

Research on the impact of securities liquidity on momentum investment strategy returns

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ABSTRACT

During the "14th five-year plan" period, financial services were actively integrated into the new business forms of e-commerce development, in which financial investment vigorously promoted the efficient allocation of capital elements, so as to construct a service system suitable for the development of e-commerce, it is not only an important opportunity to meet the needs of the digital economy and expand its own development space, but also provides strong support for the high-quality development of e-commerce. Momentum strategy is a classical Behavioral finance investment strategy. Securities liquidity is the key factor affecting the return of momentum strategy. Based on this, this paper studies the impact of securities liquidity on momentum investment strategy returns by using empirical analysis. we find that the impact of securities liquidity on portfolio returns is different with the change of investors' holding period, and the momentum winner portfolio and loser portfolio returns are asymmetric under the influence of liquidity. The results of this study not only provide alternative paths for the practitioners to choose more effective momentum investment strategies, but also facilitate the deep integration of e-commerce and financial services from the perspective of investment.

Keywords: Momentum strategy, liquidity of securities, portfolio return, electronic commerce.

INTRODUCTION

Since securities investment came into being, it has promoted the reform of our economic system. The boom in e-commerce in recent years has brought many opportunities to financial innovation. Looking into the future, whether our country wants to successfully build an independent economy or E-commerce and financial formats should be integrated developed, it will undoubtedly need the support of securities investment, and the Securities Investment Market can play a full role as the premise. This requires a large number of securities investors to intervene in the securities market to invest in securities. However, investors are intrinsically motivated to enter the securities market to make a profit. Under the background of non-strong efficient market in our country, many investors have been inclined to use momentum strategy to invest in the market to obtain more considerable investment returns. With the confirmation of momentum effect in financial markets, the construction of momentum portfolio has developed rapidly, and the construction and optimization of portfolio is a long-term research hotspot in security market.

However, looking at the returns of momentum investment strategies in the current market, they are often unsatisfactory. The reason is that the effectiveness of momentum strategies is affected by many factors. Simply considering price momentum strategies may not be able to achieve profits. Among the many influencing factors, the liquidity of assets and transaction costs are the most important, that is, the liquidity of securities. Securities liquidity not only plays the core role of market efficiency, but also is an important basis for evaluating the value of securities, which directly reflects the development quality of the securities market (James, 2020). Analyzing the impact of momentum portfolio returns is inseparable from the study of liquidity.

Theoretically speaking, the current scholars' research focuses on the optimization of momentum strategies, but few people analyze its internal connection with momentum investment based on liquidity (May & Hassan, 2018). Even though a few literatures discuss the impact of liquidity on asset returns, more Regarding the impact of the pricing of the asset itself (Ea & Sa, 2019), there is a clear difference between investors using momentum strategies to make profits. From the perspective of liquidity, it is essential to optimize momentum investment strategies and analyze the impact of liquidity on the returns of momentum strategies. This study just makes up for the lack of empirical support in existing theoretical studies.

This paper studies the specific impact of security liquidity on the return of momentum portfolio constructed with it. First of all, in theory, momentum investment strategy belongs to behavioral financial decision-making theory, and liquidity is the microstructure of the market. This paper innovatively combines market microstructure and behavioral financial decision-making to promote the integration of the two theories, forming an interdisciplinary and expanding Research perspective. Secondly, there are few relevant literatures focusing on the impact of securities liquidity on the returns of momentum investment strategies, and the relationship between the two is still being explored. This study not only enriches the research in the field of momentum investment strategies, but also expands the existing research results, and combine the two, compared to the previous case where momentum investment strategy and liquidity were discussed separately, to deepen the research topic and make up for the insufficiency of existing research. Thirdly, practically speaking, it can help investors build better

momentum investment strategies on the basis of considering liquidity, obtain more considerable investment returns, and drive investors to actively participate in the financial market, thereby promoting the prosperity and development of the financial market and better promoting the electronic business financial service level.

RELATED THEORETICAL BASIS AND LITERATURE REVIEW

Theoretical basis

Efficient market hypothesis

In traditional financial theory, investors are completely regarded as rational people. They always make their own decisions with the goal of maximum utility, so that the entire market has no room for speculation, it is a strong and efficient market, namely the Efficient Market Hypothesis (Fama, 1970). All information contained in securities is already reflected in prices, and market participants cannot use market information to predict securities returns to act. The traditional efficient market hypothesis is an ideal state, which includes two assumptions: one is that security prices follow random walks in the market, and market participants cannot obtain excess returns; the other is that the real value of assets can be fully reflected in security prices. However, with the emergence of behavioral finance, it has brought a huge impact on traditional financial theory. The theory proposes that investors cannot be completely rational and that markets are not completely efficient (Thaler & Richard, 2016). The cognitive and behavioral biases that exist in the market can be exploited by investors, and the corresponding strategies can be used to obtain excess returns. Momentum investment strategy is one of the important methods.

Momentum Effect and Investment Strategy

The momentum effect is the inertia effect, which refers to the current stock price fluctuation trend, which is the continuation of the short-term movement trend in the past. During a given observation period, stocks that rose in the past continued to rise in price in the following period, and stocks that fell in the past continued to decline in price in the following period (Sharma & Jain, 2020). The so-called momentum strategy uses the inefficiency of the market to buy securities with better returns in the past short-term and sell securities with poor returns in the same period. In practice, this investment model is often referred to as "Chase up and down". The irrational behavior of investors has led to the underreaction of the market, and the changes in the intrinsic value of securities cannot be reflected from the fluctuations of securities prices. However, as time goes on, more information is reflected in the public eye, and after the perception of market participants is corrected, the price will gradually return to the range that reflects the normal intrinsic value, and the prices of securities that were once depressed will rise again. Investors using the momentum portfolio strategy use this process to obtain excess market returns through a series of buying and selling operations.

Securities liquidity

In 1936, in Keynes's description of the characteristics of money, the concept of "liquidity" first appeared in the academic field of view. After that, liquidity factors began to be considered in many fields such as financial management and macroeconomics. Liquidity includes transaction cost, price range, transaction time, price level and other characteristics, rich in connotation, and can be analyzed from multiple perspectives to analyze the connotation of liquidity (Apergis et al., 2015). Liquidity includes transaction cost, price range, transaction time, price level and other characteristics, rich in connotation, and can be analyzed from multiple perspectives to analyze the connotation of liquidity. There are various measurement methods. It gives a unified standard definition, but scholars generally believe that it can be measured from various perspectives such as depth, width, and breadth. According to the summary of the liquidity characteristics of securities by many scholars, this paper defines it as the ability of financial assets to trade at reasonable prices in a short period of time. The vital vitality of financial markets is reflected in the liquidity of securities. At present, the effectiveness of the momentum investment strategy in the Chinese market is controversial, mainly because the momentum investment strategy will be affected by a variety of factors, and against the background of our country's non-efficient market, securities liquidity has become a key factor affecting the momentum investment strategy, and Momentum portfolio returns are closely related.

Literature review

A Review of Research on Securities Liquidity

Up to now, there is no unified measurement standard for securities liquidity (Ruenzi., 2020). Various scholars select or compile liquidity indicators according to their own research paths. The literature on the relationship between securities liquidity and yield can be seen earlier in foreign countries. Scholars Amihud and Mendelson (1986) first measured market liquidity and obtained similar market phenomena: As market liquidity decreases, the overall return on the securities market increases. In terms of individual stocks, stocks with high yields tend to perform worse in their own liquidity. Later scholars discussed the introduction of liquidity into the well-known mean-variance framework of portfolio selection, demonstrating the powerful effect of liquidity on optimal portfolio selection. In particular, portfolio performance, as measured by the Sharpe ratio relative to the tangent portfolio, varies significantly with liquidity. In recent years, scholars have continued to explore more aspects of liquidity and demonstrated that liquidity produces cross-sectional changes in stock returns, and that less liquid stocks can be compensated with higher liquidity premiums. Although the liquidity standard measurement index system has not yet been formed, the significance of its impact on investment returns has been reflected many times in a large number of academic studies. However, the existing research results are mostly attempts to compile a more complete liquidity The index system or the study of the relationship between liquidity and portfolio returns has rarely paid attention to the impact of securities liquidity on the returns of momentum investment strategies. The academic community's analysis of the relationship between liquidity and momentum investment portfolio returns remains to be studied.

Research Review on Momentum Investing Strategies

Foreign researchers generally believe that momentum investment strategy used in the stock market will effectively achieve the expected return. Jegadeesh and Titman (1993) were the first to demonstrate the existence of momentum investment opportunities in the stock market. Rouwenhorst (1998) takes the market data of many European countries as the sample, through the empirical analysis, proves that the momentum effect generally exists in the European market. Subsequently Hameed and Kusnadi (2002) also demonstrated that momentum effects are indeed prevalent in Asian markets. Domestic scholars have conducted empirical research on the momentum strategy and found that the RMB-based currency momentum strategy produces an excess return of up to 5% per year, and the momentum strategy is more profitable under the high volatility of the Chinese stock market (Hsu & Chen, 2021). The effectiveness of momentum strategy is affected by many factors, among which the liquidity of assets is very important. Lee and Swaminathan (2000) introduced the liquidity parameter into the interpretation of momentum trading and reversal trading and found that there is a relationship between turnover and momentum strategy returns in the same direction. Subsequently, when Hvid kjaer (2006) studied the different performance of momentum portfolio strategies under different trading volumes, he also concluded that the size of trading volume had a certain impact on the returns of momentum investment strategies. Some domestic scholars (Deng et al., 2021) use the turnover rate as a liquidity indicator. The study found, the stocks with high turnover rate and the stocks with low turnover rate showed different characteristics, and the stocks with low turnover rate showed a higher turnover rate. More pronounced momentum effects; stocks with high turnover exhibit more pronounced reversal effects than low turnover.

Scholars' previous studies have mainly focused on the impact of liquidity on investment returns. However, most studies only roughly introduce liquidity variables to explore the impact on asset prices, and few studies consider the relationship between liquidity and momentum investment strategies. Therefore, it is extremely necessary to introduce securities liquidity and study its specific impact on investment strategies. Although no studies have shown the exact impact of liquidity on momentum portfolio returns, there is literature exploring the impact of liquidity on investment returns, such as some studies have demonstrated that a more liquid stock portfolio, the excess return is smaller (Bailey & Gilbert, 2007). Other scholars have found that different points of view, that is, low market liquidity period and low market returns coincide with the period (Hameed & Viswanathan, 2010). Therefore, we will make assumptions about the impact of stock liquidity on momentum portfolio returns based on the previous theoretical relations.

RELATED THEORETICAL BASIS AND LITERATURE REVIEW

The former shows that the study of the impact of securities liquidity on momentum portfolio returns has both theoretical research value and long-term practical significance, while the exploration of its specific impact must be constructed momentum portfolio, measuring portfolio returns and portfolio liquidity is also essential. Based on the above, this chapter constructs the momentum investment strategy, selects each measurement index, and establishes the empirical research model, which paves the way for the further empirical analysis.

Momentum portfolio and its yield

The study used a sample of CSI 300 Index stocks. The CSI 300 Index is a representative sample of 300 stocks listed on the Shanghai and Shenzhen Stock Exchanges. As a research sample, it can fully represent both the Shanghai and Shenzhen stock markets and fully reflect the historical changes in the stock market, also used in the current academic research stocks, securities and other market returns. According to the return rate of the CSI 300 underlying stocks in the past J weeks, that is, through the rise and fall of the formation period, the sample data is sorted from low to high, and the top 10% of the stocks are selected as the winner portfolio, After the formation period Buy and hold, the bottom 10% of the stocks are losers, and they will be short and sold after the formation period. All of the stocks in the portfolio are selected with equal weight, and do not weighted processing, to build a momentum portfolio, calculate the yield of different forming period and holding period respectively.

Based on the research standard of Robert et al. (2004), the grouping ratio of winner portfolio W and loser portfolio L is taken as 10%, which is helpful for the following scholars to compare and analyze the different research results at home and abroad. Forming period J selects 1-30 weeks, holding period K selects 1,2,3 weeks as momentum portfolio strategy under different time combinations, forming 90 portfolios. For brevity of description later, we defined J and K as (1-30,1) short-term holding portfolio and J and K as (1-30,2) medium-term holding portfolio, respectively, J and K for (1-30,3) are defined as portfolio of long-term holdings.

Stock yield is the total return on an investment in a stock/100% of the initial investment, reflects the level of return on the stock. For the momentum portfolio, we can use the average rise and fall of 60 stocks as the Index of portfolio return because of the selection of the average weight of individual stocks in the portfolio.

Measure of liquidity

Turnover rate = trading volume/outstanding share capital*100%. The higher the turnover rate, the shorter the time investors hold the security and the more frequently the stock trades, thus the better the liquidity of the stock. Many scholars at home and abroad often use turnover rate to measure the relationship between securities liquidity and securities returns, which provides a lot of theoretical basis for this paper. Therefore, this paper chooses the daily average turnover rate of the underlying CSI 300

Index starting from December 30,2019, over the different weeks of the observation period as the basis for measuring the level of liquidity of the securities, and then explore the specific impact of securities liquidity on portfolio returns.

Construction of empirical model

In order to study the relationship between the liquidity of securities and the return of momentum portfolio, this paper takes the return of momentum portfolio under different formation periods as the explained variable(γ), and the liquidity of securities is measured by the turnover rate(T), as an explanatory variable, the rest of the factors are assigned to random disturbances(ξ) to complete the study, this paper proposes the research hypothesis:

H0: Securities liquidity has no effect on momentum strategy return.

H1: Securities liquidity has a positive correlation with momentum investment strategy return.

H2: Securities liquidity has a negative correlation with momentum investment strategy return.

H3: Securities liquidity has an impact on momentum investment strategy return but no specific correlation.

To test these hypotheses, a regression model was constructed:

$$\gamma = \beta T + \xi \quad (1)$$

γ stands for momentum portfolio return, β is the parameter to be estimated. This paper will focus on the β and the size of the positive and negative to get the impact of stock liquidity on the momentum investment strategy and how the specific impact. T is the average daily turnover rate of momentum portfolio in different formation periods, ξ is a random perturbation term.

AN EMPIRICAL TEST OF THE IMPACT OF SECURITIES LIQUIDITY ON THE RETURN OF MOMENTUM INVESTMENT STRATEGIES

Data selection and standardization

Sample selection

The data in this article comes from the choice data of Oriental Fortune. The selected research period is from December 30, 2019, to August 23, 2020, for a period of 30 trading weeks (excluding the Spring Festival non-trading week), excluding ST/*ST/PT stocks and stocks that were suspended during the period were excluded from the constituent stocks with completely missing data in each week. (Please see Appendix A for sample data normalization results)

Table1: Descriptive statistical analysis of yield

Mean	0.0181
Standard error	0.0034
Median	0.0202
Mode	0.0407
Standard deviation	0.0557
Variance	0.0031
Kurtosis	0.6253
Skewness	0.0746
Domain	0.3339
Minimum	-0.1347
Maximum	0.1992
Sum	4.8960
Number of observations	270.0000
Confidence (95.0%)	0.0067

Through the above data analysis can be easily obtained, all portfolio turnover rate of the highest value of 3.38%, the lowest value of 2.12%, the rest of the portfolio are in between the two values, it can be seen that the overall liquidity volatility is not large. In the first 5 weeks, the winner of the portfolio and the loser portfolio is not equal, the loser portfolio performance slightly inferior. For the 90 different portfolios, 34 of them showed negative returns.

Take the case of J and K (1,1) for example. Starting December 30,2019, buy 30 stocks in the top 10% of the CSI 300 Index, in order of return over the course of a week, at the same time, the 30 stocks of the latter 10% are short sold, and the daily average turnover rate of the 60 stocks is equal to the weight average during the forming week, to get the measure of liquidity of the whole momentum portfolio. Change the value of different J and K, and cycle back and forth. Then we get 30 different formation period exchange rate and yield under 3 different holding periods and test the significance of the relationship between the liquidity of each portfolio and the return of the portfolio.

The empirical results of the impact of liquidity on momentum portfolio returns

short-term holding portfolio

The momentum portfolio returns and turnover datas of 30 different formation periods, J and K (1-30,1), were imported into EViews. 8. The results of regression analysis are as follows:

Table 2: Short-term holding portfolio regression results

Variable	Coefficient	Std.Error	t-Statistic	Prob.	R ²	F-Statistic
T ₁	-1.7379	2.3741	-0.7320	0.4702	0.0188	0.4702
C ₁	5.8353	6.4822	0.9002	0.3757		

Table 3: Short-term holding portfolio ADF unit root test

	t-Statistic	Prob.
ADF unit root test	-2.1494	0.0325*

Note:***, **, *means significant at 0.001 , 0.01 , 0.05 level

From the statistical test, the P value of T1 is about 0.4702, which is greater than 0.05. Currently, the correlation between turnover rate and return rate is not significant.

The ADF unit root test was carried out on the basis of the existing regression model to ensure the validity of the regression results. The unit root smoothness test results show that the P value is 0.0325, less than 0.05, which shows that the data is stable, return and turnover rate is cointegration, the regression results are meaningful.

In this case, the study was further refined to examine the effects of the two portfolios separately:

Table 4: Results of the winner portfolio regression

Variable	Coefficient	Std.Error	t-Statistic	Prob.	R ²	F-Statistic
W ₁	-4.8500	2.6397	-1.8373	0.0768	0.0108	0.0768
WC ₁	14.8467	7.2074	2.0599	0.0488*		

Table 5: Results of the loser portfolio regression

Variable	Coefficient	Std.Error	t-Statistic	Prob.	R ²	F-Statistic
L ₁	-3.1093	1.9649	-1.5824	0.1248	0.0821	0.1248
LC ₁	9.0055	5.3650	1.6786	0.1044		

It is found that the P value of the statistical test of the winners and losers in the portfolio is greater than 0.05, and the P value of the statistical test is higher than 0.05, no significant relationship was found between turnover rate and portfolio return.

medium-term holding portfolio

Table 6: Medium-term holding portfolio regression results

Variable	Coefficient	Std.Error	t-Statistic	Prob.	R ²	F-Statistic
T ₂	-5.2697	2.6755	-1.9696	0.0588	0.1217	0.0588
C ₂	15.959	7.3050	2.1846	0.0374*		

Table7: Medium-term holding portfolio ADF unit root test

	t-Statistic	Prob.
ADF unit root test	-2.5038	0.0142*

From the statistical test p value can be seen, the P value of T2 is about 0.0588, greater than 0.05, at this time the turnover rate and the yield has not shown a significant correlation.

The unit root test results show that P value is 0.0142, less than 0.05, the data is stable, return and turnover rate is cointegration, the regression results are meaningful.

Table 8: Results of the winner portfolio regression

Variable	Coefficient	Std.Error	t-Statistic	Prob.	R ²	F-Statistic
W ₂	-9.5213	3.2614	-2.9194	0.0069**	0.2334	0.0069
WC ₂	28.597	8.9049	3.2113	0.0033**		

Table 9: Results of the loser portfolio regression

Variable	Coefficient	Std.Error	t-Statistic	Prob.	R ²	F-Statistic
L ₂	-4.2510	2.5005	-1.7001	0.1002	0.0936	0.1002
LC ₂	12.635	6.8273	1.8507	0.0748		

It is found that in the winner portfolio, the statistical test p value of turnover rate is about 0.0069, less than 0.01, at the level of 1% , there is a significant correlation between the turnover rate and the yield, the Correlation coefficient is -0.0952, indicating that the turnover rate and the yield is still a negative correlation; The turnover rate has the explanation function to the rate of return, and brings is the negative influence.

For the loser group, the P value is 0.1002, which is still greater than 0.05. There is no significant correlation between the turnover rate and the return of the portfolio.

long-term holding portfolio

Table10: Long-term holding portfolio regression results

Variable	Coefficient	Std.Error	t-Statistic	Prob.	R ²	F-Statistic
T ₃	-7.8550	3.3422	-2.3503	0.0260*	0.1648	0.0260
C ₃	23.605	9.1254	2.5868	0.0152*		

Table 11: Long-term holding portfolio ADF unit root test

	t-Statistic	Prob.
ADF unit root test	-2.623729	0.0106*

From the statistical test p value can be seen that the value of T3 is about 0.0260, less than 0.05, that is, the correlation between turnover and yield is significant at 5% level. Correlation coefficient is -7.8550, indicating that in this case the rate of turnover and yield changes in the opposite direction.

The unit root test results show that P value is 0.0106, less than 0.05, the data is stable, return and turnover is cointegration, the regression results are meaningful.

Table 12: Results of the winner portfolio regression

Variable	Coefficient	Std.Error	t-Statistic	Prob.	R ²	F-Statistic
W ₃	-12.939	3.6435	-3.5511	0.0014**	0.3105	0.0014
WC ₃	38.729	9.9481	3.8931	0.0006***		

Table 13: Results of the loser portfolio regression

Variable	Coefficient	Std.Error	t-Statistic	Prob.	R ²	F-Statistic
L ₃	-5.0842	2.7191	-1.8698	0.0720	0.1110	0.0720
LC ₃	15.125	7.4242	2.0372	0.0512*		

It is found that in the winner portfolio, the statistical test p value of turnover rate is about 0.0014, less than 0.01, at a level of 1%, that is, there is an obvious correlation between the turnover rate and the return rate, and the coefficient is about -12.9387, which shows that the turnover rate and the return rate are still moving in the opposite direction and bring negative effects.

For the loser portfolio, the statistical test p value of turnover rate is 0.072, less than 0.1, which is significant at the level of 1%. There is an obvious correlation between turnover rate and return rate, and the coefficient is about -5.0842, it shows that the turnover rate and the return rate are still moving in the opposite direction, and the liquidity of securities has an explanatory effect on the return of the portfolio and brings about a negative effect.

Data selection and standardization

Table 14: Data collation of empirical results

holding period		1 week	2 weeks	3 weeks
The whole portfolio	Prob.	0.4702	0.0588	0.0260
	Statistical significance	reject	reject	support
	Coefficient	-1.7370	-5.2697	-7.8550
winner portfolio	Prob. of residual test	0.0325	0.0142	0.0106
	Prob.	0.0786	0.0069	0.0014
	Statistical significance	reject	support	support
loser portfolio	Coefficient	-4.8500	-9.5213	-12.9387
	Prob.	0.1248	0.1002	0.0720
	Statistical significance	reject	support	reject
	Coefficient	-3.1093	-4.2510	-5.0842

By comparing the momentum portfolio with different holding periods, we can see that the short holding period of one week and the portfolio with 30 different forming periods do not pass the test, and liquidity has no significant effect on the return of the portfolio, with the holding period extended to 2 weeks, although the overall portfolio did not pass the test, but only from the winner portfolio analysis, securities liquidity has a significant negative impact on the winner portfolio returns. When the holding period increases to the 3rd week, the overall portfolio passes the test, the securities liquidity has a significant negative impact on the investment return, indicating that the higher the liquidity of the securities, the worse the later return, thus

inferring, with the increase of holding period, the negative impact of securities liquidity on momentum investment strategy returns will be more significant.

Therefore, with short holdings within 3 weeks, we support the null hypothesis H0 that Securities liquidity has no effect on momentum strategy return. In long-term holdings of 3 weeks and above, we support the hypothesis H2 that Securities liquidity has a negative correlation with momentum investment strategy return.

The winner portfolio explains more in the overall process, and the impact on returns is clearly greater than that of the loser portfolio. At first, there was no significant relationship between the liquidity and yield of the two portfolios. As the holding period increased, the liquidity of the winner portfolio began to show a more significant impact on the yield than the overall portfolio, while there has always been no significant relationship between securities liquidity and returns in the loser portfolio.

CONCLUSIONS

Results and Discussion

This paper innovatively incorporates liquidity indicators into the momentum investment strategy analysis framework, Selecting the underlying stocks of the CSI 300 Index, measuring the liquidity of securities, using the J-K (winner-loser) portfolio method in behavioral finance to construct a variety of momentum investment portfolios, and measuring the liquidity and portfolio return of the securities portfolio, and explores the impact of security liquidity on momentum portfolio returns through regression analysis, and the concrete conclusion is obtained:

For long-term momentum portfolios, security liquidity will significantly negatively affect portfolio returns. In the short-term and medium-term holding period of 1-2 weeks, the momentum portfolio fails the test, and the liquidity of securities has no significant impact on the return of the momentum portfolio. When the holding period is extended to 3 weeks, the overall portfolio passes the test, momentum portfolio returns are significantly and negatively affected by security liquidity. As the holding period increases, the negative impact of securities liquidity on the returns of momentum investment strategies will become more significant. The higher the liquidity of the momentum investment portfolio, the less ideal the later returns will be. This also reflects that in China's non-strong efficient market, frequent buying and selling may not necessarily lead to better investment returns.

The influence of securities liquidity on winners and losers portfolio is asymmetric. Compared with the loser portfolio, the liquidity of the winner portfolio has a greater impact on the return of the portfolio.

Management Implications

According to the above research results, from the point of view of market managers, it is necessary to improve market transparency, strengthen market liquidity, promote the healthy development of the market, market participants in good faith transactions to provide protection. The improvement of the operating quality of the securities market will be reflected well in the investment returns, which is naturally conducive to attracting more investors to actively participate in the securities investment and promoting the high-quality development of the entire financial market. Helping the high-quality development of e-commerce from financial services.

From the perspective of securities investors, on the one hand, when the momentum investment strategy is adopted in our country's securities market, in order to ensure the effectiveness of the strategy and obtain the expected excess return, the securities liquidity index must be incorporated into the momentum investment strategy optimization framework. If the holding period is longer, a momentum portfolio should be constructed with less liquid securities. On the other hand, investors cannot blindly buy and sell according to liquidity. If investors pay too much attention to liquidity indicators, follow the wind direction and blindly ignore the actual investment value, such irrational behavior will exacerbate market volatility. The effectiveness of momentum investing strategies will inevitably suffer as well.

In a word, the research results of this paper not only fill the deficiency of the current theoretical research on the impact of stock liquidity on momentum investment strategy returns, but also provide empirical support for the further exploration of the relationship between the two, it also provides an innovative reference index for stock investors to optimize their momentum investment strategies and speeds up the process of exploring the effectiveness of momentum investment strategies. The above theoretical value and practical significance will directly promote the high-quality operation of the stock market and provide better financial service support for the development of e-commerce.

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APPENDIX A: Results of standardization of sample data

Table 1: Return and turnover of each portfolio

Formation period Holding period		1week	2weeks	3weeks	Turnover (%)
1week	Winner	0.0303	0.0754	0.0802	2.12
	Loser	0.0214	0.0374	0.0136	
	Winner—Loser	0.0089	0.0380	0.0666	
2weeks	Winner	0.0373	0.0635	0.0635	2.54
	Loser	0.0060	-0.0292	-0.0292	
	Winner—Loser	0.0314	0.0927	0.0927	
3weeks	Winner	0.0407	0.0407	0.0935	2.69
	Loser	-0.0471	-0.0471	-0.0762	
	Winner—Loser	0.0878	0.0878	0.1697	
4weeks	Winner	0.0640	0.0882	0.1632	2.87
	Loser	-0.0351	0.0053	0.0331	
	Winner—Loser	0.0991	0.0829	0.1301	
5weeks	Winner	0.0312	0.0850	0.0030	2.72
	Loser	0.0505	0.0857	0.0232	
	Winner—Loser	-0.01933	-0.00076	-0.02019	
6weeks	Winner	0.0541	-0.0413	-0.0308	3.00
	Loser	0.045563	-0.02121	0.023987	
	Winner—Loser	0.008539	-0.02013	-0.05482	
7weeks	Winner	-0.09066	-0.07873	-0.12936	3.06
	Loser	-0.05254	-0.00254	-0.04523	
	Winner—Loser	-0.03812	-0.07619	-0.08413	
8weeks	Winner	0.02932	0.020021	-0.05244	2.78
	Loser	0.060348	0.008632	-0.06299	
	Winner—Loser	-0.03103	0.011389	0.010552	
9 weeks	Winner	-0.02439	-0.09496	-0.13471	3.07
	Loser	-0.04233	-0.10323	-0.09547	
	Winner—Loser	0.017935	0.008277	-0.03924	
10 weeks	Winner	-0.06461	-0.10999	-0.10598	3.21
	Loser	-0.07313	-0.05874	-0.0629	
	Winner—Loser	0.008525	-0.05125	-0.04308	
11 weeks	Winner	-0.0445	-0.0445	-0.0302	3.23
	Loser	0.0220	0.0243	0.0397	

	Winner—Loser	-0.0664	-0.0688	-0.0699	
12 weeks	Winner	0.0033	0.0274	0.0513	3.38
	Loser	0.0092	0.0233	0.0377	
	Winner—Loser	-0.0058	0.0041	0.0136	
13 weeks	Winner	0.0245	0.0484	0.0526	2.95
	Loser	0.0205	0.0293	0.0112	
	Winner—Loser	0.0040	0.0191	0.0414	
14 weeks	Winner	0.0138	0.0259	0.0382	2.65
	Loser	0.0088	-0.0099	0.0369	
	Winner—Loser	0.0050	0.0358	0.0013	
15 weeks	Winner	0.0027	0.0210	0.0436	2.51
	Loser	-0.0176	0.0258	0.0378	
	Winner—Loser	0.0203	-0.0049	0.0058	
16 weeks	Winner	0.0112	0.0420	0.0404	2.50
	Loser	0.0483	0.0693	0.0424	
	Winner—Loser	-0.0371	-0.0273	-0.0020	
17 weeks	Winner	0.0287	0.0594	0.0442	3.07
	Loser	0.0250	-0.0028	-0.0256	
	Winner—Loser	0.0037	0.062	0.0697	
18 weeks	Winner	0.0259	0.0006	0.0783	2.51
	Loser	-0.0203	-0.0414	-0.0311	
	Winner—Loser	0.0463	0.0419	0.1094	
19 weeks	Winner	-0.0365	0.0273	0.0801	2.42
	Loser	-0.0184	-0.0074	0.0334	
	Winner—Loser	-0.0181	0.0347	0.0467	
20 weeks	Winner	0.0558	0.0685	0.0747	2.44
	Loser	0.0085	0.0437	0.0399	
	Winner—Loser	0.0475	0.0248	0.0348	
21 weeks	Winner	0.0028	0.0033	0.0429	2.28
	Loser	0.0407	0.0430	0.0590	
	Winner—Loser	-0.0379	-0.0397	-0.0161	
22 weeks	Winner	0.0114	0.0517	0.0645	2.15
	Loser	0.0007	0.0209	0.0154	
	Winner—Loser	0.0107	0.0308	0.0491	
23 weeks	Winner	0.0355	0.0506	0.0741	2.20
	Loser	0.0198	0.0167	0.0947	

	Winner—Loser	0.0156	0.0339	-0.0206	
24 weeks	Winner	0.0098	0.0440	0.1992	2.43
	Loser	-0.0099	0.0601	0.1292	
	Winner—Loser	0.0196	-0.0161	0.0700	
25 weeks	Winner	0.0361	0.1921	0.1272	2.55
	Loser	0.0705	0.1394	0.0850	
	Winner—Loser	-0.0343	0.0527	0.0422	
26 weeks	Winner	0.1747	0.1009	0.1000	2.44
	Loser	0.0560	0.0098	0.0146	
	Winner—Loser	0.1187	0.0912	0.0854	
27 weeks	Winner	-0.0652	-0.0660	0.0167	2.91
	Loser	-0.0448	-0.0484	-0.0371	
	Winner—Loser	-0.0204	-0.0176	0.0539	
28 weeks	Winner	0.0032	0.0893	0.0910	2.97
	Loser	-0.0071	0.0034	0.0089	
	Winner—Loser	0.0103	0.0859	0.0821	
29 weeks	Winner	0.0920	0.0999	0.0298	2.98
	Loser	0.0134	0.0255	0.0441	
	Winner—Loser	0.0786	0.0744	-0.0143	
30 weeks	Winner	0.0184	-0.0517	-0.0695	3.09
	Loser	0.0148	0.0347	0.0458	
	Winner—Loser	0.0036	-0.0864	-0.1154	