



# Industry Momentum Strategies in A-shares Market

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**Abstract.** We apply industry momentum strategies to A-shares market to investigate the profitability of industry momentum in China. Setting Shenwan industry classification as a standard, we use 30 industries from 2010 to 2019 as a sample. Results suggest ranking industries based on the previous 6-month returns yields higher profits than based on the 3-month, 9-month and 12-month returns, on this basis holding portfolios for 6 months help investors obtain substantial and stable profits. Besides, we find skipping one month between formation period and holding period barely improve performance.

**Keywords:** Industry momentum strategies · Double sort · A-shares market

## 1 Introduction

Momentum-based trading strategies, referring to buying past winners and selling past losers of stocks, was explored by Jegadeesh and Titman [1] (1993). Many scholars conducted further research to examine whether this strategy can generate positive returns. Under researches of Moskowitz and Grinblatt [2] (1999), momentum investment strategies found to be less profitable once excluding industry momentum. Applying trading volume to explain the momentum pattern, Lee and Swaminathan [3] (2000) found that stocks with higher past turnover ratios tend to earn lower future returns. The application of the momentum-based trading strategies has been extensively studied in recent years. However, the focus of those investigations rarely lies on the industry momentum profits on Chinese stocks market.

The aim of this paper is to figure out whether industry momentum generates excess returns in China. Using a 2010–2019 sample period and thirty industries, we investigate how profitability varies under different trading patterns, which is determined by both formations period and holding periods of each portfolio.

The remainder of this paper is organized as follows. In Sect. 2, we provides a literature review. In Sect. 3, the data and strategies used are specified for further analysis. In Sect. 4, we presents the results and explains the implications of our research. Section 5 concludes the paper.

## 2 Literature Review

Momentum strategies have been tested in many regions by worldwide scholars, results suggest momentum is not notable everywhere. In China, conventional momentum strategies are commonly believed to perform poorly [4] (Ya Gao et al., 2021). Gang et al. [5] (2017) states that momentum strategies are literally profitable when investment horizons are less than one week, owing to the overreaction of Chinese investors to the company cash flow news. Also drawing a comparison between contrarian and momentum strategies in terms of time horizon, Kang et al. [6] (2002) observed that overreaction to firm-specific information drives the short-term contrarian profits up and lead intermediate-term momentum profits not distinct.

Momentum strategies are investigated on both individual stocks and industry level. When we look back to previous literature, we find scholars hold different views on the role of industry momentum. Some scholars [6] (Moskowitz and Grinblatt, 1999; Ron Eichel, 2021) maintained that once control for industry momentum, profits would even become statistically insignificant. But according to the research of Nijman et al. [7] (2004), who used a portfolio-based regression approach to explain momentum phenomenon in Europe, industry momentum plays a minimum effect while individual stocks effect mainly contributes to the excess returns.

Central of this paper is to analyse if Chines investors can obtain considerable profits by implementing industry momentum strategies with different time horizons. We adopt Shenwan industry classification, a general classification standard in China, as the basis of our research. Then we rank all industries by double sorting to construct portfolios, which are based on past returns and trading volume. In this paper, we assume using double-sort can eliminate the influence of trading volume to a certain extent, thus making the results more robust.

## 3 Data and Methodology

### 3.1 Data and Industry Formation

Monthly prices and turnover ratios of stocks in A-share covering the period of January 2010 to November 2019 are obtained from CSMAR. For implementation of industry momentum strategies, 30 industries included in our samples are defined according to Shenwan industry classification. In order to control the influence of industry values, we construct each industry by selecting 5 high-value stocks within the industry and excluding stocks listed after January 2010 and those losing too much data. Empirical analysis is conducted at monthly frequency, monthly return of each industry is calculated on value-weight basis:

$$R_{i,t} = \sum_{i=1}^5 \text{Stock}_{i,t} * W_{i,t} \quad (1)$$

where  $R_{i,t}$  is the monthly return of stocks belonging to industry  $i$  at the time  $t$ ,  $\text{Stock}_{i,t}$  and  $W_{i,t}$  represent the monthly return and allocated weight of stock  $i$  respectively at the time  $t$ . Aiming at reflecting the trading volume of each industry. We refer to the study of Lee and Swaminathan (2000) and set turnover ratios of each industry as the indicator of

trading volume. Monthly turnover ratios of each industry is calculated on equal-weight basis:

$$\text{Tur}_{i,t} = 1/5 \sum_{i=1}^5 \text{turnover}_{i,t} \tag{2}$$

where  $\text{Tur}_{i,t}$  is defined as the turnover ratios of industry  $i$  at time  $t$ ,  $\text{turnover}_{i,t}$  represent the turnover ratios of stock  $i$  at the time  $t$ .

### 3.2 Portfolio Construction

To examine industry momentum strategies in Chinese stocks market, we combine the approach employed in Lee and Swaminathan (2000) and Gang et al. (2019). Each of the formation period (denoted as  $J$ ) and each of the holding period(denoted as  $K$ ) is incorporated into one trading strategy. Each industry momentum investment strategy is constructed as follow:

Step one: We first rank 30 industries in each month  $T$  in ascending order on the basis of their geometric average returns over the past  $J$  months( $J = 3,6,9,12$ ), the calculation is as follows:

$$R_{i,T-J} = \sqrt[J]{\prod_{T-J}^{T-1} (1 + R_{i,t})} - 1 \tag{3}$$

where  $R_{i,T-J}$  is the profit of industry  $i$  in the past  $J$  months; and  $R_{i,t}$  represents the return of industry  $i$  at the time  $t$ .

Step two: We divide 30 industries into 5 portfolios in order, with each including 6 industries. Then industries in each portfolios are sorted for the second time in descending order based on their average turnover ratios in the past  $J$  months( $J = 3,6,9,12$ ), the calculation is as follows:

$$V_{i,T-J} = 1/J \sum_{T-J}^{T-1} \text{Tur}_{i,t} \tag{4}$$

where  $V_{i,T-J}$  is defined as average turnover ratios of industry  $i$  in the past  $J$  months,  $\text{Tur}_{i,t}$  refers to turnover ratios of industry  $i$  at time  $t$ .

Step three: After 30 industries are ranked in the first two steps, we select the first three industries as a winner portfolio and the bottom three as a loser portfolio, with each industry within the portfolio assigned an equal weight.

Step four: We implement a long-short strategy by taking a long position on the winner portfolio and taking a short position on the loser portfolio for both  $K$  months. At given time  $T$ , the profit generated by the strategy is calculated as follow:

$$\begin{aligned} R_T^{J,K} &= \sum_{i=1}^3 R_{i,T,K}^W - \sum_{j=1}^3 R_{j,T,K}^L \\ &= \sum_{i=1}^3 \left[ \sqrt[K]{\prod_T^{T+K-1} (1 + R_{i,t}^W)} - 1 \right] - \sum_{i=1}^3 \left[ \sqrt[K]{\prod_T^{T+K-1} (1 + R_{i,t}^L)} - 1 \right] \end{aligned} \tag{5}$$

where  $R_{J,K}^T$  is the profit gained by the individual industry momentum strategy in the month  $T$ (from  $T$  to  $T + K-1$ ).  $R_{i,T,K}^W$  and  $R_{j,T,K}^L$  stand for the return of each industry in winner portfolio and loser portfolio at time  $T$  respectively.

Step five: We finally calculate the average return of each strategy as follow:

$$R^{J,K} = 1/S - K - J + 1 \sum_{T=J+1}^{S-K+1} R_T^{J,K} \quad (6)$$

where  $R^{J,K}$  is defined as the average return of the  $J/K$  strategy and  $S$  refers to the time span included in our research. In the meantime, simple t-statistics is applied to examine whether monthly return of each  $J/K$  strategy is significant.

Given that lagged reaction may effect our result, we further our research by implementing strategies with one month between ranking period and holding period.

## 4 Results and Discussion

We start our study by calculating the profitability of industry momentum strategies in A-share market for the period 2010–2019. The monthly average return of 16 (J,K) strategies (without one-month gap) and corresponding significance level of the results is displayed in the Panel A.

As shown in the Panel A, the only two strategies yielding a negative returns are (9,9) strategy and (12,3) strategy. Focusing on either winner portfolios or loser portfolios, all trading patterns can bring high profits with high significance level at 1%. For example, when  $K = 6$  and  $J = 12$ , the monthly profit of taking a long position on winner portfolios is 21.4% with a t-statistic of 6.106, either of which is highest in the table. Nevertheless, for winners minus losers portfolios, only four strategies can generate profit with high significance level, including (3,6) strategy, (3,9) strategy, (6,3) strategy and (6,6) strategy. The most profitable buy-and-sell strategy ((6,6) strategy) yields a monthly return of 4.8% with significance at 1% level.

Referring to Panel B, when we implement the strategies with one-month gap after sorting the 30 industries, profit shows negligible difference with that of Panel A, by which our results suggests that skipping one month dose not necessarily contribute to higher profits through industry momentum strategies. For example, when  $K = 3$  and  $J = 9$ , returns of the investment strategy decrease from 4% in Panel A to 2.3% in Panel B, with its t-statistic becoming insignificant (0.94). However, when  $J = 6$  and  $K = 3$ , strategies with one-month gap outperform those without one-month gap.

Furthermore, based on the similarities between the two panels in Table 1, we find for each  $J$ , longer the holding period ( $K$ ), higher the monthly return of momentum strategies. Therefore, we conclude that prolonging the formation period can help investors gain higher profits under industry momentum strategies. Besides, comparing four ranking strategies, industry momentum are found more profitable based on the previous 6 months than on the other three ranking periods (3-month, 9-month and 12-month) under given holding periods.

We proceed our study by calculating the cumulative industry momentum profits in the 2010–2019 period. The time trend of (3,3) strategy, (6,6) strategy, (9,9) strategy and (12,12) strategy in the Fig. 1 shows how the profitability of industry momentum strategies changes over time. Provided that industry momentum strategies can always generate positive returns, the line should slope monotonically upward. Nevertheless, based on our research, we find the profits increase with fluctuation over the whole

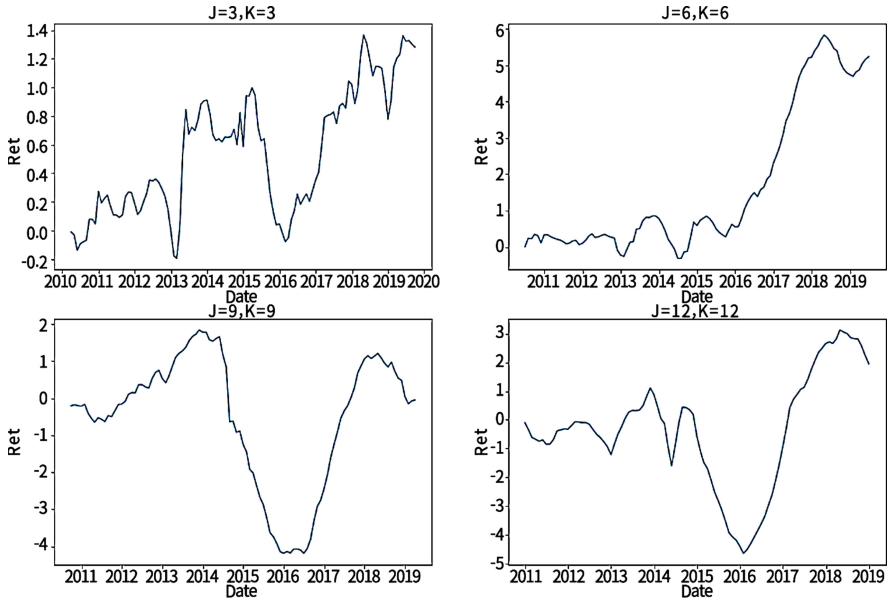
**Table 1.** Industry momentum strategies in A-shares market

(J,K) Strategies	Portfolio	Panel A			Panel B				
		J = 3	J = 6	J = 9	J = 12	J = 3	J = 6	J = 9	J = 12
K = 3	W (t-stat)	0.054 (3.412)***	0.103 (4.595)***	0.157 (5.361)***	0.186 (6.218)***	0.051 (3.494)***	0.096 (4.4)***	0.143 (5.501)***	0.182 (6.068)***
	L (t-stat)	0.043 (2.951)***	0.076 (3.6)***	0.116 (3.989)***	0.181 (4.21)***	0.044 (2.989)***	0.067 (3.266)***	0.12 (3.783)***	0.18 (4.143)***
	W-L (t-stat)	0.011 (1.004)	0.028 (1.723)*	0.040 (1.653)*	0.005 (0.139)	0.007 (0.694)	0.029 (1.795)*	0.023 (0.941)	0.002 (0.049)
	W (t-stat)	0.059 (4.056)***	0.115 (5.225)***	0.165 (6.044)***	0.214 (6.106)***	0.054 (4.039)***	0.104 (5.007)***	0.156 (5.843)***	0.21 (5.611)***
K = 6	L (t-stat)	0.036 (2.601)***	0.067 (3.551)***	0.128 (4.054)***	0.201 (4.048)***	0.03 (2.207)***	0.069 (3.378)***	0.133 (3.907)***	0.204 (4.386)***
	W-L (t-stat)	0.023 (1.972)**	0.048 (3.164)***	0.037 (1.594)	0.014 (0.396)	0.024 (2.271)***	0.034 (2.232)***	0.023 (0.94)	0.007 (0.221)

(continued)

Table 1. (continued)

(J,K) Strategies	Portfolio	Panel A				Panel B			
		J = 3	J = 6	J = 9	J = 12	J = 3	J = 6	J = 9	J = 12
K = 9	W (t-stat)	0.049 (3.092)***	0.084 (4.257)***	0.130 (4.912)***	0.189 (5.002)***	0.048 (4.039)***	0.078 (5.007)***	0.13 (5.843)***	0.197 (5.611)***
	L (t-stat)	0.031 (2.271)***	0.075 (3.459)***	0.130 (3.949)***	0.173 (5.031)***	0.035 (2.475)***	0.078 (3.515)***	0.132 (4.237)***	0.178 (5.7)***
	W-L (t-stat)	0.018 (1.467)	0.009 (0.534)	-0.001 (-0.02)	0.016 (0.55)	0.013 (1.064)	0 (0.001)	-0.002 (-0.09)	0.019 (0.643)
K = 12	W (t-stat)	0.040 (3.026)***	0.082 (3.667)***	0.140 (4.212)***	0.204 (5.141)***	0.038 (3.102)***	0.086 (3.67)***	0.141 (4.449)***	0.22 (5.441)***
	L (t-stat)	0.045 (3.002)***	0.074 (3.737)***	0.119 (4.556)***	0.184 (4.645)***	0.043 (2.802)***	0.068 (3.423)***	0.127 (4.767)***	0.19 (4.677)***
	W-L (t-stat)	-0.005 (-0.348)	0.008 (0.422)	0.021 (0.812)	0.020 (0.628)	-0.004 (1.064)	0.018 (0.001)	0.014 (-0.09)	0.03 (0.643)



**Fig. 1.** Cumulative industry momentum profits.

period when  $J, K = 3$  or  $6$ , meaning that for some period the strategies are not profitable. 2014–2016 witnessed a plummet of momentum profits for the (9,9) strategy and (12,12) strategy, which can be blame on the crash of A-shares market in 2015. The cumulative returns for the (9,9) and (12,12) strategies have decreased more significantly, both about from 1 percent to -4 percent, even if the (6,6) strategy also shows a downward trend. Therefore, we believe applying the (6,6) strategy on A-shares market can help investors obtain the most stable and highest profits.

## 5 Conclusions

This paper examines industry momentum strategies in A-shares market. 16 strategies are constructed based on the formation periods and the holding periods from 2010 to 2019. We discover that only 4 buy-and-sell strategies can produce statistically significant returns, with the (6,6) strategy being the most profitable among them, despite the fact that taking a long position on winning portfolios or a short position on losing portfolios always produces positive returns. We further our research by investigating strategies that skip one month between formation period and holding period. Findings show that adding one-month gap can not significantly enhance the profitability of industry momentum strategies in China. We also depict the time trend of four industry momentum profits. Results show that industry momentum strategies are not always reliable, but the (6,6) strategy performs relatively stable even in the financial crisis.

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