Data Assignment Report

Spring 2025 Financial Econometrics

B11703090 林淑佑

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1 Summary

This study examines momentum strategies using stock data from 2001 to 2023. We form winner and loser portfolios based on past 12-month returns and evaluate their future 3-month performance. The key findings include:

- **Momentum Effect is More Pronounced in Value-Weighted Strategies:** The value-weighted (VW) long-short portfolio generates positive monthly excess returns of 0.457%, while the equal-weighted (EW) strategy produces negative returns of -0.084%.
- **Winner Portfolios Outperform the Market:** The VW winner portfolio exhibits positive and statistically significant alphas in all asset pricing models, indicating that momentum effects cannot be fully explained by traditional risk factors.
- **Momentum Winners Tend to be Less Profitable Firms:** In the five-factor model, the profitability factor (RMW) shows a significant negative relationship with winner portfolios.

2 Portfolio Performance

Table 1 reports the average risk premiums for all six portfolios. The EW long-short portfolio yields a negative average risk premium of -0.084% per month, while its VW counterpart yields a positive premium of 0.457% per month. Although EW portfolios exhibit minimal difference between winners and losers, the VW strategy shows a clear outperformance of winner portfolios over loser portfolios, indicating a stronger momentum effect compared to the EW strategy.

Table 1: Average Risk Premium

	Loser (Sell)	**Winner (Buy)**	**Long-Short**
Equal-Weighted (EW)	0.00756	0.00789	-0.00084
	(0.00395)	(0.00263)	(0.00245)
Value-Weighted (VW)	0.00290	0.00854	0.00457
	(0.00380)	(0.00242)	(0.00293)

3 Model Results

To examine the profitability of our momentum strategy, we estimate three asset pricing models using time-series regressions: (1) the CAPM, (2) the Fama-French three-factor model and (3) the Fama-French five-factor model:

$$R_{p,t} - RF_t = \alpha_p + \beta_{p,MKT} MktRF_t + \varepsilon_{p,t} \tag{1}$$

$$R_{p,t} - RF_t = \alpha_p + \beta_{p,MKT} MktRF_t + \beta_{p,SMB} SMB_t + \beta_{p,HML} HML_t + \varepsilon_{p,t} \tag{2}$$

$$\begin{aligned} R_{p,t} - RF_t = \alpha_p + \beta_{p,MKT} MktRF_t + \beta_{p,SMB} SMB_t + \beta_{p,HML} HML_t \\ + \beta_{p,RMW} RMW_t + \beta_{p,CMA} CMA_t + \varepsilon_{p,t} \end{aligned} \tag{3}$$

where $R_{p,t}$ is the portfolio return, RF_t is the risk-free rate, $MktRF_t$ is the market risk premium, and the factors are defined as follows: SMB_t (Small Minus Big), HML_t (High Minus Low), RMW_t (Robust Minus Weak), and CMA (Conservative Minus Aggressive).

The specific results of Equation (1), (2) and (3) are presented in Table 2 and Table 3. For the EW portfolios, the alpha remains positive and significant for winner portfolios only in the five-factor model (0.90% , $p < 0.1$). The value factor (HML) shows significance in the five-factor model, with a negative coefficient for loser portfolio (-0.3273, $p < 0.1$) and a positive coefficient for long-short portfolio (0.2460, $p < 0.05$). Moreover, the profitability factor (RMW) exhibits a significant negative effect for the winner portfolio (-0.3153, $p < 0.01$), suggesting that momentum winners tend to be less profitable firms.

For the VW portfolios, the winner portfolios demonstrate positive and significant alphas in all models, with the strongest significance in the five-factor model (0.98%, $p < 0.05$). The value factor (HML) shows similar patterns to the EW case, and the profitability factor (RMW) again shows a significant negative coefficient for the winner portfolio.

These results indicate that value-weighted momentum strategies generate more robust abnormal returns than EW strategies, with alphas persisting even after controlling for other risk factors. Overall, the consistent presence of positive alphas in winner portfolios suggests that momentum effects are not fully captured by traditional risk factors.

Table 2: Results of Regression Analysis (Equal-Weighted)

Model	**(1) CAPM**			**(2) 3 Factors**			**(3) 5 Factors**		
Dep Var.	loser	winner	long short	loser	winner	long short	loser	winner	long short
α	0.0075	0.0075	-0.0012	0.0075	0.0075	-0.0013	0.0078	0.0090*	-0.0000
	(0.0089)	(0.0054)	(0.0054)	(0.0085)	(0.0054)	(0.0052)	(0.0085)	(0.0050)	(0.0056)
MktRF	0.0098	0.0692	0.0628	0.0154	0.0696	0.0576	0.0220	0.0372	0.0188
	(0.0805)	(0.0727)	(0.0627)	(0.0833)	(0.0856)	(0.0641)	(0.0841)	(0.0744)	(0.0728)
SMB				0.0066	0.0133	0.0061	-0.0305	-0.0634	-0.0339
				(0.1852)	(0.1464)	(0.1015)	(0.1772)	(0.1418)	(0.0975)
HML				-0.2091	-0.0866	0.1234	-0.3273*	-0.0806	0.2460**
				(0.1821)	(0.0928)	(0.1276)	(0.1931)	(0.1180)	(0.1119)
RMW							-0.1914	-0.3153***	-0.1260
							(0.1644)	(0.0929)	(0.1240)
CMA							0.3702	0.1231	-0.2424
							(0.3437)	(0.1819)	(0.2121)

Signif. codes: * p<0.1, ** p<0.05, *** p<0.01

Table 3: Results of Regression Analysis (Value-Weighted)

Model	**(1) CAPM**			**(2) 3 Factors**			**(3) 5 Factors**		
Dep Var.	loser	winner	long short	loser	winner	long short	loser	winner	long short
α	0.0029	0.0082*	0.0042	0.0027	0.0083*	0.0044	0.0036	0.0098**	0.0056
	(0.0076)	(0.0046)	(0.0050)	(0.0071)	(0.0045)	(0.0047)	(0.0071)	(0.0040)	(0.0050)
MktRF	0.0004	0.0569	0.0622	0.0311	0.0839	0.0617	0.0165	0.0442	0.0214
	(0.0902)	(0.0637)	(0.0594)	(0.0980)	(0.0801)	(0.0555)	(0.1024)	(0.0711)	(0.0696)
SMB				-0.1127	-0.1320	-0.0261	-0.1732	-0.2006	-0.0696
				(0.1939)	(0.1260)	(0.1385)	(0.1877)	(0.1329)	(0.1217)
HML				-0.2758*	-0.0903	0.1858	-0.3114	-0.0259	0.3561**
				(0.1583)	(0.0800)	(0.1460)	(0.1889)	(0.1103)	(0.1368)
RMW							-0.2479	-0.2602**	-0.1051
							(0.1727)	(0.1042)	(0.1384)
CMA							0.2004	-0.0449	-0.3654
							(0.3473)	(0.1694)	(0.2484)

Signif. codes: * p<0.1, ** p<0.05, *** p<0.01

4 Conclusions

Based on the results above, we find that the momentum effect appears in the stock market, with clear differences between the winner and loser portfolios. The VW winner portfolio outperforms the loser portfolio, yielding monthly excess returns of 0.854% compared to 0.290% for losers. In contrast, the EW portfolios show minimal differences between winners (0.789%) and losers (0.756%), suggesting that larger stocks demonstrate stronger momentum characteristics.

In session 3 (Model Results), we show that the VW winner portfolio exhibits persistent and significant positive alphas across all factor models, with an alpha of 0.98% in the five-factor model. Our analysis confirms that momentum represents a distinct risk factor not fully captured by traditional models. These abnormal returns remain statistically significant even after controlling for market, size, value, profitability, and investment factors, supporting the view that momentum offers an independent and robust source of returns in financial markets.