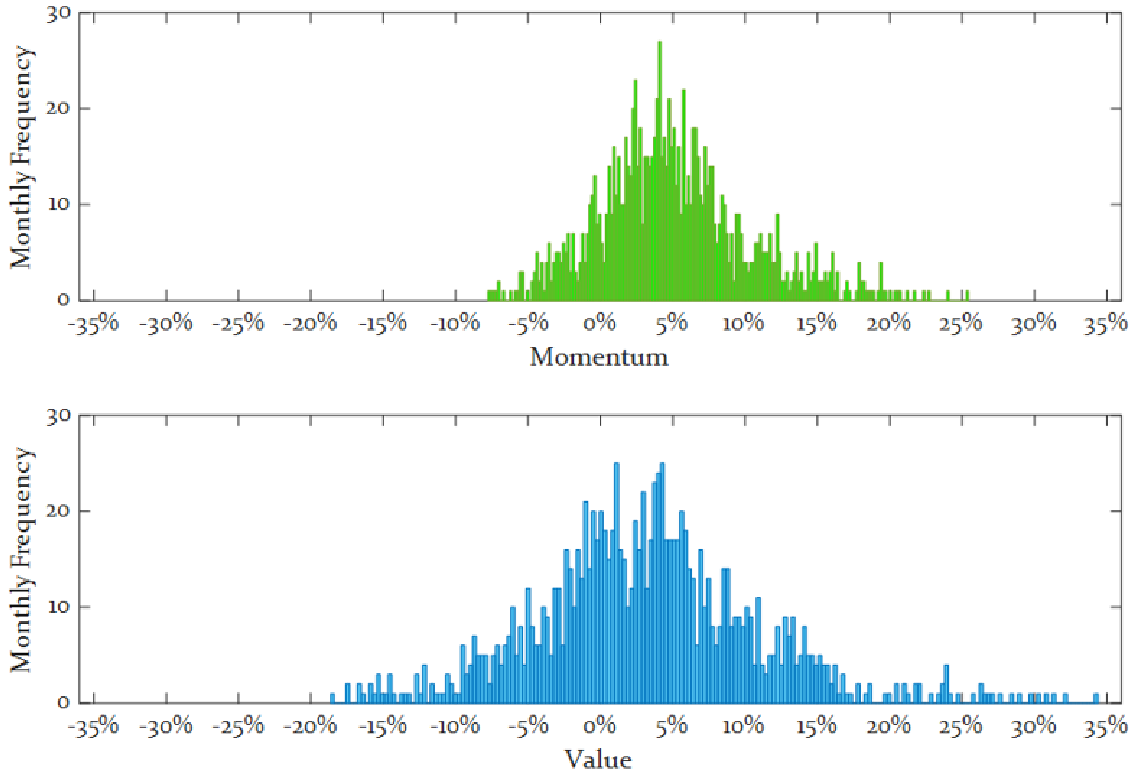


Histograms of Returns

Another way to compare these three-year excess return numbers is by plotting histograms to show the shape of the entire distribution of the monthly three-year excess returns for the complete data set. In Figure 5, the top distribution for momentum (in green) has more mass to the right, indicating a higher probability of outperformance than that of value. Momentum also appears more concentrated about the mean, indicating less risk in obtaining the average three-year excess return.

Figure 5: Three-Year Excess Return Distributions

January 1927 – September 2022



Drawdown Analysis of Momentum versus Value

The following drawdown analysis provides an alternative data set for comparing 'risk' between momentum, value, and market strategies. Table 3 displays those drawdown characteristics for the complete time series (over 1,149 months). As can be seen, the momentum strategy spends slightly less time in a drawdown on average than value (6.07 months versus 6.37) with a standard deviation of 12.71 months for momentum and 16.56 for value. By way of comparison, the market experienced an average drawdown duration of 6.86 months with a standard deviation of 19.50 months. The longest drawdowns occurred during the 1930's and lasted the longest for the market at 183 months, compared to value at 163 months and momentum at 76 months. Further, on average, momentum drawdowns are slightly less severe than value. In fact, the average drawdown for momentum was -17.57% versus -18.23% for value. Moreover, value had a larger maximum of drawdown of -88.44% versus momentum at -74.27%, with a more dramatic worst month at -38% versus -27% for momentum. On the other hand, momentum did experience a slightly higher number of total drawdowns at 130 (4 more than value), and value had much better best absolute month of +82% versus +30% for momentum.

Table 3: Drawdown Comparison

January 1927 – September 2022

	Momentum	Value	Market
Total Number of Drawdowns	130	126	118
Worst Month (Absolute)	-27%	-38%	-29%
Best Month (Absolute)	30%	82%	39%
Mean Drawdown Across All Drawdown Months	-17.57%	-18.23%	-17.71%
Maximum Drawdown	-74.27%	-88.44%	-83.71%
Mean Duration of Drawdown (Months)	6.07	6.37	6.86
Median Duration of Drawdown (Months)	2	2	2
Std. Deviation of Drawdown Duration (Months)	12.71	16.56	19.50
Maximum Duration of Drawdown (Months)	76	163	183

We calculate drawdowns in Table 4 using the same sub sample period as before from January 1950 through September 2022. Again, we see similar dynamics between value and momentum drawdowns. However, momentum does experience a slightly larger average drawdown of -11.21% versus -10.02% for value in the sub sample period.

Table 4: Sub-Sample Drawdown Comparison

January 1950 – September 2022

	Momentum	Value	Market
Total Number of Drawdowns	112	107	107
Worst Month (Absolute)	-27%	-30%	-23%
Best Month (Absolute)	19%	25%	17%
Mean Drawdown Across All Drawdown Months	-11.21%	-10.02%	-10.18%
Maximum Drawdown	-50.64%	-58.23%	-50.39%
Mean Duration of Drawdown (Months)	5.07	5.28	5.36
Median Duration of Drawdown (Months)	2	2	2
Std. Deviation of Drawdown Duration (Months)	9.38	9.15	10.52
Maximum Duration of Drawdown (Months)	63	69	73

Conclusions

Without risk, there is no return. Still, we believe there is a common notion that a momentum strategy carries higher risk than that of a value strategy. However, in this analysis, we show that value can be 'riskier' than momentum over the long term. Even in the most extreme interpretation of our results, value would be deemed at least as risky as momentum. Thus, we may reject the common notion as a mere misconception.

We believe this commonly held belief of momentum's overly 'risky' nature may be due to its tendency to suffer short, sharp periods of underperformance as explained in our earlier paper, 'Momentum Crashes: The Long And Short Of It'. Therefore, it may be the nature of momentum's underperformance rather than the objective results that color the mind of investors. Perhaps, momentum's underperformance is more visceral than the plodding nature of value strategies. Alternatively, it may be the case that momentum is wrongly associated with alternative strategies (i.e., traditional growth) or poorly executed momentum-based strategies which fail to recognize the importance of rebalancing frequency and signal decay in harnessing momentum. To wit, we believe successful momentum strategies must effectively manage risk, rebalance frequencies, and trading costs. Easier said than done. Regardless, if investors can persevere through inevitable periods of underperformance, both a well-executed value and momentum strategy should earn a place in a diversified portfolio based upon their risk/return propositions.

Appendix 1: Global ex-U.S. Comparison

As a robustness check, we consider a similar analysis with a universe of Global ex U.S. stocks. The story is much like the U.S. story, albeit with a shorter time-period. Momentum outperforms value by 126 bps annualized and does so with less volatility.

In terms of portfolio construction: we again use data from the Fama-French website. The momentum portfolio returns are formed from the weighted average of the following: top quintile prior return stocks intersected with each of the five size quintiles. The returns are cap-weighted, and the weights used across the five intersection quintiles are the historical average of market cap weights for the size quintiles (Q1-3%, Q2-4%, Q3-6%, Q4-12%, Q5-75%). The value portfolio is constructed analogously with the replacement of top quintile prior returns with top quintile book-to-market. The market portfolio is also constructed with these same size quintile market cap weights. We construct the returns for Global Developed ex U.S. and then separately for Emerging Markets and combine the two using 75% Global Developed ex U.S. and 25% Emerging Markets aggregation weights. Note that for EM, we use the top 30% of momentum and value (due to data limitations) intersected with both a large cap and a small cap set of stocks representing the entire EM universe. We then use the approximate cap-weighted historical average of 90% - large, 10%-small for the EM portfolio returns.

Table A1.1: Performance and Characteristics Comparison

July 1992 – September 2022

	Momentum	Value	Market
Return (Annualized)	**8.86%**	7.60%	6.16%
Trailing 1-Year Return (Annualized)	-26.65%	**-17.15%**	-25.89%
Trailing 3-Year Return (Annualized)	**2.58%**	1.43%	-0.68%
Trailing 5-Year Return (Annualized)	**1.92%**	-0.98%	-0.50%
Volatility (Annualized)	**17.00%**	19.08%	16.56%
Tracking Error (to Market)	6.98%	**6.04%**	--
Beta (to Market)	**0.94**	1.10	1.00
Sharpe Ratio	**0.39**	0.28	0.24
Information Ratio (to Market)	**0.39**	0.24	--
T-Stat (Excess Returns)	**2.05**	1.66	--
Batting Average (Excess Returns)	**58%**	54%	--

Figure A1.1 shows the rolling annualized three-year excess return volatility for momentum and value while Figure A1.2 shows the three-year excess returns. Momentum is seen to outperform except for the period around the early 2000's tech bubble catastrophe. Table A1.3 also displays results, similar to that of the U.S., in that the drawdowns are less severe and have a shorter duration for momentum when compared to value.

Figure A1.1: Global ex U.S. Rolling Three-Year Excess Return Volatility: Momentum and Value

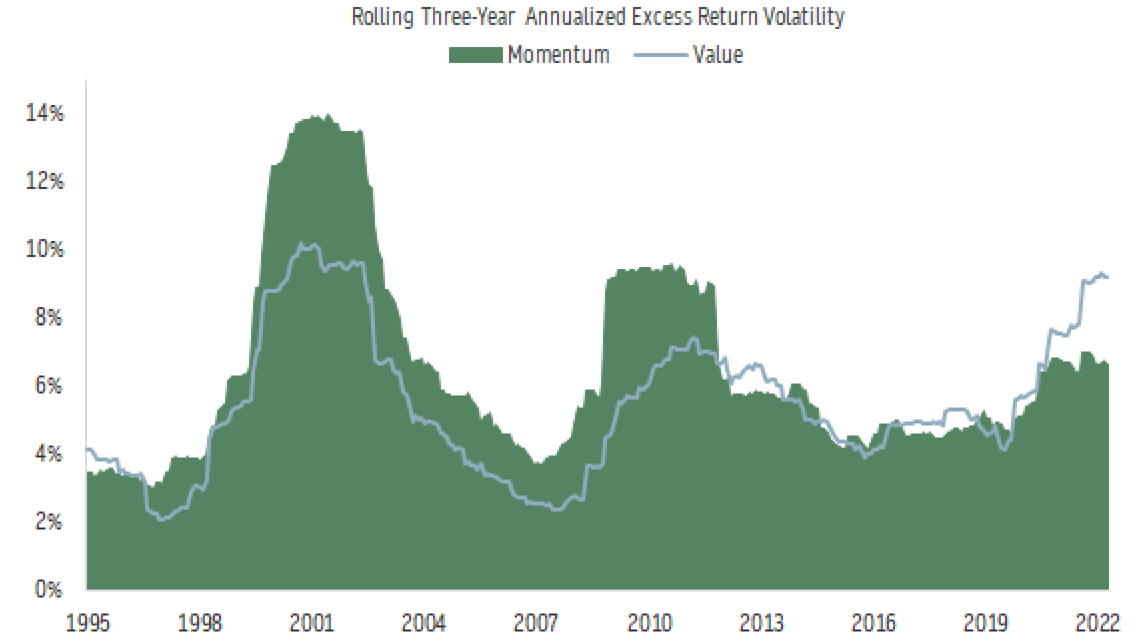


Figure A1.2: Global ex U.S. Rolling Three-Year Excess Returns: Momentum and Value
July 1992 – September 2022

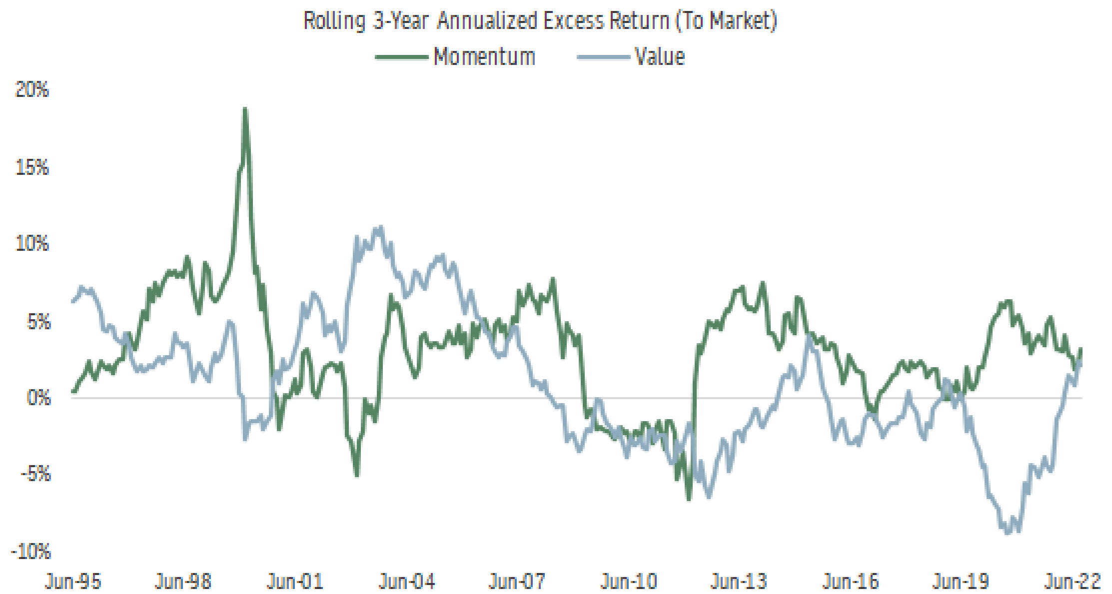


Table A1.3: Global ex U.S. Drawdown Analysis

July 1992 – September 2022

	Momentum	Value	Market
Total Number of Drawdowns	27	27	28
Worst Month (Absolute)	-18%	-27%	-23%
Best Month (Absolute)	15%	19%	15%
Mean Drawdown Across All Drawdown Months	-17.40%	-16.24%	-14.04%
Maximum Drawdown	-54.62%	-63.62%	-57.80%
Mean Duration of Drawdown (Months)	10.52	10.81	10.36
Median Duration of Drawdown (Months)	1	3	2
Std. Deviation of Drawdown Duration (Months)	18.64	23.86	17.96
Maximum Duration of Drawdown (Months)	70	118	75

Appendix 2: Simulating Dependent Momentum and Value Return Series

Using the historical returns for the momentum and value factors, we compute the Spearman's rank correlation coefficient to measure the dependence between the two sequences of returns. Rather than simulating a bivariate normal process, we instead utilize copulas (Latin for "link" or "tie"). This allows us to generate sample pairs that preserve the momentum and value dependence structure while simultaneously having each marginal distribution equal to the univariate empirical distribution of the underlying data series. The inversion method is used in that, if we have an empirical cumulative distribution function (F_X) then $F_X^{-1}(U)$ with U a uniform $[0,1]$ random variable, has the same distribution as that of F_X. The main idea at work here is that is when one evaluates a cumulative distribution function (CDF) at a random variable with the same CDF, one obtains a uniformly distributed random variable. Computing the CDF shows that:

$$P\left(F_X\left(X\right) \le u_0\right) = P\left(X \le F_X^{-1}\left(u_0\right)\right) = F_X\left(F_X^{-1}\left(u_0\right)\right) = u_0. \quad (1)$$

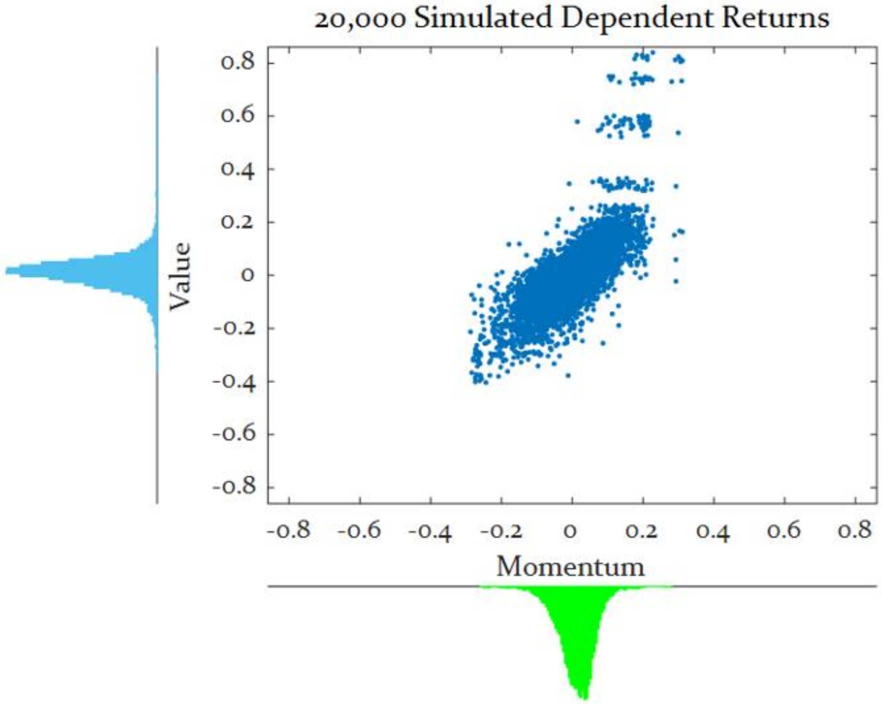
Recognizing this as the CDF of a uniform (0,1) random variable we have that $F_X\left(X\right) \overset{d}{=} U\left[0,1\right]$. We can then use this fact to obtain two uniform random variables that preserve the dependence between momentum and value while also using them to preserve the same marginals as momentum and value respectively in the bivariate distribution

We proceed as follows:

1. Compute empirical inverse CDFs for both momentum and value separately.
2. Compute the Spearman's rank correlation between momentum and value.
3. Simulate bivariate *T*-distributed pairs using the correlation, from step 2, to measure the dependence.
4. Evaluate the *T*-CDF at the random *T* values to generate uniform random variables with dependence.
5. Feed these uniforms into the empirical inverse CDFs of momentum and value to generate the pairs of dependent returns which also preserve the original distributions through the marginals.
6. Lastly one can use a smoothed version of the empirical inverse CDF by allowing for small normally distributed perturbations to be added to the simulated returns, which we also apply.

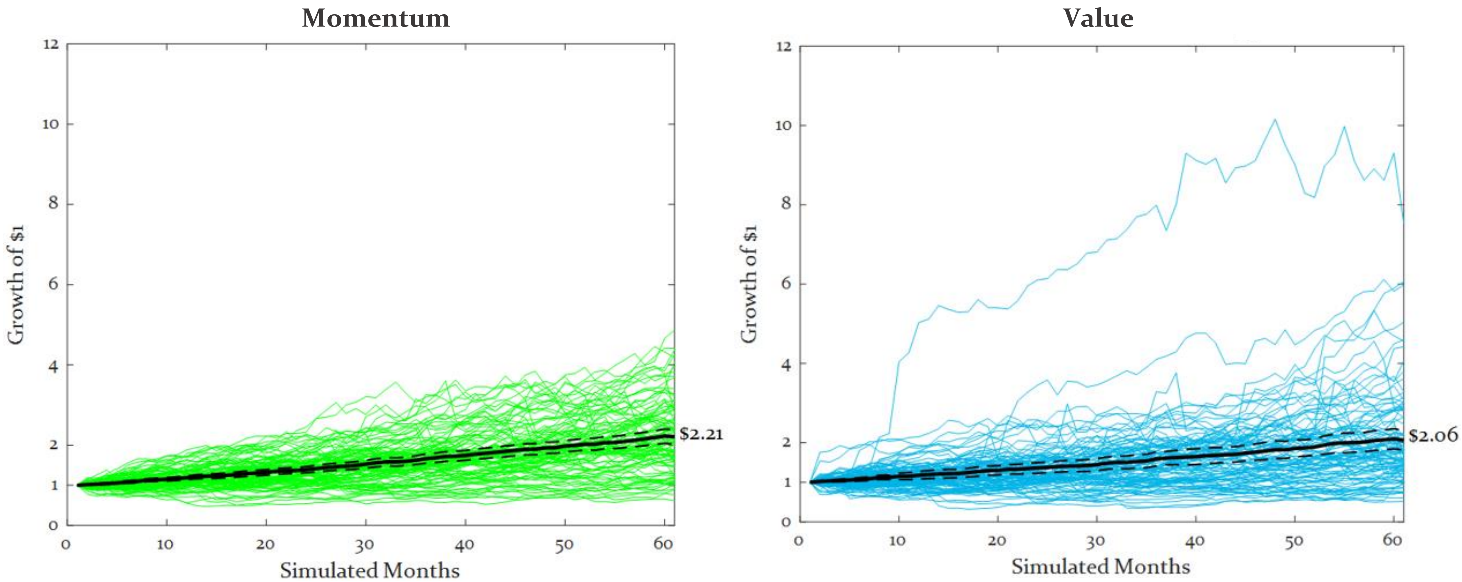
Figure A2.1 shows 20,000 simulated absolute returns for these (momentum, value) pairs along with their marginal distributions.

Figure A2.1: Simulated Returns



Utilizing this simulated return algorithm, with the historical U.S. momentum and value return series as inputs, we show in figure A2.2, 100 simulated five-year sample paths. The blue and green lines represent each individual sample path (alternate histories) while the solid black lines represent the cross-sectional average growth. The dashed black lines represent a 95% confidence interval for the cross-sectional average growth. On average, the momentum growth is higher, as expected, with a $1 investment becoming $2.21 for momentum compared to $2.06 for value. Notice also how the higher variation in the value sample paths manifests itself with more "outlier" type histories occurring.

Figure A2.2: Simulated Growth of Each Strategy



We also ran a two-sample Kolmogorov-Smirnov goodness-of-fit hypothesis test with respect to the monthly excess returns. This is a non-parametric test with a null hypothesis that the excess returns of momentum and the excess returns for value come from the same probability distribution. We can reject this same distribution null hypothesis with a *p*-value of 0.0001231. This implies different payout structures for the excess return series.

About EAM

EAM Investors is solely focused on delivering alpha for clients in global equity markets. A momentum-driven approach to investing leverages their collective insight within a systematic process designed to deliver consistent and predictable outcomes. EAM's Informed Momentum® investment process has been applied consistently across all strategies since inception of the firm in 2007.

About the Authors

Travis Prentice

Travis is CEO and Chief Investment Officer of EAM Investors, a firm he co-founded in 2007. In addition, he is Portfolio Manager for EAM's US and Global strategies, as well as an analyst across all EAM's strategies. Prior to founding EAM, Travis was a Partner, Managing Director and Portfolio Manager with Nicholas-Applegate Capital Management where he had lead portfolio management responsibilities for their Micro and Ultra Micro Cap investment strategies and a senior role in the firm's US Micro/Emerging Growth team. He has 25 years of institutional investment experience specializing in momentum-based strategies. He holds an MBA from San Diego State University and a BA in Economics and a BA in Psychology from the University of Arizona.

David Wroblewski, PhD

David is a Director of Applied Research at EAM Investors. Prior to joining EAM in 2021, David was Director of Research at Denali Advisors, an institutional equity manager with US and Non-US strategies. He has additional experience in research and risk management from Nicholas-Applegate Capital Management. David also serves as an Adjunct Instructor in the Department of Mathematics at San Diego City College. He has over 15 years of investment experience. David received a Ph.D. in Mathematics at the University of California, San Diego, a Master of Science in Applied Mathematics and a Bachelor of Science in Applied Mathematics from San Diego State University. David has published papers in the Journal of Investment Management, Financial Analyst Journal, and Applied Economics, among other financial publications. He has been awarded the "Harry M. Markowitz, Special Distinction Award" from The Journal of Investment Management.

Important Disclosures

The information provided here is for general informational purposes only and should not be considered an individualized recommendation or personalized investment advice. The investment strategies mentioned here may not be suitable for everyone. Each investor needs to review an investment strategy for his or her own particular situation before making any investment decision. All expressions of opinion are subject to change without notice in reaction to shifting market conditions. Data contained herein from third-party providers is obtained from what are considered reliable sources. However, its accuracy, completeness or reliability cannot be guaranteed. Supporting documentation for any claims or statistical information is available upon request. Investing involves risk including loss of principal. Past performance is no guarantee of future results and the opinions presented cannot be viewed as an indicator of future performance.

For the analysis, we construct U.S. long-only, market cap-weighted, top quintile portfolios for momentum and value. The market portfolio is also cap-weighted and consists of all available U.S. stocks. The momentum sorts are based on the trailing 1-year return excluding the most recent month, and the value sorts are based on book-to-market ratios. The data is from the Fama-French website and spans the time-period of January 1927 through September 2022.

Fama-French returns referenced in this document are calculated using monthly from Ken French's website:
https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html