

Is Momentum Factor Effective in Taiwan Market?

PyInvest

February 2019

Abstract

This essay focuses on momentum factor in Taiwan market. We construct two ways to measure momentum factor including price momentum strategy and risk-adjusted price momentum strategy. The empirical results show that the momentum factor is effective in Taiwan market in the short-term (3 months) and middle-term (6 months), but not long-term (1 year). Moreover, the momentum portfolios usually perform much better than the benchmark during the bull market. Furthermore, the risk-adjusted price momentum strategy is better than price momentum strategy. The risk-adjusted price momentum strategy even performs well during the bear market, and the stocks in this portfolio persist going up longer than the other strategy.

1 Introduction

A completed trading strategy should include signals of buying, selling, increasing the positions, closing the positions, and so on. This essay focuses on the momentum factor. The aim of the project is to test if the momentum factor effective in Taiwan market, how long does it effect, and how is the performance going during the bull market and bear market. Therefore, we would know if it is a good idea to add momentum factor to the trading strategy. Furthermore, we would understand how to use it in the trading strategy.

There are many ways to measure a momentum factor, including price momentum(Ebenezer Asem,2019 [1]), price momentum with trading volume (Charles M.C. Lee, 2002 [4], Christopher G. L. William D. L., 2012 [3]), α momentum (Hühn, H.L. Scholz, H.,2018 [2]), and so on. We choose to focus on price momentum in this essay.

2 Research Method

The essay evaluates if momentum factor is effective in Taiwan market by constructing opposite portfolios based on momentum factor. The back-testing period is between 01/01/2008 and 31/12/2018, and the portfolio reviews are quarterly, semiannually, and annually respectively. Moreover, there are two momentum strategies which are price momentum and risk-adjusted price momentum in this essay. Therefore, the empirical results include different frequencies of portfolio reviews with two momentum strategies during both bull markets and bear markets.

2.1 Back-testing Structure

First, the processes of constructing portfolios are as following:

Step1. Check the universe, which means the listed companies of Taiwan Stock Exchange on the portfolio-reviewing day.

Step2. Select 50 stocks in terms of the performance of momentum strategy as the portfolio. In this project, we construct two 50-stock portfolios. One portfolio consists of stocks with the highest momentum, while the other is formed by stocks with lowest momentum.

Step3. Construct price-weighted portfolio, which means the portfolio contains the same units of each stock.

Second, we do back-testing based on adjusted price, which adjusted the dividends and corporate events. Finally, we evaluate the performances of the portfolios.

2.2 Portfolio Review Frequency

The portfolio review frequency is important because it can observe how long dose the factor effective in the market. To avoid the stock prices be affected by the dividend paying season(June-September) in Taiwan, this paper chooses the end of these months as the portfolio review days.

Table 1. The review dates of different frequency portfolio reviews

Quarterly review	the end of January, April, July, and October
Semiannually review	the end of April, and October
Annually review	the end of October

2.3 Momentum Strategy

This essay focuses on price momentum, which means the momentum is in terms of the stock prices. This project contains two momentum strategies which are price momentum and risk-adjusted price momentum.

A. Price Momentum

Price momentum is defined by monthly stock return of the month covering the portfolio review day.

$$price\ momentum = \frac{P_T}{P_t} - 1$$

where P_T is the stock price on the portfolio review day and P_t is the stock price on the end of last month

B. Risk-Adjusted Price Momentum Risk-adjusted price momentum is defined by monthly stock Sharpe ratio of the month covering the portfolio review day.

$$Risk - Adjusted\ Price\ Momentum = \frac{R_s - r_f}{\sigma_s}$$

where R_s is the monthly return of the stock in the month of portfolio review day, r_f is the risk-free rate, and σ_s is the standard deviation of the stock.

In this case, we choose $r_f=0$

2.4 Portfolio Performance Evaluating

We calculate total return, annualized return, standard deviation, and Sharpe ratio to evaluate a portfolio performance during the back-testing period. Furthermore, we calculate the annual return to check if a portfolio performed stably during every year. Finally, we compare the performance of portfolio with the benchmark to see if it outperformed steadily.

$$Sharpe\ Ratio = \frac{R_p - r_f}{\sigma_p}$$

where R_p is annualized return of the portfolio, r_f is risk-free rate which we choose $r_f = 0$, σ_p is the standard deviation of the portfolio.

3 Empirical Analysis

3.1 Data Description

- A. **Back-testing Period:** 01/01/2008-31/12/2018
- B. **Data for Selecting Process:** daily close prices of stocks
- C. **Back-testing Data:** Adjusted prices of stocks
- D. **Benchmark:** TAIEX total return index, which is the universe of the portfolios.
- E. **Data Resource:** Bloomberg Terminal

3.2 Empirical Results of Momentum Strategies

First, look at the empirical results of the price momentum strategy. According to Figure1, the performance of top50 portfolios are better than bottom50 portfolios. the result implies that those stocks with higher return during the past month are much likely to go up in the future months than those stocks with lower return during the past month. Moreover, take a look at different frequency of top50 portfolios in Table2. The performance of quarterly review portfolio is better than semiannually review portfolio, and the performance of annually review portfolio is the worst. This phenomenon shows that those stocks performed well in the past month are likely to persist going up in the short term but not long term. Therefore, the top50 portfolio reviews quarterly performed best with price momentum strategy, which means the price momentum strategy is effective in the short term.

Table 2. Empirical Results of Price Momentum Portfolios

top50 portfolio	Quarterly	Semiannually	Annually
Total Return (%)	170.44	161.19	21.81
Annualized Return (%)	9.47	9.12	1.81
Standard Deviation (%)	21.62	21.08	18.84
Sharpe Ratio (%)	43.79	43.26	9.61
Bottom50 portfolio	Quarterly	Semiannually	Annually
Total Return (%)	-68.19	-55.37	-56.66
Annualized Return (%)	-9.89	-7.07	-7.32
Standard Deviation (%)	20.97	19.87	20.18
Sharpe Ratio (%)	-47.15	-35.58	-36.26

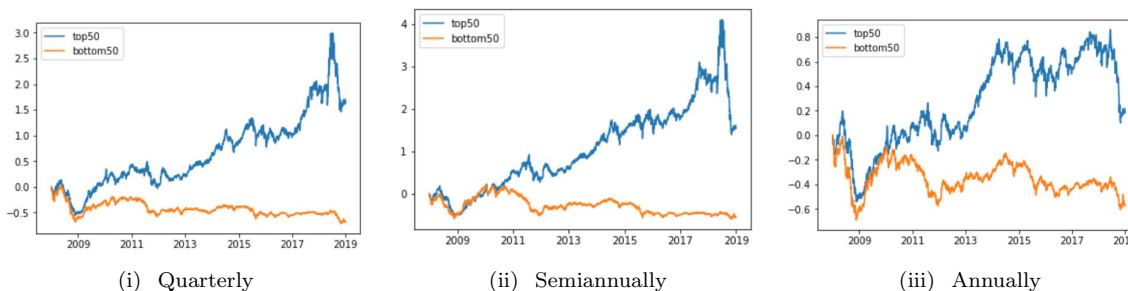


Fig. 1. Performances with Price momentum strategy

Secondly, move to the risk-adjusted price momentum strategy. The difference between risk-adjusted price momentum strategy and price momentum is that it considers the risk factor (standard deviation) in the portfolios. Similarly, look at Figure2, the top50 portfolios performed better than bottom50 portfolios. On the other hand, according to Table3, the different frequencies of the top50 portfolio review show that the

best performance is semiannually review portfolio but not quarterly review portfolio. The result says that those stocks can persist going up longer when the strategy considers the risk factor.

Table 3. Empirical Results of Risk-adjusted Price Momentum Portfolios

top50 portfolio	Quarterly	Semiannually	Annually
Total Return (%)	327.96	335.33	92.75
Annualized Return (%)	14.13	14.31	6.15
Standard Deviation (%)	18.29	17.66	17.26
Sharpe Ratio (%)	77.25	81.04	35.61
Bottom50 portfolio	Quarterly	Semiannually	Annually
Total Return (%)	-40.12	-6.03	-30.46
Annualized Return (%)	-4.56	-0.56	-3.25
Standard Deviation (%)	16.78	16.62	16.75
Sharpe Ratio (%)	-27.14	-3.39	-19.40

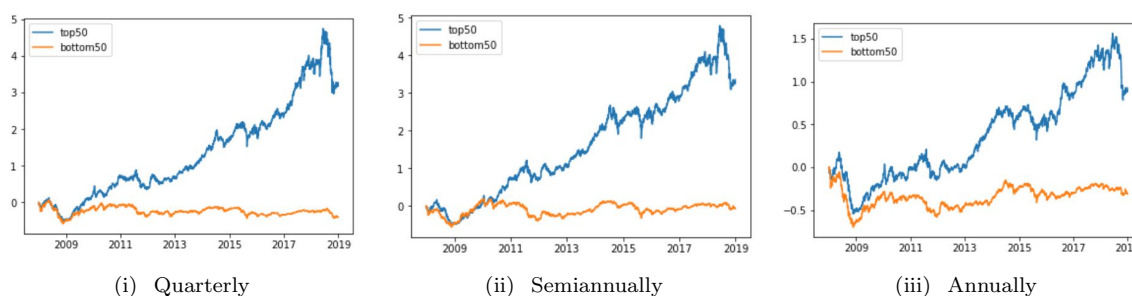


Fig. 2. Performances with Risk-adjusted Price momentum strategy

Furthermore, compare price momentum strategy with risk-adjusted price momentum strategy. It is clear that risk-adjusted price momentum strategy performed better than price momentum strategy with different review frequencies for both top50 and bottom50 portfolios.

3.3 Momentum Strategies v.s. Benchmark

We have known that top50 portfolios of both momentum strategies performed well with quarterly and semi-annually. In this section, we want to know if the momentum strategies beat the benchmark. We choose TAIEX as the benchmark, which is the universe of these portfolios.

According to Table4, the portfolios of both momentum strategies performed better than the benchmark. Although the benchmark with the lowest standard deviation, the Sharpe ratios of those portfolios still beat it. The result shows that momentum strategies can get more return with the same risk.

Table 4. The Performance of Momentum Portfolios and Benchmark

	Price Momentum		Risk-adjusted Price Momentum		Benchmark
	Quarterly	Semiannually	Quarterly	Semiannually	
Total Return (%)	170.44	161.19	327.96	335.33	71.47
Annualized Return (%)	9.47	9.12	14.13	14.31	5.02
Standard Deviation (%)	21.62	21.08	18.29	17.66	15.14
Sharpe Ratio (%)	43.79	43.26	77.25	81.04	33.18

Furthermore, it is important to know if the portfolios with momentum strategies steadily performed well. First, look at annul returns of the portfolios with price momentum strategy, blue bars represent the quar-

terly review portfolio, orange bars represent the semiannually review portfolio, and grey bars represent the benchmark. The graph shows that the price momentum portfolios usually performed better than benchmark in bull markets. However, the portfolios were usually beaten by the benchmark in bear markets. Go back to Table4, the standard deviation of price momentum portfolios are 21.62% and 21.08% respectively, both of them are bigger than the benchmark which is only 15.14%.

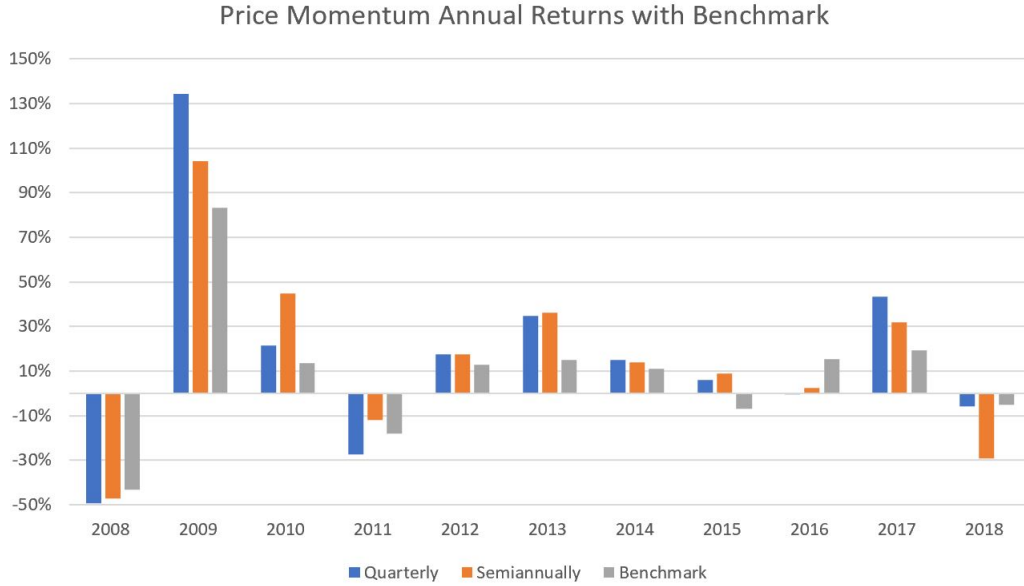


Fig. 3. Price Momentum Annual Returns with Benchmark

Move to annual returns of the portfolios with risk-adjusted price momentum strategy. Figure4 shows that most of performances of the momentum portfolios performed much better than the benchmark in bull markets. Moreover, the performances were not beaten by the benchmark a lot during bear markets. On the other hand, they even beat the benchmark in 2011 and 2015 while the benchmark was going down. Therefore, it is clear that the risk-adjusted price momentum strategy is effective in Taiwan Market, and it is better than price momentum strategy.

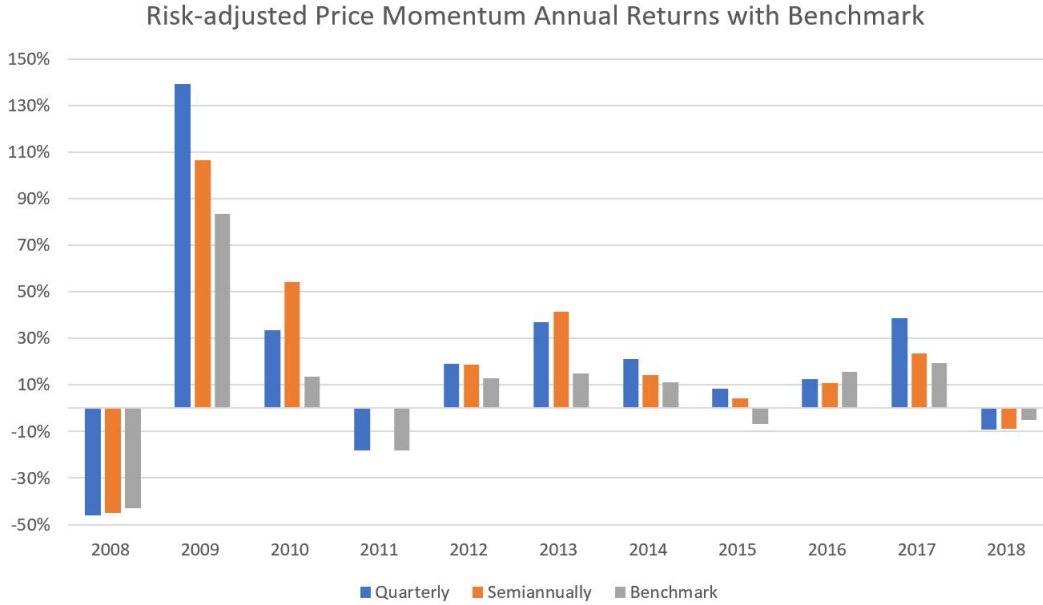


Fig. 4. Risk-adjusted Price Momentum Annual Returns with Benchmark

4 Conclusion

According to the empirical results, it is clear that the momentum factor is effective in Taiwan market. First, the results show that the performances of top50 portfolios are better than bottom50 portfolios, which means those stocks performed well in the past month is much likely to persist perform well in the future months. On the other hand, all the bottom50 portfolios got the negative returns which means it is not smart to buy the stocks drop a lot in the past month because it is difficult for them to go up in the near future months. Second, look at the performances of portfolios with different review frequency. The results imply that the momentum factor is effective in both the short-term and middle-term but not long-term. It means that it is a good idea to hold a stock within 6 months with momentum strategies. Third, comparing the performances of momentum strategy portfolios with the benchmark, the annual returns shows that momentum strategies usually performed better than the benchmark during the bull market. However, the portfolios performed not as good as benchmark during the bear market. It says the it is great to add momentum factor to trading strategies in the bull market. Finally, the performance of portfolios with risk-adjusted price momentum strategy are better than the price momentum strategy, which means it is important to consider risk factor with momentum strategy.

On the other hand, there are some important issues which we should focus on. First, although both total returns and annualized returns of portfolios with momentum strategies are much higher than the benchmark, they are not the "real returns" because it doesn't consider transaction costs in this essay. Second, the momentum strategies don't consider the investable capacity, which means we can not make sure it is easy to construct the portfolios with momentum strategies.

In conclusion, momentum factor is effective in Taiwan market both in the short-term and middle-term, and we should consider more issues when we construct portfolios with momentum strategies to earn the excess return.

References

- [1] Ebenezer Asem. Dividends and price momentum. *Journal of Banking Finance*, 33, 2009. Pages 486-494.

- [2] H. Hühn, H.L. Scholz. Alpha momentum and price momentum. *Int. J. Financial Stud.*, 6, 2018. 49.
- [3] Christopher G. L. William D. L. Endogenous trading volume and momentum in stock-return volatility. *Journal of Business Economic Statistics*, 2012. Pages 253-260.
- [4] Charles M.C. Lee. Price momentum and trading volume. *The Journal of Finance*, 55, 2002. Pages 2017-2069.