An Investigation of Existence of Momentum in The Stock Exchange of Thailand

Abstract: Momentum in stock market is refers to the idea that stocks will keep moving in the same direction. In other word, stocks with rising prices will continue to rise and stocks with falling prices will continue to fall. The performance of this classification has been well documented in numerous studies in different countries. These studies suggest that past winners tend to outperform past losers in the future. However, academic research in this direction has been limited in countries such as Thailand and to the best of our knowledge; there has been no such study in Thailand after the financial crisis of 1997. Since there is a distinct absence of detailed academic research on momentum strategy in the Stock Exchange of Thailand after the crisis, we examined the performance of momentum strategy from 2010 to 2014. Returns on portfolios are calculated on monthly basis. Our results on momentum strategy confirm that there is positive momentum profit in large size stocks whereas there is negative momentum profit in small size stocks during the period of 2010 to 2014. Furthermore, the equal weighted average of momentum profit of both small and large size category do not provide any indication of overall momentum profit.

Keywords: Momentum Strategy, Past loser, Past winner, Stock Exchange of Thailand

Introduction

Stocks are usually classified according to their characteristics which are unique enough such that the performance of each category can be differentiated from another. Barberis and Shleifer (2003) contend that the reasons behind such classifications in financial market are sometimes financial innovation or it can also be because of finding a premium in a group of stocks with similar features. One of the major classifications in stocks market is called momentum strategy. Based on this strategy stocks are classified according to their past performances into past winners and past losers. Momentum in stock market is refers to the idea that stocks will keep moving in the same direction. In other word, stocks with rising prices (past winners stocks) will continue to rise and those stocks with falling prices (past losers stocks) will continue to fall (Jegadeesh and Titman, 1993). The performances of this classification have been well documented in numerous studies in different countries. These studies suggest that past winners tend to outperform past losers. See e.g. (Jegadeesh and Titman, 1993, Griffin et al., 2003, Fama and French, 2012). However, academic research in this direction has been limited in countries such as Thailand and to the best of our knowledge, there has been no such study in Thailand after the financial crisis of 1997.

The purpose of this study is to take a closer look at the performance of stocks based on the aforementioned classification in the Stock Exchange of Thailand after the 1997 crisis. The significance of this study stems from the fact that Thailand is an open market and has been encouraging foreign investments as one of means to enhance employment, promote economic development, and technology transfer and the main equity market in Thailand, the Stock Exchange of Thailand is a crucial channel for Foreign Investment inflow into the Country. Chui and Wei (1998) contend that the equity market size in Thailand increased from $1.72 billion in 1984 to $133.66 billion in 1993,an increase of over 77 times within a decade. The main contribution of this paper is evidence for size category in the context of the equity market in

Thailand. Almost all previous studies have focused solely on large stocks or indices. This paper extends the scope beyond large stocks and indices by including small and tiny stocks as well. Further, since there is a distinct absence of detailed academic research on momentum strategy in the Stock Exchange of Thailand after the crisis, this paper also contributes to the extension of existing literature of the study. This research is also of significance for those researchers who would like to compare the performance of this strategy in different countries and markets. The rest of the paper is structured as follow: Section 2 reviews previous academic studies for each classification in different markets. Section 3 explains the research design and methodology that is used in this research. Section 4 reports the important findings of the research. Section 5 concludes the paper.

Past studies

Jegadeesh and Titman (1993) analyze the momentum strategy in NYSE and AMEX over the period of 1965 to 1989 and they conclude that buying past winner and selling past loser generate significant abnormal return. Jegadeesh and Titman (1993) further contend that choosing those stocks that have generated higher return relative to other stocks based on previous 6 months cumulative return and hold them for the next 6 month, generates 12.01% on average per year. Chui et al. (2000) examine the existence of momentum profit in Asian countries over the period of 1986 to 2000 and find that the momentum profit disappears after crisis of 1997 and only half of the countries in the sample generate positive momentum profit. Chui et al. (2000) contend that in Thailand the momentum return is positive before crisis but it is weak and not significant after crisis. Chui et al. (2010) study momentum strategy in international market and find that there is no momentum profit in four countries namely; Turkey, Japan, Korea, and Taiwan. The finding on negative momentum profit in Korea is also shared by some other scholars. see e.g. (Chae and Eom, 2009, Lee and Cho, 2014). Fama and French (2012) also study momentum strategy in four regions and they find that momentum strategy works fine everywhere except for Japan, and spreads in average momentum return decreases from smaller to bigger stocks. Fama and French (2012) conclude that average monthly WML (winner minus loser) return for small stocks is 0.82% whereas for large stocks is 0.41%.

Portfolio formation

In order to study momentum strategy, a 5 years sample period from January 2009 to February 2014 is covered. However, the first momentum sort absorbs a year of data, so the sample period for momentum strategy is effectively from 2010 to 2014. All data are extracted from Stock Exchange of Thailand database (SET Smart), accessed from and available with the Business Research Center at the Thammasat University. SET Smart database contains historical trading prices and indices, listed companies, key statistics information, and information and news.

Yen et al. (2004) argue that some part of the premium maybe due to size effect. In order to eliminate this effect they use two-dimension sort in constructing of portfolios which is also used by Basu (1983) and Fama and French (2012). In this paper we also use the same method for portfolio formation. Stocks are sorted size and momentum. Portfolios are constructed at end of each month and then evaluated for the next 12 month on monthly basis. In construction of portfolios on size-momentum, stocks also need to be ranked on the basis of their past 12 month's performance in order to separate past winner and past loser. For a stock to be included in these portfolios, it should have at least 2 years of trading data. If any stock does not satisfy these conditions, it is eliminated from the sample. Furthermore, some scholars argue that financial

companies have different financial structure so they remove the financial companies from their sample to prevent bias in the final result of value premium (Yen et al., 2004). However, Barber and Lyon (1997) compare two samples, one with financial companies and one without financial companies and they find that the general final result is not affected by adding financial companies into the sample. In this study financial companies are not excluded from the sample.

Portfolio construction on size-momentum

At the end of each month, stocks are sorted based on their market capitalization in descending order. Stocks in the top 10% are considered as large stocks and stocks in bottom the 10% are considered as small stocks. After separating stocks as large stocks and small stocks, in each size category, stocks are ranked based on their past 11 months' cumulative performance in descending order. In the study of momentum strategy, skipping the month of sorting is standard (Fama and French, 2012). In other word for portfolios formed at the end of month *t*, the lagged momentum return is a stock's cumulative return for *t*-11 to *t*-1. Then the top 30% in each class are considered as past winners and the bottom 30% are considered as past losers. The middle 40% are considered as neutral. This method also leads to formation of 6 portfolios; *SW*, *SN*, *SL*, *BW*, *BN*, and *BL*. In this case *S* and *B* indicate small and large caps, while, *N*, and *L* indicate winner, neutral, and loser, (top 30%, middle 40%, and bottom 30%), respectively and is similar to the method used by Fama and French (2012). After forming portfolios at the end of each month, portfolios are then evaluated on monthly basis using continuously compounded method and Sharpe ratio for the next 12 months starting from the month following the formation of the portfolio. After calculation of monthly returns on each of these portfolios, *WML* (Winner minus loser) is calculated for each size class, and the overall *WML* is the equal weight of WML_S and WML_B. Formulas can be written as follow:

$$WML_S = SW - SL \tag{1}$$

$$WML_B = BW - BL \tag{2}$$

$$WML = Equal\ weight\ of\ WML_S\ and\ WML_B \tag{3}$$

Where, *S* and *B* denote small and large, respectively, *W* stands for winners and *L* stands for losers.

According to Fama and French (1998) stocks in a portfolio can be weighted in two ways; equal-weighted and value-weighted. Chui et al. (2000) use the value-weighted method in their study of Asian market with the rationale that small stocks are less liquid in Asian market. Ding et al. (2005) also use the value-weighted method and argue that it is logical that stocks with big market capitalization should have a bigger share in a portfolios' return. In this study, following Fama and French (2012) we use the value-weighted method and accordingly stocks are weighted in each portfolio based on their market capitalization.

Risk-adjusted returns

According to Yen et al. (2004) stocks and portfolios should be evaluated both in terms of total return and risk adjusted return. In this study we use the Sharpe ratio for measuring the portfolios performances per unit of risk. Sharpe ratio is calculated for each portfolio formed based on size-momentum namely; *SW*, *SL*, *BW*, and *BL*. The Sharpe ratio formula can be written as follow:

$$Sharpe\ ratio = \frac{\bar{R}_p - \bar{r}_f}{\sigma_p} \quad (4)$$

Where, $\bar{R}_p$ is the average return of the portfolio for a certain period of time which is monthly return in this study, $\bar{r}_f$ is risk free rate within the same period of time, and $\sigma_p$is the standard deviation of the portfolio.

The chances that governments default on an obligation denominated in its own currency are almost zero so Treasury bill and government bond are totally risk free rate (Hull, 2011). In this study, Thailand government Bond 10 years is used as risk free rate.

Performance of the portfolios formed on size-momentum

Table 1 summarizes the performance of the 4 portfolios formed on the basis of size-momentum namely; *SW*, *SL*, *BW*, and *BL* over the period of 2010 to 2013. The result in panel A indicate that, over the period between 2010 and 2013 there is a statistically negative difference between average monthly return of small-winners stock portfolios and small-losers stock portfolios WML_S. Based on this result we can conclude that there is a negative momentum profit in small size category. Although, small-winners stock portfolios provide higher average monthly return in comparison to small-losers stock portfolios in 14 of the 39 months of portfolios formation, none of these are statistically significant. Overall, the result demonstrates that small-loser stock portfolios generate higher average monthly return than the small-winner stock portfolios. The average monthly of momentum profit in small stocks category is -1.37 percent with the *t*-value of -1.897. In term of risk-adjusted return as well, small-winners portfolios do not outperform small-losers portfolios. Small-winners portfolios have higher average monthly risk-adjusted return in 19 of the 39 months of portfolios formation, but it is statistically significant only for two of the 19 months. We conclude therefore that small-winner stock portfolios do not provide higher risk-adjusted returns than small-loser stock portfolios; the mean difference between the two beings 3 percent with a *t*-value of 0.359.

The results in panel B report that there is a statistically positive difference in average monthly returns of large-winner stock portfolios and large-loser stock portfolios WML_B during the period of 2010 to 2013. Large-winner stock portfolios generate higher average monthly returns than large-loser stock portfolios in 25 of the 39 months of portfolios formation, out of which only three months are statistically significant. The analysis indicates that large-winner stock portfolios outperformed large-loser stock portfolios. The average monthly of momentum profit in large size category is 0.59 percent with a *t*-value of 1.674. Furthermore, the results indicate that there is also statistically positive difference in average monthly risk-adjusted returns between large-winner stock portfolios and large-loser stock portfolios during the period of the study. Large-winner stock portfolios generate higher average monthly risk-adjusted return in comparison to large-loser stock portfolios in 22 of the 39 months of portfolios formation, but the difference is statistically significant in only 7 of the 22 months. This result leads us to conclude that the large-winner stock portfolios gain higher average monthly risk-adjusted returns than large-losers stock portfolios with a mean difference of 12 percent and *t*-value of 1.842.

Panel C summarizes the overall momentum profit *(WML)* which is the equal weight of momentum profit in small size category and large size category. The results indicate that there is no momentum profit in Thailand during the period of 2010 to 2013. Although, a positive average

monthly momentum profit is noted in 18 of the 39 months of portfolios formation, the results are statistically significant for only one of the 18 months. On the whole, the average monthly momentum profit over the period of the study is -0.4 percent with a *t*-value of -0.833. This result is consistent with previous studies of momentum strategy in Thailand; Chui et al. (2000) investigate the momentum return in eight Asian countries including Thailand and find that over the period of 1986 to 2000 momentum strategy is profitable and significant in Thailand for the period before crisis of 1997 and but is weak and not statistically significant in the post crisis years. They further state that after crisis only half of the countries in their sample generate positive momentum return and find no clear relationship between the performance of the strategy before and after the crisis.

Table 1: Summary statistics for portfolios on size-momentum; December 2009-February 2014, 39 months

The behaviors of past winners' portfolios and past losers' portfolios are studied in Thailand. At the end of each month starting from December 2009, stocks are sorted based on their market capitalization in descending order. Those stocks in the top 10% are considered as large stocks and those in bottom 10% considered as small stocks. In each size class, stocks are then ranked in descending order at the end of month *t* based on their past *t*-11 to *t*-1 performance. Top 30% in each class are considered as past winners and selected to construct size adjusted past winners' portfolios and bottom 30% are considered as past losers and selected to form size adjusted past losers' portfolios. The middle 40% are considered as neutral. This leads to formation of 6 portfolios namely; SW, SN, SL, BW, BN, and BL, where S and B stand for small and large and W, N, L stand for winner, neutral, and loser (top 30%, middle 40%, and bottom 30%), respectively. All portfolios are value-weighted. After formation, portfolios are evaluated based on value weighted monthly return for the next 12 months. Winner minus losers (WML) in small size category is $\mathrm{WML_S} = SW - SL$ and in large size category is $\mathrm{WML_B} = BW - BL$, and the overall WML is the equal weight average of $\mathrm{WML_S}$ and $\mathrm{WML_B}$. Portfolios average monthly returns, standard deviation of the portfolios which is the standard deviation of the portfolios returns, and Sharpe ratio that is used for calculation of the risk adjusted return of the portfolios are reported. The risk free that is used in this study is the 10-year government bond. The t-statistics are given in parenthesis and * indicates that it is significant at 10%, ** indicates it is significant at 5%, and *** indicates it is significant at 1%.

Panel A: Small winners portfolios versus small losers portfolios

T	SW (%)	SW S.D (%)	SW Sharpe ratio (x100)	SL (%)	SL S.D (%)	SL Sharpe ratio (x100)	Difference in S.D (%)	$\mathrm{WML_S}$ (%)		Difference in Sharpe ratio of SW and SL (X100)	
1	3.90	8.60	0.42	2.26	7.82	0.25	0.78	1.64	(0.41)	0.17	(0.342)
2	1.79	7.49	0.20	1.59	9.20	0.14	-1.71	0.21	(0.057)	0.06	(0.142)
3	4.03	12.59	0.30	4.53	10.22	0.41	2.38	-0.50	(-0.116)	-0.12	(-0.3028)
4	7.28	12.49	0.56	5.10	9.56	0.50	2.93	2.18	(0.435)	0.06	(0.1248)
5	5.62	10.11	0.53	5.37	10.24	0.50	-0.12	0.25	(0.059)	0.03	(0.0744)
6	3.61	7.62	0.43	6.23	9.25	0.64	-1.63	-2.62	(-0.719)	-0.21	(-0.4875)
7	2.19	6.77	0.28	7.72	11.40	0.65	-4.63	-5.54	(-1.53)*	-0.37	(-0.9872)
8	2.49	7.06	0.31	7.17	13.10	0.52	-6.05	-4.68	(-1.183)	-0.21	(-0.5631)
9	0.19	5.96	-0.02	3.12	15.83	0.18	-9.87	-2.92	(-0.684)	-0.20	(-0.5115)
10	1.21	6.23	0.14	3.14	16.80	0.17	-10.57	-1.93	(-0.396)	-0.02	(-0.0599)
11	0.54	6.64	0.03	0.96	9.36	0.07	-2.72	-0.42	(-0.129)	-0.03	(-0.0871)
12	1.09	7.61	0.10	2.10	9.28	0.19	-1.67	-1.02	(-0.294)	-0.09	(-0.2234)
13	0.68	6.68	0.06	0.92	9.91	0.06	-3.24	-0.24	(-0.077)	-0.01	(-0.01729)
14	1.49	6.01	0.20	2.70	12.94	0.19	-6.92	-1.22	(-0.318)	0.01	(0.0288)
15	0.89	7.34	0.08	1.89	12.20	0.13	-4.86	-1.00	(-0.265)	-0.05	(-0.1299)
16	0.75	7.20	0.06	-0.12	13.23	-0.03	-6.04	0.87	(0.229)	0.09	(0.2527)
17	0.29	7.05	0.00	-1.40	9.19	-0.19	-2.14	1.70	(0.483)	0.18	(0.4367)
18	0.81	8.67	0.06	-0.94	8.66	-0.14	0.01	1.75	(0.467)	0.20	(0.4666)
19	1.20	8.83	0.10	-0.91	9.46	-0.13	-0.63	2.11	(0.558)	0.23	(0.5582)
20	1.73	7.89	0.18	-0.76	10.20	-0.10	-2.31	2.49	(0.634)	0.29	(0.6601)
21	2.52	7.94	0.28	-0.16	8.57	-0.05	-0.63	2.68	(0.743)	0.33	(0.7619)
22	3.15	3.70	0.77	2.64	6.87	0.34	-3.17	0.51	(0.209)	0.43	(0.9146)
23	6.64	5.69	1.11	3.07	8.68	0.32	-2.98	3.56	(1.05)	0.79	(1.6688)**
24	6.00	4.00	1.42	6.15	8.45	0.69	-4.45	-0.15	(-0.049)	0.73	(1.512)*
25	7.73	5.49	1.35	9.41	9.55	0.95	-4.06	-1.68	(-0.431)	0.40	(0.7979)
26	6.82	5.94	1.10	11.83	11.39	1.01	-5.45	-5.02	(-0.943)	0.08	(0.1527)
27	5.73	6.14	0.88	14.17	11.35	1.22	-5.22	-8.44	(-1.65)*	-0.34	(-0.6383)
28	8.67	8.40	1.00	15.38	13.30	1.13	-4.90	-6.72	(-1.278)	-0.14	(-0.2815)
29	6.05	7.52	0.77	14.52	13.77	1.03	-6.25	-8.47	(-1.83)**	-0.27	(-0.7029)
30	5.98	8.01	0.71	14.61	10.96	1.31	-2.95	-8.63	(-2.229)**	-0.60	(-1.604)*
31	4.47	12.77	0.33	9.13	16.24	0.54	-3.48	-4.66	(-0.812)	-0.22	(-0.5658)
32	2.47	10.24	0.21	6.41	16.89	0.36	-6.65	-3.94	(-0.705)	-0.15	(-0.3842)
33	5.28	14.06	0.35	4.75	18.01	0.25	-3.95	0.53	(0.078)	0.11	(0.2555)
34	4.63	11.45	0.38	5.77	16.77	0.33	-5.32	-1.14	(-0.19)	0.05	(0.1242)
35	4.56	12.47	0.34	7.12	17.83	0.38	-5.35	-2.55	(-0.404)	-0.04	(-0.101)
36	5.03	15.96	0.30	2.18	14.39	0.13	1.57	2.86	(0.443)	0.17	(0.3911)
37	2.00	13.24	0.13	3.44	12.36	0.25	0.88	-1.44	(-0.265)	-0.13	(-0.294)
38	0.29	12.51	0.00	1.23	7.88	0.12	4.63	-0.95	(-0.225)	-0.12	(-0.286)
39	0.60	11.59	0.02	1.54	7.64	0.16	3.94	-0.94	(-0.228)	-0.13	(-0.321)
Average 1-39	3.329	8.61	0.40	4.78	11.6	0.37	-2.89	-1.37	(-1.897)**	0.03	(0.359)

Panel B: Big winner portfolios versus big losers portfolios

T	BW (%)	BW S.D (%)	BW Sharpe ratio (x100)	BL (%)	BL S.D (%)	BL Sharpe ratio (x100)	Difference in SD (%)	WML_B (%)		Difference in Sharpe ratio of BW and BL (x100)	
1	3.69	5.31	0.64	1.85	4.54	0.34	0.78	1.85	(0.918)	0.30	(0.7294)
2	3.21	6.17	0.47	1.82	3.75	0.41	2.42	1.39	(0.671)	0.06	(0.1598)
3	3.55	6.24	0.52	2.18	4.19	0.45	2.05	1.37	(0.632)	0.07	(0.1756)
4	2.67	5.34	0.45	2.00	3.49	0.49	1.85	0.67	(0.358)	-0.04	(-0.1042)
5	3.29	5.83	0.51	2.68	2.72	0.88	3.11	0.61	(0.324)	-0.36	(-0.8851)
6	3.22	5.67	0.52	2.76	2.97	0.83	2.70	0.46	(0.249)	-0.31	(-0.7602)
7	2.19	5.74	0.33	2.25	3.32	0.59	2.42	-0.06	(-0.031)	-0.26	(-0.63)
8	1.79	5.34	0.28	2.48	3.75	0.58	1.60	-0.69	(-0.364)	-0.30	(-0.7353)
9	0.21	5.18	-0.02	1.81	4.46	0.34	0.72	-1.60	(-0.813)	-0.36	(-0.8747)
10	-1.05	6.79	-0.20	0.25	6.44	-0.01	0.35	-1.30	(-0.506)	-0.19	(-0.4936)
11	-0.77	7.54	-0.14	0.77	7.14	0.06	0.39	-1.54	(-0.547)	-0.21	(-0.5431)
12	-0.27	7.08	-0.08	0.75	6.07	0.07	1.02	-1.02	(-0.387)	-0.15	(-0.3878)
13	-0.28	7.93	-0.07	0.95	6.10	0.11	1.83	-1.23	(-0.433)	-0.18	(-0.4501)
14	1.32	6.72	0.15	2.33	5.41	0.37	1.30	-1.01	(-0.42)	-0.22	(-0.5658)
15	2.27	6.87	0.29	2.91	5.22	0.50	1.64	-0.64	(-0.26)	-0.21	(-0.5291)
16	2.00	7.16	0.24	3.45	4.51	0.70	2.66	-1.45	(-0.596)	-0.46	(-1.1306)
17	1.25	7.70	0.12	1.60	5.30	0.25	2.40	-0.35	(-0.129)	-0.12	(-0.2999)
18	0.87	7.77	0.07	1.34	5.71	0.18	2.06	-0.46	(-0.171)	-0.11	(-0.2712)
19	1.91	7.32	0.22	2.99	4.89	0.55	2.43	-1.08	(-0.435)	-0.33	(-0.8234)
20	0.06	8.50	-0.03	0.64	6.67	0.05	1.83	-0.57	(-0.182)	-0.08	(-0.1901)
21	1.52	6.71	0.18	1.32	5.90	0.17	0.81	0.20	(0.078)	0.01	(0.0219)
22	3.48	4.37	0.73	2.45	5.04	0.43	-0.67	1.03	(0.543)	0.30	(0.7481)
23	3.74	3.88	0.89	1.44	4.34	0.26	-0.45	2.31	(1.388)*	0.62	(1.5472)*
24	3.28	3.66	0.82	1.72	5.36	0.27	-1.71	1.56	(0.827)	0.55	(1.3518)*
25	2.93	5.70	0.46	1.59	5.54	0.23	0.16	1.34	(0.583)	0.23	(0.5585)
26	3.42	3.84	0.81	2.03	5.80	0.30	-1.96	1.39	(0.676)	0.52	(1.251)
27	2.63	5.91	0.39	1.30	4.80	0.21	1.12	1.34	(0.602)	0.19	(0.4496)
28	2.12	5.36	0.34	1.17	5.84	0.15	-0.47	0.95	(0.407)	0.19	(0.4579)
29	3.52	3.03	1.07	0.49	4.08	0.05	-1.05	3.03	(2.049)**	1.02	(2.469)***
30	3.87	2.21	1.62	2.29	3.17	0.63	-0.96	1.58	(1.488)	0.99	(2.5452)***
31	3.60	4.18	0.79	0.45	3.41	0.04	0.77	3.16	(2.106)**	0.75	(1.9038)**
32	3.16	3.95	0.73	1.13	4.32	0.19	-0.36	2.04	(1.262)	0.53	(1.3655)*
33	0.81	6.01	0.08	0.18	3.36	-0.03	2.64	0.62	(0.32)	0.12	(0.3003)
34	1.84	5.60	0.27	-0.12	4.27	-0.10	1.33	1.97	(0.995)	0.37	(0.948)
35	2.33	6.80	0.30	0.17	3.29	-0.04	3.51	2.15	(1.005)	0.34	(0.853)
36	1.42	8.14	0.14	0.05	3.33	-0.08	4.81	1.37	(0.545)	0.21	(0.534)
37	1.19	8.76	0.10	-0.48	3.02	-0.26	5.74	1.67	(0.627)	0.36	(0.912)
38	-0.01	8.03	-0.04	-1.35	2.90	-0.58	5.13	1.34	(0.549)	0.53	(1.328)*
39	-0.44	8.29	-0.09	-1.14	3.21	-0.45	5.08	0.70	(0.275)	0.36	(0.9066)
Average 1-39	1.89	6.09	0.35	1.33	4.56	0.23	1.5%	0.59	(1.674)**	0.12	(1.842)**

Panel C: Winners versus losers			
T	WML_{S-B} (%)	**WML** (%)	
1	-0.21	1.74	(0.729)
2	-1.18	0.80	(0.347)
3	-1.87	0.43	(0.16)
4	1.51	1.43	(0.486)
5	-0.36	0.43	(0.172)
6	-3.08	-1.08	(-0.48)
7	-5.48	-2.80	(-1.141)
8	-3.99	-2.69	(-1.001)
9	-1.32	-2.26	(-0.814)
10	-0.64	-1.62	(-0.488)
11	1.12	-0.98	(-0.357)
12	0.00	-1.02	(-0.365)
13	0.99	-0.73	(-0.279)
14	-0.20	-1.11	(-0.396)
15	-0.36	-0.82	(-0.283)
16	2.32	-0.29	(-0.106)
17	2.05	0.67	(0.244)
18	2.21	0.64	(0.223)
19	3.19	0.51	(0.182)
20	3.07	0.96	(0.311)
21	2.48	1.44	(0.509)
22	-0.52	0.77	(0.474)
23	1.26	2.93	(1.477)*
24	-1.71	0.70	(0.389)
25	-3.02	-0.17	(-0.08)
26	-6.41	-1.81	(-0.596)
27	-9.78	-3.55	(-1.2)
28	-7.67	-2.88	(-0.947)
29	-11.50	-2.72	(-1.001)
30	-10.21	-3.52	(-1.643)*
31	-7.82	-0.75	(-0.222)
32	-5.97	-0.95	(-0.275)
33	-0.10	0.57	(0.14)
34	-3.11	0.41	(0.108)
35	-4.71	-0.20	(-0.05)
36	1.49	2.11	(0.508)
37	-3.11	0.11	(0.029)
38	-2.29	0.19	(0.061)
39	-1.63	-0.12	(-0.038)
Average 1-39	-0.020	-0.004	(-0.833)

Conclusion

Our results on momentum strategy confirm that there is positive momentum profit in large size stocks whereas there is negative momentum profit in small size stocks during the period of 2010 to 2013. Furthermore, the equal weighted average of momentum profit of both small and large size category do not provide any indication of overall momentum profit.

References:

[1] BANZ, R. W. 1981. The relationship between return and market value of common stocks. *Journal of Financial Economics,* 9**,** 3-18.

[2] BARBER, B. M. & LYON, J. D. 1997. Detecting long-run abnormal stock returns: The empirical power and specification of test statistics. *Journal of Financial Economics,* 43**,** 341-372.

[3] BARBERIS, N. & SHLEIFER, A. 2003. Style investing. *Journal of Financial Economics,* 68**,** 161-199.

[4] BASU, S. 1983. The relationship between earnings' yield, market value and return for NYSE common stocks: Further evidence. *Journal of Financial Economics,* 12**,** 129-156.

[5] BAUMAN, W. S., CONOVER, C. M. & MILLER, R. E. 1998. Growth versus Value and Large-Cap versus Small-Cap Stocks in International Markets. *Financial Analysts Journal,* 54**,** 75-89.

[6] CAPAUL, C., ROWLEY, I. & SHARPE, W. F. 1993. International Value and Growth Stock Returns. *Financial Analysts Journal,* 49**,** 27-36.

[7] CHAE, J. & EOM, Y. 2009. Negative Momentum Profit in Korea and its Sources*. *Asia-Pacific Journal of Financial Studies,* 38**,** 211-236.

[8] CHUI, A. C., WEI, K.-C. & TITMAN, S. 2000. Momentum, legal systems and ownership structure: An analysis of Asian stock markets. *SSRN Scholarly Paper No. ID 265848, Social Science Research Network, Rochester, NY.*

[9] CHUI, A. C. & WEI, K. 1998. Book-to-market, firm size, and the turn-of-the-year effect: Evidence from Pacific-Basin emerging markets. *Pacific-Basin finance journal,* 6**,** 275-293.

[10] CHUI, A. C. W., TITMAN, S. & WEI, K. C. J. 2010. Individualism and Momentum around the World. *The Journal of Finance,* 65**,** 361-392.

[11] DANIEL, K. & TITMAN, S. 1997. Evidence on the Characteristics of Cross Sectional Variation in Stock Returns. *The Journal of Finance,* 52**,** 1-33.

[12] DAVIS, J. L., FAMA, E. F. & FRENCH, K. R. 2000. Characteristics, Covariances, and Average Returns: 1929 to 1997. *The Journal of Finance,* 55**,** 389-406.

[13] DING, D. K., CHUA, J. L. & FETHERSTON, T. A. 2005. The performance of value and growth portfolios in East Asia before the Asian financial crisis. *Pacific-Basin Finance Journal,* 13**,** 185-199.

[14] FAMA, E. F. & FRENCH, K. R. 1992. The Cross-Section of Expected Stock Returns. *The Journal of Finance,* 47**,** 427-465.

[15] FAMA, E. F. & FRENCH, K. R. 1993. Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics,* 33**,** 3-56.

[16] FAMA, E. F. & FRENCH, K. R. 1998. Value versus Growth: The International Evidence. *The Journal of Finance,* 53**,** 1975-1999.

[17] FAMA, E. F. & FRENCH, K. R. 2012. Size, value, and momentum in international stock returns. *Journal of Financial Economics,* 105**,** 457-472.

[18] GRAHAM, B. & DODD, D. L. F. 1934. *Security Analysis: The Classic 1934 Edition*, McGraw-Hill Education.

[19] GRIFFIN, J. M., JI, X. & MARTIN, J. S. 2003. Momentum Investing and Business Cycle Risk: Evidence from Pole to Pole. *The Journal of Finance,* 58**,** 2515-2547.

[20] HULL, J. C. 2011. *Options, Futures, and Other Derivatives*, Pearson Education.

[21] JEGADEESH, N. & TITMAN, S. 1993. Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency. *The Journal of Finance,* 48**,** 65-91.

[22] LAKONISHOK, J., SHLEIFER, A. & VISHNY, R. W. 1994. Contrarian Investment, Extrapolation, and Risk. *The Journal of Finance,* 49**,** 1541-1578.

[23] LEE, D. & CHO, J. 2014. Stock Price Reactions to News and the Momentum Effect in the Korean Stock Market. *Asia-Pacific Journal of Financial Studies,* 43**,** 556-588.

[24] LINTNER, J. 1965. The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets. *The Review of Economics and Statistics,* 47**,** 13-37.

[25] NAI-FU CHEN & FENG ZHANG 1998. Risk and Return of Value Stocks. *The Journal of Business,* 71**,** 501-535.

[26] PETKOVA, R. & ZHANG, L. 2005. Is value riskier than growth? *Journal of Financial Economics,* 78**,** 187-202.

[27] ROSENBERG, B., REID, K. & LANSTEIN, R. 1985. Persuasive evidence of market inefficiency. *The Journal of Portfolio Management,* 11**,** 9-16.

[28] SHARPE, W. F. 1964. CAPITAL ASSET PRICES: A THEORY OF MARKET EQUILIBRIUM UNDER CONDITIONS OF RISK*. *The Journal of Finance,* 19**,** 425-442.

[29] YEN, J. Y., SUN, Q. & YAN, Y. 2004. Value versus growth stocks in Singapore. *Journal of Multinational Financial Management,* 14**,** 19-34.