Research on Small-Cap Value Rotation Investment Strategy Based on "Size Effect" - Evidence from the Chinese Stock Market

Ziang Zhou[1]

Abstract

This paper investigates the small-cap value rotation investment strategy. This paper analyzes the rationality and applicability of small-market rotation strategy from two aspects: theoretical analysis and practical test. This paper first sorts out and expounds the theoretical basis of small-cap rotation investment strategy. Subsequently, the details of the strategy are introduced in additional with some notice that the investor should pay attention to. Besides, its returns and applicability are examined, which is based on the real data from Chinese stock market. The results indicate that the small-cap value rotation investment strategy remains viable in today's Chinese stock market, but its applicability exhibits certain cyclical variations. Therefore, when adopting such an investment strategy, careful consideration of its specific applicability is necessary.

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[1] School of Finance, Central University of Finance and Economics, China.

1. Introduction

In the 1970s and 1980s, an increasing number of practitioners and scholars began to notice that buying stocks of small-cap companies often yielded higher average returns compared to buying stocks of large-cap companies in the securities industry. According to the Efficient Market Hypothesis, market information should reflect the value of companies, and stock prices should be based on the actual value of the company. Thus, buying stocks of companies, regardless of their market capitalization, should not result in excess returns. However, the observed phenomenon challenged the Efficient Market Hypothesis.

Subsequently, more and more scholars noticed this anomaly and conducted empirical tests. They found that such a phenomenon existed in the stock markets of many developed and emerging countries. Consequently, numerous researchers proposed theoretical models to explain this "size effect."

While the theoretical development in academia continued, the industry began to utilize this phenomenon to develop trading strategies for profit. One such strategy involves gaining excess returns by simply buying stocks of small-cap companies.

This paper is divided into four parts. The first part consists of a literature review, summarizing the discovery and theoretical development of the size effect. The second part analyzes the reasons behind the size effect. The third part introduces the small-cap value rotation investment strategy and examines its returns and applicability. The fourth part presents the conclusion.

The structure of this paper follows a logical sequence: as the theoretical foundation and market background of the small-cap value rotation investment strategy are rooted in the existence of the "size effect," the paper first demonstrates its presence through the literature review. Subsequently, the reason behind the "size effect" is analyzed to establish its rationality. Finally, the paper introduces the derived small-cap value rotation investment strategy.

2. Preliminary Notes

2.1   "Size Effect" in International Markets

Regarding the phenomenon of "size effect" in the stock market, many scholars have noticed this and conducted extensive research in this area. Banz analyzed stock data from companies listed on the New York Stock Exchange from 1926 to 1975. He divided the companies into five groups based on market capitalization and company risk exposure, and found that the smallest group of companies had an average return 19.8% higher than the largest group, after controlling for company risk exposure. This was the first time a scholar pointed out in a paper that stock returns were negatively correlated with company size, and smaller companies could yield relatively higher average returns Banz (1981). Subsequently, Reinganum (1981), conducted a similar method and data analysis to Banz, but divided the stocks into ten groups, also reaching the same conclusion, with an even larger difference in returns between the smallest and largest market cap groups. Found significant "size effect" particularly in January, especially in the first two weeks of January, based

on stock data from companies listed on the New York Stock Exchange from 1963 to 1979, Keim (1983). The most famous studies related to asset pricing using data from the U.S. stock market were conducted by Fama and French between 1992 and 1998. They conducted a series of empirical tests and demonstrated that company size had strong explanatory power for stock excess returns. And then, they proposed the Fama-French three-factor model (Fama and French, 1992, 1993, 1995, 1996, 1998).

In addition to the U.S. stock market, similar phenomena have been found in other markets. Chan et al., (1991) and Chow & Hulburt (2000), discovered the "size effect" anomaly in their empirical research on Japanese stocks and found that it was also present in the "book-to-market ratio" anomaly. Cheung et al. (1994), conducted an empirical study based on data from the South Korean stock market and found a similar phenomenon there as well Cheun et al., (1994)

2.2   "Size Effect" in the Chinese Market

Many scholars have also conducted research on the domestic stock market in China. Song and Jin (1995) used stock data from the Shanghai stock market in 1993-1994 and empirically confirmed the existence of "size effect" in the Shanghai stock market. Wang and Zhou (2002), improved Song and Jin (1995) method and extended the sample period, and despite these changes, the Chinese stock market still showed a significant premium for small-cap companies. Zhang and Hu (1997) based their research on stock data from the Hong Kong stock market and also discovered significant excess returns from small-cap companies. Wu (2007), found evidence of the "size effect" in the Taiwanese stock market and observed a mutual influence between company size and the book-to-market ratio. Used data from the Chinese A-share market from 2000 to 2016 and, based on the characteristics of the Chinese stock market, constructed the Chinese three-factor model on the basis of the Fama-French three-factor model, and further proposed the Chinese four-factor model, which had strong explanatory power for the anomalies in the Chinese stock market. The size factor played a particularly significant role in this model, (Liu et al., 2019).

2.3   Studies Denying the Existence of "Size Effect"

Although numerous studies have empirically demonstrated the existence of "size effect" in many regions' stock markets, there are still some research results showing that the premium from small-cap stocks in certain regions is not significant. Lilti and Montagner (1998) and Morelli (2007), studied the French stock market and found no evidence of "size effect." Conducted an empirical test based on data from 296 stocks in the Chinese stock market from 1995 to 1999 and concluded that there was no "size effect" in the Chinese stock market, Zhu and He (2001). There are also a series of studies that have tested stock markets in various countries and regions, demonstrating that Switzerland, Australia, Hong Kong, Germany, and the UK have no "size effect", (Yang and Chen 2011).

3. Reasons for the Existence of Size Effect

The existence of "size effect" has been confirmed in the stock markets of many regions. However, according to the Efficient Market Hypothesis, such an effect should not occur, and the stock market showing excess returns is considered irrational. This return cannot be fully explained by the risk factors in the Capital Asset Pricing Model (CAPM). Subsequently, several theories have emerged to explain this anomaly.

3.1   Traditional Financial Theory

From a risk perspective, one might easily assume that the higher returns of small companies are due to their higher risk levels. Small companies may have lower operating maturity, weaker competitiveness in the market, and greater financial instability, leading to higher risk, and the premium from small-cap companies may serve as compensation for this risk. However, as mentioned earlier, Banz's 1981 paper already controlled for company risk exposure and found that "size effect" still existed even after risk control. This suggests that this anomaly cannot be explained by risk alone.

To explain this market anomaly, Fama and French developed the three-factor model to explain market returns, which demonstrated strong explanatory power in the U.S. stock market. Liu et al. (2019), extended this work and developed the three-factor and four-factor models suitable for the Chinese stock market, providing better explanations for various anomalies in the Chinese stock market, including the "size effect." According to the traditional view of the positive correlation between risk and return, factors beyond risk exposure in these multi-factor asset pricing models can be understood as alternative representations of risk from different perspectives. However, these multi-factor asset pricing models do not explicitly explain what specific risks these factors reflect, from which perspectives, and why risk exposure fails to capture these risks. Nevertheless, this does not undermine the practical application of these models in asset pricing.

3.2   Behavioral Finance Theory

Behavioral finance explains the "size effect" from the perspective of investor behavior. Some scholars argue that the investors in small-cap companies are often individual investors, while institutional investors are less interested in small-cap companies. Therefore, there are more noise traders in small-cap companies, and an increase in noise traders leads to higher price volatility and increased stock risk. At the same time, due to limited arbitrage opportunities, rational investors cannot perform perfect arbitrage to correct prices. As a result, investors' sentiments significantly influence the prices of these small-cap stocks. When investors are pessimistic, the stock prices of these small-cap companies are pushed down, leading to undervaluation, and buying small-cap stocks yields excess returns, creating a significant size effect in the market. Conversely, when investors are optimistic, small-cap stocks are overvalued, and the size effect is not significant.

4. Application and Return Test of Small-Cap Value Rotation Strategy

Based on the description above, we have clarified the existence and rationality of the "size effect." This effect serves as the theoretical foundation for our research on the small-cap strategy. Only by leveraging such market characteristics can we provide theoretical support for the practical application of this strategy.

4.1   Small-Cap Value Rotation Strategy

In simple terms, the small-cap strategy selects small-cap company stocks as the investment portfolio based on the observed "size effect" anomaly in the market. It involves rotating the assets within the portfolio over a certain time period to ensure that the portfolio remains composed of small-cap company stocks. By rotating and selecting small-cap company stocks, the strategy aims to achieve higher returns. The guiding principle is to capitalize on the market's "size effect" to achieve higher profits.

In specific implementation, the small-cap strategy involves several details:

a. Determining the number of stocks in the investment portfolio, considering factors such as capital amount and risk diversification. Generally, to diversify risk as much as possible, a selection of 30 or more stocks from at least 10 different industries can effectively diversify risk.

b. Deciding the frequency of portfolio rebalancing, which involves adjusting the portfolio at certain intervals. This decision should be based on factors such as market volatility, activity, and trends, while also considering the transaction costs for each rebalancing.

c. Designing the weights of different stocks within the portfolio, which means determining the quantity of each stock to be purchased. This depends on the capital amount and the consideration of risk diversification. The number of stocks is adjusted to balance the relative gains and losses among the stocks, thus creating an overall profitable and low-risk asset portfolio.

d. Setting the end time for the strategy. Each strategy has its applicable situations, and when the market environment or trends are no longer suitable for the strategy, it should be discontinued in a timely manner.

The above process is a basic strategy structure. Based on different investment needs, market environments, and investor preferences, the strategy can be further adapted and expanded. However, the overall guiding principle is derived from utilizing the "size effect" in the market.

4.2   Backtesting the Return of the Small-Cap Value Rotation Strategy

In 2022, the overall performance of the Chinese stock market was not good, with a poor investment environment and an economic downturn. However, small-cap stocks outperformed large-cap stocks even in such a market environment. From April 27, 2022, to August 8, 2022, the CSI 1000 Index accumulated a return of

36.26%, performing well. Moreover, in the current market environment, both institutional and individual investors are optimistic about growth stocks. Small-cap stocks have significant investment potential, and the small-cap value rotation strategy is likely to outperform the broader market in this economic cycle.

To test the return of the small-cap value rotation strategy in the Chinese stock market, this study conducted a backtest on a simple small-cap value rotation strategy. The strategy involves selecting stocks with market capitalization between 2 to 3 billion RMB, excluding suspended stocks, and choosing the 20 smallest stocks in terms of market capitalization as the investment portfolio. The rebalancing period is set at 15 days. The assumed transaction costs are 0.03% commission for buying and 0.031% (0.03% commission + 0.001% stamp duty) for selling, with a minimum commission deduction of 5 RMB per transaction. The backtesting period is from January 5, 2005, to December 31, 2022, starting with an initial amount of 100,000 RMB. The performance is compared to the return of the CSI 300 Index. The specific backtesting results are shown in Figures 1 and 2.
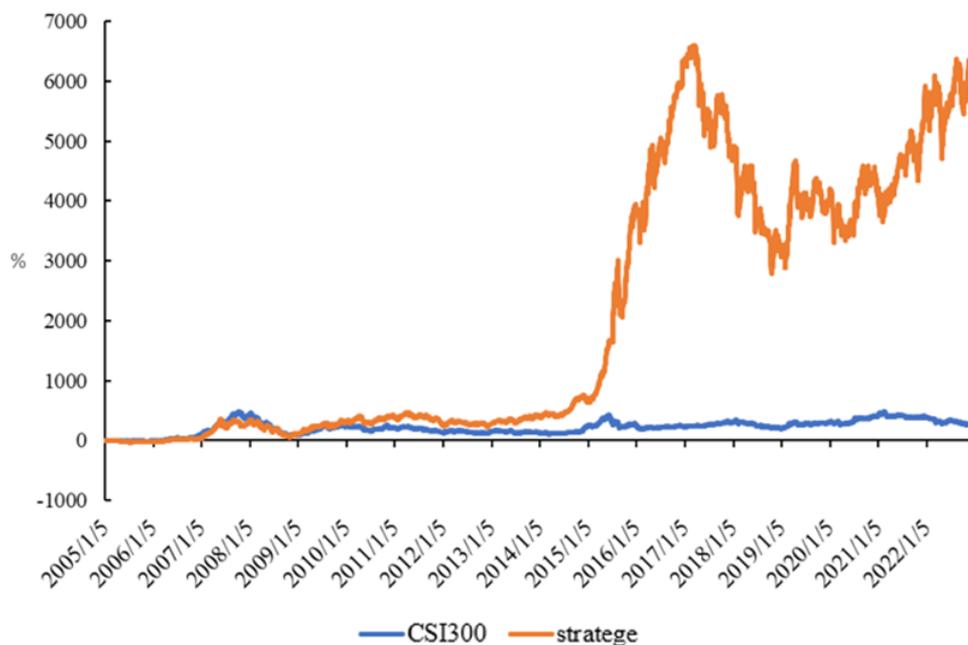
Figure 1: Small market rotation strategy backtest yield and CSI 300 yield
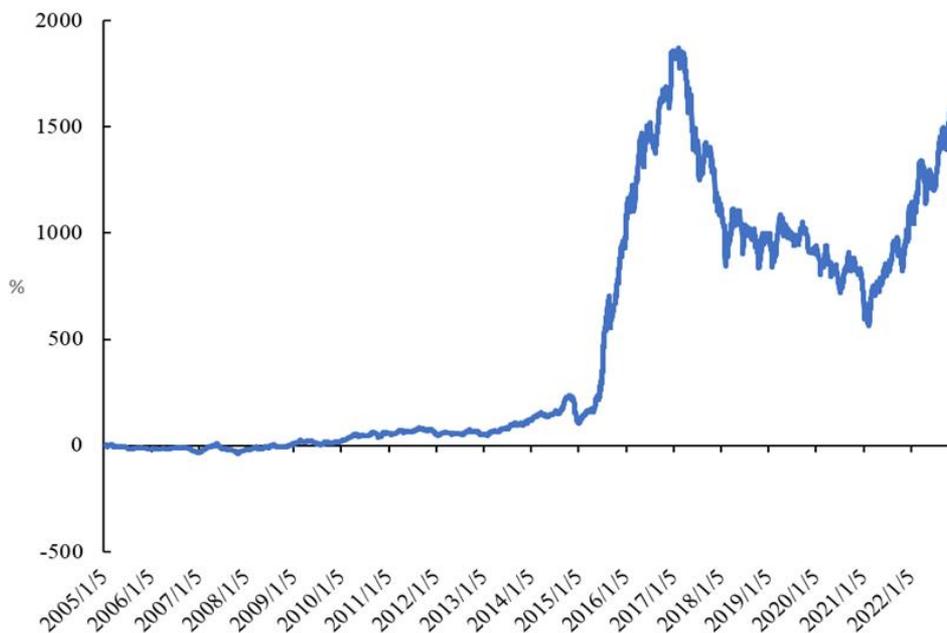
Figure 2: Excess return of small market capitalization strategy

As shown in Figures 1 and 2, the returns obtained from using the above-mentioned small-cap value rotation strategy significantly outperformed the returns of the CSI 300 Index. Starting from 2005, the strategy achieved a remarkable cumulative return of 5911.11% with an average annualized return of 26.39%, while the CSI 300 Index only yielded a return of 285.83%. However, upon observation of the results, we can also notice that the strategy had relatively large drawdowns.

From the two graphs, it is evident that the strategy's substantial excess returns mainly occurred after 2016. Before 2010, the difference in returns between the two was not significant. Even during the backdrop of the 2008 financial crisis, their returns remained relatively close.

Additionally, this study performed backtests on the investment strategy for each year, and the specific backtesting results are shown in Figure 3 and Table 1.
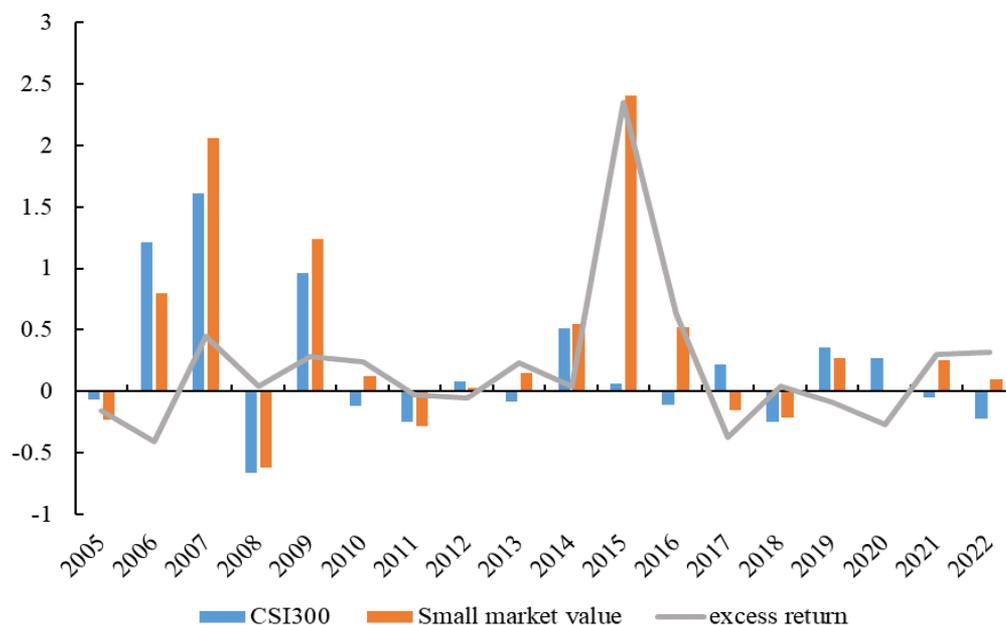
Figure 3: Backtested earnings by year

Table 1: Annual backtested return and excess return

Year	CSI300 rate of return	Small market value strategy rate of return	Excess return
2005	-0.07	-0.23	-0.16
2006	1.21	0.8	-0.41
2007	1.61	2.06	0.45
2008	-0.66	-0.62	0.04
2009	0.96	1.24	0.28
2010	-0.12	0.12	0.24
2011	-0.25	-0.28	-0.03
2012	0.08	0.03	-0.05
2013	-0.08	0.15	0.23
2014	0.51	0.55	0.04
2015	0.06	2.41	2.35
2016	-0.11	0.52	0.63
2017	0.22	-0.15	-0.37
2018	-0.25	-0.21	0.04
2019	0.36	0.27	-0.09
2020	0.27	0	-0.27
2021	-0.05	0.25	0.3
2022	-0.22	0.1	0.32

Based on Figure 3 and Table 1, it can be observed that the investment strategy employed in this study sometimes yields lower returns relative to the broader market and even incurs higher losses, indicating that the strategy may become ineffective during certain years. Additionally, there seems to be a cyclical relationship between periods of effectiveness and ineffectiveness. Based on the above rules, this investment strategy is likely to remain effective in 2023.

It is essential to note that this investment strategy serves as a test for evaluating the practical effectiveness of the small-cap value rotation strategy through backtesting. In real-world investment processes, various external factors need to be considered, making the strategy more complex. Nonetheless, the fundamental framework and guiding principles of the small-cap value rotation strategy have been demonstrated in the preceding text.

5. Conclusion

In conclusion, this paper aimed to elucidate the discovery and theoretical development of the market anomaly known as the "size effect" by reviewing literature from various scholars, thus confirming the existence of this phenomenon. Subsequently, the reasons behind the size effect were explored to explain its rationale. Building upon the presence and rationality of the size effect, the paper illustrated the specifics of the derived small-cap value rotation investment strategy and verified its returns and applicability. The results indicate that this investment strategy remains applicable in the present market but exhibits periodic changes in its effectiveness. Therefore, investors should be mindful of the strategy's applicable periods and consider factors such as market conditions and trends to make informed decisions and select suitable investment strategies accordingly.

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