Momentum Unveiled: Navigating Investment Strategies in Post-Crisis Markets

BAFI 508 Final Report
Group 8

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1. Introduction

1.1. Motivation

In financial markets, seeking strategies that outperform is key for investors and researchers. Momentum investing, which assumes past winners continue to perform well, challenges the efficient market hypothesis (EMH) by using historical trends. The post-2007 financial crisis, however, raises doubts about the effectiveness of traditional momentum strategies. Our study investigates momentum investing's viability in the altered market landscape up to 2023, prompted by crisis-induced uncertainty.

Leveraging Jegadeesh and Titman's (2001) seminal research on momentum strategy profitability, we aim to assess its post-crisis relevance. Their work, which demonstrated the value of past performance in predicting future gains, sets the stage for our exploration into the adaptability and potential of momentum investing in today's market conditions.

1.2. Literature

Our study delves into the momentum investment strategy post-2007 financial crisis, drawing on key works that explore its performance, adaptability, and relevance in today's markets. This literature review synthesizes these contributions, emphasizing their importance to our research theme.

The impact of the financial crisis on momentum strategies: Dolvin and Foltice (2017) examine the 2007 crisis's impact on U.S. stock market momentum trading, noting a shift from profitable "winner" portfolios to an inverted U-shaped return pattern. This shift suggests a fundamental change in market reactions, highlighting the need to reevaluate momentum strategies for their post-crisis efficacy and adaptability.

Broadening the scope : Moskowitz, Ooi, and Pedersen (2011) expand our understanding by documenting time series momentum across various asset classes, affirming momentum strategies' viability beyond the stock market. Their work, which challenges traditional financial theories and shows momentum's adaptability in volatile markets, is vital to grasp the strategy's broader applicability post-crisis.

Adapting momentum strategies for individual investors: Foltice and Langer (2015) focus on momentum strategies for individual investors, addressing the challenges of transaction costs and trading constraints. Their research, highlighting momentum investing's evolution with technological and market changes post-crisis, provides insights into its practical implementation and ongoing relevance.

Together, these studies form a solid foundation for our examination of momentum strategies post-2007 crisis. By analyzing market reaction shifts, momentum's applicability across assets, and its optimization for individual investors, they enrich our understanding of momentum investing in the contemporary financial landscape. The insights from these pivotal works will guide our analysis of momentum strategies' adaptability and significance in today's markets.

1.3. Goals

With a foundation laid by these seminal studies, our research seeks to advance the discourse on momentum investment strategies by focusing on specific aspects of their application and efficacy in a post-crisis world:

1. **Performance consistency analysis:** Our goal is to evaluate the momentum strategy's performance up to 2023, considering the ongoing recovery from the 2007 crisis and the impact of new technological and regulatory changes. We'll assess its continued profitability and adaptability in the current market environment.
2. **Impact of alpha and beta:** We will examine the role of Alpha (excess returns) and Beta (market risk) in shaping momentum investing outcomes. This analysis aims to shed light on the risk-adjusted returns of momentum strategies, offering insight into their performance in today's markets.
3. **Effectiveness of traditional models:** Our study will explore how well traditional financial models, like the CAPM, explain or predict momentum strategy returns. We'll discuss the limitations of these models in fully understanding momentum investing nuances, suggesting a potential reevaluation of their evaluative use.

2. Methodology

CRSP data and Compustat datasets were cleaned and formatted for analysis. The following stocks were excluded: stocks that were not common stocks or were not listed on the NYSE, AMEX, or NASDAQ. Following Jegadeesh and Titman (2001), stocks with closing prices below $5 at the start of the holding period, and all stocks with market capitalizations within the smallest decile for a given year and month combination were excluded. Duplicate data was removed.

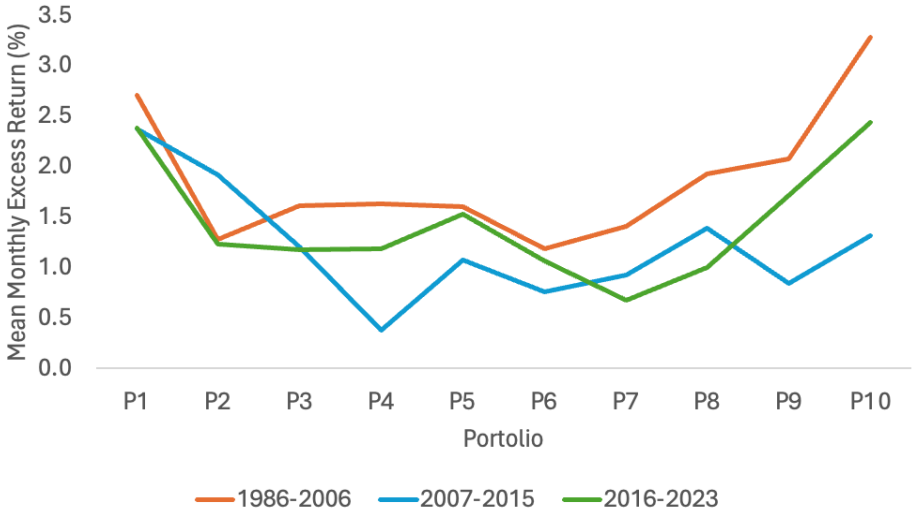
Momentum was defined as the return for the prior six months. Based on this definition, momentum was calculated for each stock by deriving cumulative returns from the last six months (skipping the current and preceding months; Moskowtiz, Ooi, & Pedersen, 2011) and stored as a 'momentum' variable.

Portfolios were created by dividing stocks into deciles based on momentum, where P1 contained stock with the lowest 10% of momentum values and P10 contained stock with the highest 10%. Three sets of portfolios were created for the following timeframes: (1) 1986-2006, (2) 2007-2015, and (3) 2016-2023. Portfolios were equal-weighted and rebalanced monthly. Portfolios were then evaluated by calculating excess return characteristics and computing CAPM and F-F Three Factor Model regressions based on returns of a holding period of six months.

3. Results and Interpretation

3.1. Excess Return Characteristics

Figure 1. Average Monthly Excess Returns by Portfolios Sorted on Momentum for the Three Time Periods



Pre-financial crisis (1986-2006): During this period, the momentum strategy appears to have been effective. Mean excess returns generally increase, and the long-short value is positive at 0.576 (Appendix, Table 1) indicating that buying high-momentum stocks and shorting low-momentum stocks would have been profitable. It is worth noting that our long-short value was smaller than that observed by Jegadeesh and Titman (2001), which may be a result of differences in data cleaning procedures or how missing values were handled, as well as a difference in the sampling period. The higher standard deviation for P10 suggests more risk but also comes with the potential for higher rewards, evidenced by its highest Sharpe ratio, indicating superior risk-adjusted returns. These findings support the effectiveness of the momentum strategy before the financial crisis, with the strategy yielding significant excess returns, especially for portfolios with the highest momentum.

Post-financial crisis (2007-2015): The post-financial crisis environment shows a marked decrease in the effectiveness of the momentum strategy. Mean returns for the highest momentum portfolio (P10) are substantially lower than in the previous period, and the negative long-short value of -1.055 (Appendix, Table 2) signifies that the standard momentum strategy would have resulted in a loss. These findings support the conclusions made by Dolvin and Foltice (2017), who found that their

portfolio with the strongest momentum had significantly negative excess returns. Nevertheless, the distribution of excess returns in this study (Figure 1) did not follow the same inverted U-shape demonstrated in their paper, which may have been the consequence of some of our P1 stocks exhibiting unusually high returns in some months. The results suggest that the financial crisis did have a substantial negative impact on the momentum strategy's performance, aligning with the notion that the crisis altered market dynamics and investor behaviour, challenging the momentum strategy's viability during this period.

Recent years (2016-2023): This period shows a mild recovery in the performance of the momentum strategy. While the mean returns for P10 are not as high as in the pre-crisis period, they have improved from the post-crisis period. The small positive long-short value of 0.060 (Appendix, Table 3) hints at a potential partial return to pre-crisis effectiveness or at least an adaptation to the new market environment. However, the overall effectiveness seems to be subdued compared to the pre-crisis period. This finding aligns with Dolvin and Foltice's proposal that while the momentum strategy may not be dead, its impact may have faded.

3.2. CAPM Regressions

Figure 2. CAPM Alpha of Portfolios Sorted on Momentum for the Three Time Periods

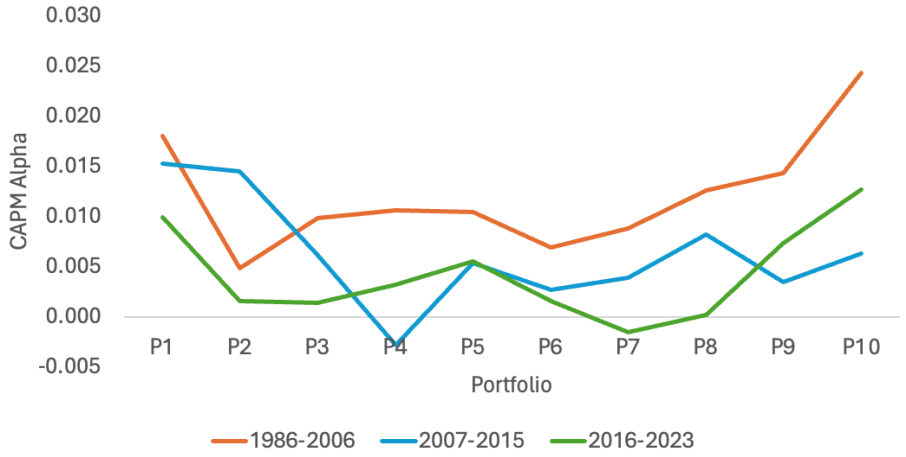
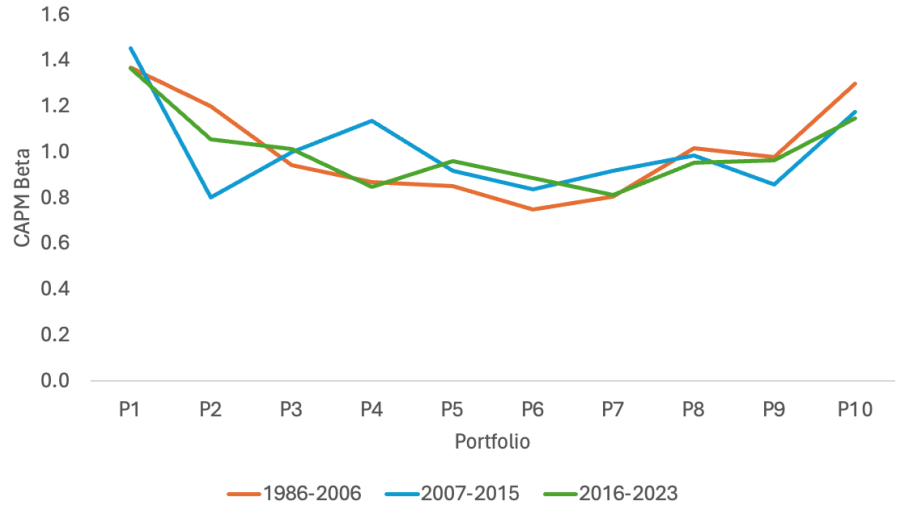


Figure 3. CAPM Beta of Portfolios Sorted on Momentum for the Three Time Periods



Pre-financial crisis (1986-2006): The CAPM regression exhibits positive alpha values across portfolios, with the highest being for P10 at 0.024 (Appendix, Table 4), suggesting outperformance relative to the market. The t-statistics for these alphas

are significant, particularly for P10 at 4.262, indicating that these abnormal returns are statistically reliable. The beta values range shows varying degrees of market-related risk, with P1 being the most volatile. The R-squared values are moderately high, peaking at 0.404 for P2, implying market returns explain a good portion of the portfolio returns. The data supports the momentum strategy's effectiveness in this period, with significant positive alphas, especially for high-momentum stocks, and a meaningful long-short alpha of 0.016, highlighting the potential for abnormal returns when applying this strategy.

Post-financial crisis (2007-2015): This period displays a stark contrast to the previous one, with lower alpha values (Figure 2), the highest being 0.015 for both P1 and P2. The negative alpha for P4 at -0.003 indicates underperformance against the market which is not statistically significant with a t-stat of -0.724. Beta values are generally lower than in the previous period (Figure 3), with P2 having the lowest beta of 0.801, suggesting lower market-related risk. The R-squared values are variable, with the highest being 0.637 for P3, yet the market still explains a fair share of the returns. The negative long-short alpha of -0.009, with a significant negative t-stat of -1.088, implies that a traditional momentum strategy would have underperformed the market during this time. The period after the financial crisis shows a diminished effectiveness of the momentum strategy.

Recent years (2016-2023): In this recent period, the alpha values are predominantly positive, though modest, with the highest alpha of 0.013 for P10 and a significant t-stat of 1.581, showing some level of outperformance. The betas are close to 1 across portfolios, indicating that portfolio volatility is closely aligned with market volatility. The R-squared values are moderate, with the highest at 0.600 for P6, indicating a decent level of explanation by the market returns. The long-short alpha is slightly positive at 0.010, with a t-stat of 1.005, suggesting that the momentum strategy would have again been able to achieve returns slightly above the market expectation. This suggests a cautious return to the viability of the momentum strategy, indicating a potential rebound in the strategy's ability to generate excess returns, albeit with more modest expectations compared to the pre-crisis era.

3.3. F-F Three Factor Model Regressions

Pre-financial crisis (1986-2006): The positive alphas across most portfolios, especially the highest for P10 at 0.026 (Appendix, Table 7)with a t-statistic of 5.131, indicate significant abnormal returns over the period after accounting for market, size, and value factors. Beta values for the market are around 1, with P1 at 1.343 indicating higher sensitivity to market movements. The SMB (Small Minus Big) and HML (High Minus Low) betas show varied sensitivities to size and value factors, with the highest SMB beta of 1.019 in P7 and the highest HML beta of 0.641 in P3. The long-short portfolio has an alpha of 0.019 with a t-stat of 2.727, demonstrating substantial abnormal returns when employing a momentum-based long-short strategy. This suggests the momentum strategy's outperformance, even after accounting for market, size, and value risks, consistent with the historical momentum effect.

Post-financial crisis (2007-2015): Alphas are generally lower compared to the pre-crisis period, with many not being statistically significant. P1 shows the highest alphas at 0.020 (Appendix, Table 8), but this is much lower than in the previous period. Market beta values are generally high, with the highest beta of 1.068 in P10, indicating a strong market risk relation. SMB and HML betas show mixed results with no clear trend. The long-short strategy's alpha is negative at -0.011, suggesting that a long-short momentum strategy would not have yielded abnormal returns and would have underperformed. Thus, post-crisis, the momentum strategy shows a significant decline in effectiveness, pointing to a potentially non-viable momentum strategy during this period.

Recent years (2016-2023): The alpha values show slight improvements from the post-crisis period with P10 having an alpha of 0.016 and a significant t-stat of 2.230 (Appendix, Table 9), indicating some level of outperformance. Market beta values are close to 1 for many portfolios, aligning with the market's volatility. SMB and HML betas are varied, suggesting different levels of size and value risk across portfolios. The long-short strategy has a small positive alpha of 0.012, showing a marginal performance over the market, with slight but not robust abnormal returns. This suggests some resurgence in momentum strategy effectiveness, but it remains less pronounced than in the pre-crisis period.

4. Discussion

Our findings offer a nuanced view of the momentum investment strategy's performance across different market periods, directly engaging with our report's goals. This discussion synthesizes our results in light of these objectives, contextualizing the momentum strategy's viability and mechanics within the evolving landscape of financial markets.

4.1. Performance Consistency Analysis

Our analysis underscores a significant variance in the momentum strategy's performance pre- and post-2007 financial crisis, with a mild recovery observed in recent years (2016-2023). Initially, the strategy exhibited profitability, aligning with the expectations of past momentum investing theories. However, the post-crisis era marked a downturn in its effectiveness, suggesting that the crisis indeed altered the market dynamics, affecting the momentum strategy's viability. The slight improvement in recent years indicates a partial adaptation to the new market environment, possibly due to technological and regulatory advancements. Nevertheless, this analysis would necessitate additional time to thoroughly examine the impact of the COVID-19 pandemic within the period of 2016-2023, as each era possesses its unique macroeconomic characteristics. This evolution highlights the need for continuous adaptation of momentum strategies to maintain profitability and relevance, underpinning the importance of assessing performance consistency in the face of changing market conditions.

4.2. Impact of Alpha and Beta

Our findings regarding alpha and beta further elaborate on the momentum strategy's fluctuating performance over time. Pre-crisis, the high alpha values, particularly for high-momentum portfolios, indicate the strategy's historical capacity to generate excess returns (Jegadeesh & Titman, 1993; 2001), with beta values reflecting its inherent market risk. Post-crisis, the decrease in alpha and the negative long-short values signify a reduction in the strategy's ability to outperform the market, a trend that slightly reverses in more recent years. This reversal, though modest, suggests a nuanced understanding of risk-adjusted returns is crucial for momentum investing, where alpha and beta play pivotal roles in shaping investment outcomes. The observed dynamics emphasize the necessity of considering both excess returns and market risk when evaluating the momentum strategy, particularly in a landscape influenced by economic upheavals and regulatory changes.

4.3. Effectiveness of Traditional Models

The CAPM regressions across different periods demonstrate the model's varying effectiveness in explaining momentum strategy returns, with significant positive alphas indicating market outperformance in the pre-crisis era, but showing a mixed picture thereafter. This inconsistency suggests that traditional models like CAPM, while useful, may not fully encompass the complexities of momentum investing post-crisis. Indeed, past research has demonstrated a lack of consistent risk-based explanations of the momentum effect, with the basis of the phenomenon still open to debate.

Additionally, momentum strategies involve not only quantitative metrics but also qualitative justifications by investors, such as psychological considerations and market sentiment, which CAPM's mathematical framework may not capture. The limitations of CAPM and similar models in reflecting the nuanced psychological underpinnings of momentum strategies, such as positive feedback (DeLong et al., 1990), underscore the need for their reevaluation or augmentation. Incorporating both quantitative and qualitative factors could provide a more comprehensive understanding of momentum strategies (Dhanker & Maheshwari, 2016), enabling these models to more accurately predict outcomes in today's multifaceted market environment.

4.4. Conclusion

Our discussion reflects on the momentum investment strategy through the lens of performance consistency, the impact of Alpha and Beta, and the effectiveness of traditional financial models. The varying degrees of strategy performance across different eras—markedly affected by the 2007 financial crisis and subsequent market changes—highlight the strategy's sensitivity to external factors. While the strategy shows signs of adaptability and potential for profitability, the changing dynamics of alpha, beta, and the partial applicability of traditional models like CAPM illustrate the complexity of leveraging momentum investing in the current financial landscape. This comprehensive examination not only addresses our initial goals but also paves the way for further research into optimizing momentum strategies within the continuously evolving framework of global markets.

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6. Appendix

Table 1. Excess Return Characteristics for 1986 to 2006

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	wml
Mean	2.706	1.280	1.608	1.635	1.604	1.182	1.409	1.928	2.076	3.281	0.576
Std	10.414	8.350	6.926	6.485	6.280	5.926	7.566	7.252	7.519	10.603	11.951
t-stat	4.125	2.433	3.686	4.002	4.055	3.168	2.956	4.220	4.383	4.913	0.765
Skew	0.842	0.000	0.244	0.227	-0.338	0.266	1.837	1.305	1.014	0.665	-0.346
Sharpe	0.260	0.153	0.232	0.252	0.255	0.200	0.186	0.266	0.276	0.309	0.048

Table 2. Excess Return Characteristics for 2007 to 2015

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	wml
Mean	2.371	1.919	1.201	0.382	1.072	0.760	0.929	1.394	0.847	1.316	-1.055
Std	11.148	6.295	6.801	6.642	5.665	5.546	5.536	6.048	5.622	8.615	11.864
t-stat	2.211	3.169	1.835	0.598	1.967	1.425	1.744	2.395	1.565	1.588	-0.924
Skew	2.545	0.130	1.145	0.528	-0.356	0.274	-0.602	-0.057	-0.211	-0.439	-2.121
Sharpe	0.213	0.305	0.177	0.058	0.189	0.137	0.168	0.230	0.151	0.153	-0.089

Table 3. Excess Return Characteristics for 2016 to 2023

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	wml
Mean	2.380	1.235	1.176	1.184	1.531	1.062	0.678	0.996	1.716	2.440	0.060
Std	9.904	7.855	6.552	5.943	5.998	6.096	5.556	7.015	9.429	9.451	10.439
t-stat	2.354	1.541	1.759	1.951	2.500	1.707	1.197	1.391	1.783	2.529	0.056
Skew	0.350	-0.217	-0.260	-0.016	-0.164	0.348	0.576	1.154	4.272	0.721	-0.108
Sharpe	0.240	0.157	0.180	0.199	0.255	0.174	0.122	0.142	0.182	0.258	0.006

Table 4. CAPM Regression Results for 1986 to 2006

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	wml
Alpha	0.018	0.005	0.010	0.011	0.010	0.007	0.009	0.013	0.014	0.024	0.016
t-stat	3.334	1.188	2.795	3.185	3.251	2.196	2.061	3.462	3.646	4.262	2.181
Beta	1.370	1.202	0.943	0.869	0.852	0.749	0.807	1.016	0.980	1.298	0.097
t-stat	11.289	13.014	11.887	11.609	11.839	10.641	8.435	12.457	11.125	10.158	0.602
R2	0.338	0.404	0.361	0.350	0.359	0.312	0.222	0.383	0.331	0.292	0.001

Table 5. CAPM Regression Results for 2007 to 2015

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	wml
Alpha	0.015	0.015	0.006	-0.003	0.005	0.003	0.004	0.008	0.003	0.006	-0.009
t-stat	1.764	2.939	1.277	-0.724	1.480	0.704	1.147	2.133	0.895	0.971	-1.088
Beta	1.454	0.801	1.001	1.137	0.917	0.839	0.919	0.986	0.860	1.176	0.377
t-stat	7.882	7.591	9.709	13.627	11.841	10.231	12.581	12.027	10.479	8.487	2.174
R2	0.370	0.352	0.471	0.637	0.569	0.497	0.599	0.577	0.509	0.405	0.043

Table 6. CAPM Regression Results for 2016 to 2023

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	wml
Alpha	0.010	0.002	0.001	0.003	0.006	0.002	-0.001	0.000	0.007	0.013	0.010
t-stat	1.276	0.253	0.314	0.709	1.383	0.350	-0.362	0.041	0.854	1.581	1.005
Beta	1.365	1.056	1.013	0.847	0.961	0.885	0.812	0.955	0.963	1.149	0.094
t-stat	8.651	8.288	10.908	9.205	11.872	9.550	9.670	8.464	5.500	7.035	0.469
R2	0.443	0.422	0.559	0.474	0.600	0.492	0.499	0.432	0.243	0.345	0.002

Table 7. F-F Three Factor Model Regression Results for 1986 to 2006

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	wml
Alpha	0.017	0.003	0.006	0.008	0.007	0.004	0.008	0.012	0.015	0.026	0.019
t-stat	3.148	0.769	1.766	2.453	2.226	1.164	1.983	3.289	4.310	5.131	2.727
Beta Mkt	1.343	1.239	1.081	0.944	0.979	0.864	0.752	0.997	0.839	1.068	-0.169
t-stat	10.274	12.170	12.755	11.751	12.722	11.620	8.016	11.249	9.706	8.565	-0.982
Beta SMB	0.779	0.413	0.422	0.472	0.381	0.457	1.019	0.474	0.853	1.229	0.827
t-stat	4.801	3.271	4.008	4.732	3.994	4.954	8.753	4.309	7.948	7.941	3.880
Beta HML	0.264	0.308	0.641	0.456	0.584	0.579	0.281	0.150	-0.072	-0.192	-0.490
t-stat	1.259	1.885	4.712	3.535	4.730	4.857	1.870	1.058	-0.518	-0.960	-1.778
R2	0.395	0.429	0.425	0.411	0.424	0.396	0.410	0.427	0.492	0.469	0.102

Table 8. F-F Three Factor Model Regression Results for 2007 to 2015

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	wml
Alpha	0.020	0.016	0.007	-0.003	0.006	0.004	0.004	0.009	0.003	0.005	-0.011
t-stat	2.599	3.163	1.646	-0.722	1.810	0.996	1.328	2.381	0.845	0.851	-1.334
Beta Mkt	1.014	0.680	0.789	0.995	0.768	0.677	0.819	0.893	0.793	1.068	0.391
t-stat	5.453	5.830	7.549	11.705	9.692	8.075	10.371	9.845	8.862	7.199	2.029
Beta SMB	1.108	0.432	0.983	0.826	0.725	0.754	0.473	0.285	0.508	0.996	0.566
t-stat	3.029	1.883	4.782	4.945	4.651	4.571	3.048	1.600	2.890	3.412	1.494
Beta HML	1.244	0.243	0.233	0.023	0.140	0.173	0.105	0.221	-0.084	-0.285	-0.525
t-stat	4.009	1.250	1.337	0.162	1.058	1.238	0.799	1.462	-0.565	-1.149	-1.635
R2	0.501	0.385	0.576	0.706	0.649	0.590	0.635	0.597	0.546	0.468	0.083

Table 9. F-F Three Factor Model Regression Results for 2016 to 2023

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	wml
Alpha	0.013	0.003	0.003	0.005	0.007	0.003	0.000	0.003	0.009	0.016	0.012
t-stat	1.976	0.509	0.801	1.263	2.016	0.699	-0.113	0.542	1.076	2.230	1.198
Beta Mkt	1.112	0.939	0.895	0.713	0.840	0.785	0.734	0.764	0.815	0.880	-0.058
t-stat	7.791	7.212	10.933	8.486	11.158	8.735	8.901	7.400	4.475	5.723	-0.280
Beta SMB	1.212	0.566	0.525	0.627	0.585	0.459	0.350	0.942	0.758	1.370	0.808

t-stat	4.852	2.487	3.664	4.260	4.440	2.917	2.428	5.220	2.379	5.093	2.210
Beta HML	0.556	0.251	0.496	0.366	0.260	0.338	0.311	0.282	0.054	0.170	-0.078
t-stat	3.448	1.710	5.364	3.848	3.057	3.324	3.337	2.416	0.261	0.981	-0.329
R2	0.604	0.477	0.703	0.619	0.700	0.586	0.581	0.588	0.288	0.496	0.053