

Price, 52-Week High Momentum, and Earnings Momentum Strategies: Evidence from an Emerging Market

Ching-Hua Yu

Department of Banking and Finance

Kainan University, Taoyuan, Taiwan

E-mail: chyu@mail.knu.edu.tw

Tel: +886-3-341-2500#7914; Fax: +886-3-341-2228

Abstract

This study is to compare the traditional momentum investment strategy proposed by Jegadeesh and Titman (1993), the momentum strategy generated by the 52-week high price ratio proposed by George and Hwang (2004), and the earnings momentum established by Chan, Jegadeesh, and Lakonishok (1996). According to this study, the earnings indicated by the standardized unexpected earnings are a more important determinant of the momentum effect than indicated by previous pricing trends and price level.

Keywords: 52-Week High, Price Momentum, Earning Momentum

1. Introduction

Many studies document that stock returns are predictable based on past price information. Since Jegadeesh and Titman (1993) show that a self-financing momentum strategy of purchasing (short-selling) stocks that have risen (fallen) the most over the previous six months results in abnormal returns of over 1% per month. This phenomenon cannot be explained by three-factor assets pricing model (Fama and French, 1996) suggests that the returns are not compensation for excess risk. Rouwenhorst (1998) finds similar evidence for stocks traded in European markets. However, many studies do not consent in their interpretation of the evidence on price momentum in the U.S. stock market. While, Jegadeesh and Titman (1993) and Chan, Jegadeesh, and Lakonishok (1996) agree that a stock price underreaction to information contain in past stock returns and company earnings results in price momentum.

In addition to the price momentum strategy, Bernard and Thomas (1989) and Foster, Olsen and Shevlin (1984) have discovered the existence of the phenomenon of price continuation after the earnings announcement. Chan, Jegadeesh, and Lakonishok (1996) show that firms reporting unexpectedly high earnings subsequently outperform firms reporting unexpectedly low earnings. Moskowitz and Grinblatt (1999) found that by using the investment portfolio generated by the industry and pointing out that the momentum of each stock could be driven by the industry, the profitability of each stock's momentum would disappear immediately in terms of the industry factor. Gutierrez and Kelley (2008) found out that short-term returns (one to two weeks) reverse, a 52-week long cumulative returns could offset the reversal phenomenon of short-term. George and Hwang (2004) find that the 52-week high strategy in U.S. are more profitable than Jegadeesh and Titman (1993). It is suggested that the price levels indicated by the 52-week high are a more important determinant of the momentum effect than indicated by previous pricing trends. While many researchers have investigated whether

price momentum strategy work well, few researchers have compared the performances of different momentum strategies. Only George and Hwang (2004) did compare three types of momentum strategies (price momentum, industry momentum, 52-week high price), and pointed out that the 52-week high price momentum strategy outperformed the other two.

The purpose of this paper is to compare the traditional momentum investment strategy proposed by Jegadeesh and Titman (1993) (JT henceforth), the momentum strategy generated by the 52-week high price ratio proposed by George and Hwang (2004) (GH henceforth), and the earnings momentum established by Chan, Jegadeesh, and Lakonishok (1996) (CJL henceforth), and discusses which momentum strategy exists in Taiwan's stock market. In this article, I offer out-of-sample evidence on the robustness of momentum trading strategies. I choose the Taiwan Stock Market because, although there is substantial work that uses data from developed market (Harvey, 1995). Therefore, evidence from emerging markets is interesting because it provides a validation test on a sample that is highly correlated with data used in previous research.

Our main findings are as follows. First, the price momentum effect proposed by JT does not exist in Taiwan's stock market, and it does not related to structural differences between institutional and individuals investors. Second, there is the earnings momentum in Taiwan's stock market, and the 52-week high price momentum strategy proposed by GH contains only weak evidence. Therefore, according to this study, the earnings indicated by the standardized unexpected earnings are a more important determinant of the momentum effect than indicated by previous pricing trends and price level. Third, by the regression analysis, among the three momentum strategies, the performance of earnings momentum strategy is the best, followed by the price momentum strategy, and the 52-week high price momentum strategy is the worst. The remainder of this paper is organized as follows: Section 2, Literature review. Section 3, we describe our data set and how the investment strategies are implemented. Section 4, describes the results. Section 5, conclusions.

2. Literature Review

The literature review concerning the momentum strategy can be divided into two categories: One is to explore the profitability of investment strategy, another is the analysis of the causes. Studies related to the profitability of investment strategy are varied according to different markets, which can be divided into the European and American markets and the Asian stock markets. According to Jegadeesh and Titman (1993), the excess remuneration is available from the momentum investment portfolio of winners purchasing shares and losers selling shares in the past 3-12 months, and follow-up scholars have also found similar results (George and Hwang, 2004; Chordia and Shivakumar, 2002; Jegadeesh and Titman, 2001; Lee and Swaminathan, 2000). In addition to markets outside the U.S., Lui, Strong, and Xu (1999), Forner and Marhuenda (2003), and Foster and Kharazi (2008) have examined stock markets in the United Kingdom, Spain, and Iran respectively, and the phenomenon of mid-term momentum was found in these three markets. Compared to the European and American stock markets that the mid-term price momentum has been widely found, but in Asian stock markets the momentum effect did not work well. Rouwenhorst (1998) carried out studies on twelve emerging markets, and pointed out that the mid-term price momentum phenomenon was not found among most Asian stock markets, such as Korea, Malaysia, Hong Kong, Thailand, and Indonesia, etc. Hameed and Kusnadi (2002) found out that the short-term reversal and mid-term momentum phenomenon similar to those in the U.S. stock market were not found in six Asian stock markets (including Hong Kong, Malaysia, Singapore, South Korea, Taiwan, and Thailand), but if the pre-turnover ratio was included, then a significant price momentum could be found in Taiwan's stock market. Chui et al. (2010) carried out a study focusing on eight Asian stock markets (including Indonesia, Japan, Korea, Malaysia, Singapore, Taiwan, Thailand, and Hong Kong, etc), and a significant momentum phenomenon was only found in Hong Kong's stock market. Compared to Europe and America, the momentum phenomenon is less obvious in the Asian stock markets.

Among various strategies, the price momentum proposed by Jegadeesh and Titman (1993) is the most widely discussed by scholars, for example, the momentum investment portfolio established by follow-up scholars, Chan, Jegadeesh, and Lakonishok (1996) by using the standard unexpected earnings, could obtain a 6-12 months significant positive average returns, and it is called the earnings momentum. George and Hwang (2004) used the ratio between the current stock price and the previous 52-week high price, and found out that the profit generated from the 52-week high price momentum strategy was better than that of the industry and price momentums. However, among different momentum strategies, which momentum effect can obtain higher performance, this paper aims on analyzing and comparing these three momentum strategies and tending to find out whether there is significant profitability in Taiwan's stock market, in order to provide references for investors towards decision-making.

3. Data and Methodology

Our sample includes common stocks in Taiwan stock market. The sample period was from January 1995 to December 2009, totaling 180 months. We collect daily returns, market capitalization of individual stocks, the closing price and earnings per share of individual stocks from the Taiwan Economic Journal (TEJ) database. However, in the TEJ database, some missing values were found concerning the rate of return, the closing price, or earnings per share, and it was because of the lack of original data, or probably due to some companies disappeared from the Taiwan stock exchange. If there were missing values for the sample of stock returns, closing price, or earnings per share during the formation and holding periods, then such stock would not be included in the establishment of momentum investment portfolio. Take the JT momentum strategy establishment for example, if missing values are found within six months of the formation period, then such company will not be included into the investment portfolio establishment of the current month. And under the 52-week high price momentum strategy, if missing values for the closing price are found within 12 months of the formation period, then such stock will not be included into the investment portfolio formed in the month. As for earnings momentum, if missing values are found within 8 months of the formation period, then such company will not be included into the sample of the investment portfolio of the month.

3.1. Momentum Strategy Establishment

1. Individual Stock Price Momentum JT

I followed same approach as JT to calculate average monthly returns to the investment strategy. I sort firms in each month based on the past six-months returns. Stocks are then assigned to three groups. The top 30% are denoted as winners and the bottom 30% losers. Then I construct a zero-investment portfolio by purchasing the winner stocks and selling the loser stocks. The portfolios are equally weighted at formation and held for K subsequent months (K equals 1, 3, 6, 9, and 12).

2. Return to Portfolios formed from Past High-GH

Gutierrez and Kelley (2008) established the investment performance using the weekly returns and found out that the short-term returns (1 to 2 weeks) showed a trend of reversal, the cumulative returns from the holding of 52-week could offset the phenomenon of the previous short-term reversed trend. And GH were formed based on the ratio of the current price to the highest price within the past 12 months and discovered that the profitability formed from the 52-week high price momentum strategy was better than profitability of the industry and price momentums.

I followed GH by forming winner loser portfolios based on the different between a stock's current price and its 52-week high. At the end of each month, stocks are ranked based on $p_{i,t-1}/high52i,t-1$ where $p_{i,t-1}$ is the close price of the stock at the end of month t-1 and $high52i,t-1$ is the highest price of stock during the previous 12-month period. The top 30% of stocks in the ranking

are used to construct the winner portfolio, the bottom 30% are used to construct the loser portfolio, the middle 40%, as the middle portfolio. Then I construct a zero-investment portfolio by purchasing the winner stocks and selling the loser stocks. The portfolios are equally weighted at formation and held for K subsequent months (K equals 1,3,6,9, and 12).

3. Earnings Momentum-CJL

In order to capture the post-earnings-announcement-drift phenomenon, I followed CJL's method to create earnings momentum. The first step in the earnings momentum strategy involves determining the standardized unexpected earnings (SUE) from the most recent earnings announcement. The standard unexpected earnings (SUE) of each stock is as the following:

$$SUE_{i,q} = \frac{e_{i,q} - e_{i,q-4}}{\sigma_{i,q}} \quad (1)$$

Where:

$e_{i,q}$ = the most recently announced earnings for month t

$e_{i,q-4}$ = earnings per share of the previous four seasons before month t

$\sigma_{i,q}$ = the standard deviation of $(e_{i,q} - e_{i,q-4})$ over the prior eight quarter

At the end of each month, stocks are ranked based on their SUE from the most recent earnings announcement. Standardized unexpected earnings is unexpected earnings (the change in quarterly earnings per share from its value four quarters ago) divided by the standard deviation of unexpected earnings over the last eight quarters. The top 30% of stocks in the ranking are used to construct the winner portfolio, the bottom 30% are used to construct the loser portfolio, the middle 40%, as the middle portfolio. Then I construct a zero-investment portfolio by purchasing the winner stocks and selling the loser stocks. The portfolios are equally weighted at formation and held for K subsequent months (K equals 1,3,6,9, and 12).

3.2. Regression

This paper used the regression analysis proposed by Fama-MacBeth (1973) to compare the three strategies. The dependent variable is individual stock i's return at month t ($R_{i,t}$). $Size_{i,t-1}$ as an independent variable to control for market capitalization. $R_{i,t-1}$ is individual stock i's return at month t-1 to control for the impact of bid-ask bounce on the coefficient the estimates. At month t using six winner and loser portfolios ranked in month t-j ($j=2,3,\dots,7$), I run a sequence of six cross-sectional regression in each month. The portfolios formed in month t-j to month t return by the following regression:

$$R_{it} = b_{0jt} + b_{1jt}R_{i,t-j} + b_{2jt}Size_{i,t-j} + b_{3jt}JH_{i,t-j} + b_{4jt}JL_{i,t-j} + b_{5jt}FHH_{i,t-j} + b_{6jt}FHL_{i,t-j} + b_{7jt}KH_{i,t-j} + b_{8jt}KL_{i,t-j} + e_{it} \quad (2)$$

where $JH_{i,t-j}$ ($JL_{i,t-j}$) is the dummy variable of the JT momentum strategy winner (loser) investment portfolio. The dummy variable $JH_{i,t-j}$ ($JL_{i,t-j}$) take value 1 if stock i belong to the JT winner (loser) portfolio in the formation month t-j ($j=2,3,\dots,7$), and 0 otherwise. The dummy variables $FHH_{i,t-j}$ ($FHL_{i,t-j}$) take value 1 if stock i belong to GH winner (loser) portfolio in the formation month t-j ($j=2,3,\dots,7$), and 0 otherwise. The dummy variables $KH_{i,t-j}$ ($KL_{i,t-j}$) take value 1 if stock i belong to CJL's winner (loser) portfolio in the formation month t-j ($j=2,3,\dots,7$), and 0 otherwise. The regression analysis used the cross-sectional regression analysis introduced by Fama-MacBeth, where the intercept term b_{0jt} as the risk-free assets, b_{3jt} is the excess return of the winner investment portfolio formed from the JT momentum strategy, b_{4jt} is the excess return of the loser investment portfolio from the JT momentum strategy, b_{5jt} is the excess return of the

winner investment portfolio formed from the 52-week high price momentum strategy, $b_{6_{jt}}$ the excess return of the loser investment portfolio formed from the 52-week high price momentum strategy, $b_{7_{jt}}$ is the excess return of the winner investment portfolio formed from the earnings momentum strategy, and $b_{8_{jt}}$ is the excess return of the loser investment portfolio formed from the earnings momentum strategy. According to GH, there are six regression equations at time t , which are $j=2, 3, 4, 5, 6, 7$, each regression equation has six coefficients at each period, and the total return in month t is derived from these six coefficients $\frac{1}{6} \sum_{j=2}^7 b_{3_{jt}} \cdots \frac{1}{6} \sum_{j=2}^7 b_{8_{jt}}$, where the individual coefficients are computed from separate cross-sectional regressions for each $j=2, \dots, 7$.

4. Empirical Results

4.1 Portfolio Analysis

Table 1 reports the average monthly returns on three momentum strategies portfolios in the Taiwan stock market during the period of 1990 to 2009. In Panel A reports the JT's investment strategies. Average monthly returns of winners and losers are reported in the second and third columns, respectively, the four column representing momentum profits (winner portfolio minus loser portfolio). The results in Panel A reveal that all momentum strategy portfolios are losing money. For example, for the momentum strategy portfolio an equally-weighted portfolio formed from stocks in the top of previous 6-month performance returns 0.9% per month over the 1-month holding period. In contract, an equally-weighted portfolio formed from stocks in the bottom of previous 6-month performance return 1.4% per month, 0.5% more than the top portfolio. A zero-momentum strategy portfolio loses, on average 0.5% per month, statistically insignificant.

Whether the holding periods, past winners underperformance past loser by a range from 0.5% to 1.4% per month. All of the differences are so small as to be statistically insignificant. Panel B of Table 1 reports average returns formed by GH. The results in Panel B reveal that GH strategy portfolios are monotonically increasing with the increase of the holding period. For example, for the strategy with $k=1$ a zero-investment strategy portfolio loses, on average 0.1% per month, as $k=3$ on average loses 0.3%. However the strategy with $k=6$ the average monthly return is from negative to positive. In Panel C, in all sample periods, we find that the average monthly return formed of the winner (loser) investment portfolio that the average monthly return of one month was 2% in the winner investment portfolio, and showed a monotonically increasing trend as the holding period extended, and the average monthly return of one month of the loser investment portfolio was -1.1%, and showed a monotonically decreasing trend as the holding period extended. The CJL strategy returns an average of 3.1% per month, showed a monotonically increasing trend as the holding period extended, and reached a statistical significance. According to the data, the existence of earnings momentum phenomenon was found in Taiwan's stock market and the returns could be maintained for more than one year.

This study has found that base on the formation period of the past six months, regardless of the length of the period, the existence of mid-term momentum effect was not found in Taiwan's stock market, this result is differed from the result conducted by JT, the return of mid-term momentum is not predictable. Second, there are little evidence to support the 52-week high momentum strategies, conducted by GH. Third, three momentum strategies only the earning momentum strategy has better performance in Taiwan Stock Market.

JT and many scholars figured that there was a significant momentum effect in the European and American stock market, but in Taiwan's stock market, a momentum effect does not work. However, whether such outcome is related to structural differences in the market investors, Schwartz and Shapiro (1992) pointed out that institutional investors accounted for up to 70% of trading volume in NYSE, but as for Taiwan's stock market in the same period; it was accounted for only 3% of total trading volume. In recent years, in order to enhance the internationalization, Taiwan's stock market has begun to open

up the foreign investment restrictions, and in 2001, it did not any restrictions. To investigate whether there is any difference in the effectiveness of momentum strategies between foreign investment restrictions and no foreign limit, I divided the sample period into two sub-periods and examine returns of the three momentum strategies portfolios for each sub-period. Table 2 and Table 3 report the average returns of winners and losers and their difference for the two sub-periods.

Table 1: Three Profits from momentum strategy :full sample

Panel A JT's individual stock momentum			
Holding period	Winner	Loser	WML
K=1	0.009	0.014	-0.005
K=3	0.032	0.043	-0.011
K=6	0.069	0.076	-0.006
K=9	0.092	0.096	-0.004
K=12	0.101	0.116	-0.014
Panel B 52-week high			
Holding period	Winner	Loser	WML
K=1	0.012	0.013	-0.001
K=3	0.040	0.037	-0.003
K=6	0.071	0.068	0.002
K=9	0.099	0.095	0.004
K=12	0.121	0.142	-0.021
Panel C Earning momentum			
Holding period	Winner	Loser	WML
K=1	0.020	-0.011	0.031
K=3	0.080	-0.017	0.097*
K=6	0.143	-0.042	0.185***
K=9	0.186	-0.054	0.24***
K=12	0.255	-0.071	0.326***

Note: This table reports the average monthly portfolio returns from January 1990 through December 2009 for the three momentum investing strategies; t-statistics are in parentheses. The sample includes all stocks listed on the Taiwan Stock Market Exchange. Panel A reports the Jegadeesh–Titman (JT) portfolios are formed based on past 6-month returns. The winner (loser) portfolio in JT's strategy is the equally weighted portfolio of 30% of stocks with the highest(lowest) past 6-month return. Panel B reports the Geprge-Hwang (GH) portfolios are formed based on the ratio of the current price to the highest price within the past 12 months. The winner (loser) portfolio for the 52-week high strategy is the equally weighted portfolio of the 30% of stocks with the highest (lowest) ratio of current price to the 52-week high. Panel C reports Chan, Jegadeesh and Lakonishok (CJL) portfolios are formed based on their standardized unexpected earnings (SUE) from the most recent earnings announcement. Standardized unexpected earnings is unexpected earnings (the change in quarterly earnings per share from its value four quarters ago) divided by the standard deviation of unexpected earnings over the last eight quarters. The winner (loser) portfolio in CJL's strategy is the equally weighted portfolio of 30% of stocks with the highest(lowest) standardized unexpected earnings. All portfolios are held for one, three, six, nine and twelve. *** significant at the 1% level;**significant at the 5%level;* significant at the 10%.

Table 2 represents the three momentum strategy in sub-sample (from January 1990 to December 2000), there were more legal limitations on foreign investment. In panel A, formed based on JT's strategies, among the five momentum strategies including the holding of 1, 3, 6, 9, and 12 months during the past six-month formation period, the average monthly return are roughly positive, the longer the holding period the higher the performance. In panel B, formed based on GH's strategies, among the five momentum strategies, the average monthly return are roughly positive, the longer the holding period the higher the performance. In panel C, formed based on CJL's strategies, among the five momentum strategies, the average monthly return are roughly positive. The JT and CH strategies are profitable but the differences between the winner and loser portfolio returns are not statistically significant, the CJL's strategy returns is profitable.

Table 2: Three Profits from momentum strategy: sub-sample

Panel A JT's individual stock momentum			
Holding period	Winner	Loser	WML
K=1	0.020	-0.011	0.031
K=3	0.027	0.034	-0.007
K=6	0.050	0.047	0.003
K=9	0.059	0.039	0.020
K=12	0.059	0.046	0.014
Panel B 52-week high			
Holding period	Winner	Loser	WML
K=1	0.009	0.009	-2.04E-05
K=3	0.028	0.025	0.003
K=6	0.054	0.045	0.010
K=9	0.050	0.018	0.032
K=12	0.054	0.045	0.010
Panel C Earning momentum			
Holding period	Winner	Loser	WML
K=1	0.020	-0.011	3.10E-02
K=3	0.027	0.034	-0.0073
K=6	0.134	-0.046	0.18***
K=9	0.229	-0.018	0.247***
K=12	0.294	-0.041	0.335***

Note: This table reports the average monthly portfolio returns from January 1990 through December 2000 for the three momentum investing strategies. The sample includes all stocks listed on the Taiwan Stock Market Exchange. Panel A reports the Jegadeesh–Titman (JT) portfolios are formed based on past 6-month returns. The winner (loser) portfolio in JT's strategy is the equally weighted portfolio of 30% of stocks with the highest (lowest) past 6-month return. Panel B reports the Geprge-Hwang (GH) portfolios are formed based on the ratio of the current price to the highest price within the past 12 months. The winner (loser) portfolio for the 52-week high strategy is the equally weighted portfolio of the 30% of stocks with the highest (lowest) ratio of current price to the 52-week high. Panel C reports Chan, Jegadeesh and Lakonishok (CJL) portfolios are formed based on their standardized unexpected earnings (SUE) from the most recent earnings announcement. Standardized unexpected earnings is unexpected earnings (the change in quarterly earnings per share from its value four quarters ago) divided by the standard deviation of unexpected earnings over the last eight quarters. The winner (loser) portfolio in CJL's strategy is the equally weighted portfolio of 30% of stocks with the highest (lowest) standardized unexpected earnings. All portfolios are held for one, three, six, nine and twelve. *** significant at the 1% level; ** significant at the 5% level; * significant at the 10% level.

In table 3 I examine three strategy's returns in sub-sample (from January 2001 to December 2009). The average monthly returns of the JT's momentum strategy were negative. Compared with Table 2, the returns of the JT's strategy without limitations of foreign investments are less profitable. In all periods, the momentum strategy was not found in Taiwan's stock market, but if it was divided into the sub-sample period, the JT momentum phenomenon was more obvious. From the above results I may find that in Taiwan's stock market, the JT momentum phenomenon and structural differences in investors are not directly related to each other.

In Panel B, without restrictions on foreign investments, average monthly returns of all investment portfolios established by the winner minus loser were negative (holding periods of 1, 3, 6, 9, and 12 months, and average monthly returns were 0.2%, -0.8%, -1.6%, -2.8%, and -5.6% in sequence). Such results suggested that in all sample periods, the weak evidence showed the existence of 52-week high price momentum in Taiwan's stock market. But when divided into sub-sample periods, the more restrict on foreign investments, the GH's investment strategy work well, but disappeared after foreign investments were no restitutions. In Panel C, the CJL strategies are profitable and the differences between the winner and loser portfolio returns are statistically significant. Therefore, there was the earnings momentum in Taiwan's stock market, and whether there were limitations foreign investments or not.

Table 3: Three Profits from momentum strategy: sub-sample

Panel A JT's individual stock momentum			
Holding period	Winner	Loser	WML
K=1	0.038	0.054	-0.016
K=3	0.093	0.111	-0.018
K=6	0.134	0.169	-0.034
K=9	0.157	0.208	-0.051
K=12	0.181	0.208	-0.027
Panel B 52-week high			
Holding period	Winner	Loser	WML
K=1	0.016	0.018	-0.002
K=3	0.048	0.057	-0.008
K=6	0.101	0.119	-0.016
K=9	0.152	0.180	-0.028
K=12	0.195	0.252	-0.056
Panel C Earning momentum			
Holding period	Winner	Loser	WML
K=1	0.010	0.003	0.008
K=3	0.110	-0.017	0.127***
K=6	0.134	-0.046	0.180***
K=9	0.295	0.001	0.295***
K=12	0.430	-0.003	0.433***

Note: This table reports the average monthly portfolio returns from January 2001 through December 2009 for the three momentum investing strategies; t-statistics are in parentheses. The sample includes all stocks listed on the Taiwan Stock Market Exchange. Panel A reports the Jegadeesh–Titman (JT) portfolios are formed based on past 6-month returns. The winner (loser) portfolio in JT's strategy is the equally weighted portfolio of 30% of stocks with the highest (lowest) past 6-month return. Panel B reports the Geprge-Hwang (GH) portfolios are formed based on the ratio of the current price to the highest price within the past 12 months. The winner (loser) portfolio for the 52-week high strategy is the equally weighted portfolio of the 30% of stocks with the highest (lowest) ratio of current price to the 52-week high. Panel C reports Chan, Jegadeesh and Lakonishok (CJL) portfolios are formed based on their standardized unexpected earnings (SUE) from the most recent earnings announcement. Standardized unexpected earnings is unexpected earnings (the change in quarterly earnings per share from its value four quarters ago) divided by the standard deviation of unexpected earnings over the last eight quarters. The winner (loser) portfolio in CJL's strategy is the equally weighted portfolio of 30% of stocks with the highest (lowest) standardized unexpected earnings. All portfolios are held for one, three, six, nine and twelve. *** significant at the 1% level; ** significant at the 5% level; * significant at the 10% level.

4.2. Regression Analysis

In this section, I followed the cross-sectional regression analysis conducted by Fama-MacBeth to compare the performance of different momentum strategies. These variables include market capitalization, earning per share, the dummy variable of JT winner, the dummy variable of JT loser, the dummy variable of 52-week high price winner stock, the dummy variable of 52-week high price loser stock, and dummy variables of earnings momentum's winner and loser stocks.

Table 4 reports the coefficient estimates from the cross-section regression. (6,6) strategies refer to the portfolios formed over 6 of the prior 7 months, and hold for 6 months. When data from all months are included, the coefficients on earning momentum dummies dominate those of JT's and 52-week high momentum. In raw returns, a self-financing earning momentum strategy yields 0.399% per month, which is much greater than -0.156% for 52-week high and 0.256% for JT.

Table 4: Comparison of JT, GH and CJL momentum strategies—regressions

	(6,6)	(6,12)
Intercept	2.238	2.293
R _{i,t-1}	-0.010	-0.010
Size	-0.166	-0.160
JH	-0.031	-0.083

Table 4: Comparison of JT, GH and CJL momentum strategies – regressions - continued

JL	-0.287	-0.202
JH - JL	0.256	0.118
GHH	-0.084	-0.215
GHL	0.072	0.082
GHH-GHL	-0.156	-0.297
KH	0.192	0.043
KL	-0.207	-0.134
KH-KL	0.399	0.177

Note: This table reports the time-series average of the month-by-month estimates of these coefficients. Each month, six($j=2, \dots, 7$) or twelve($j=2, \dots, 7$) cross-sectional regressions in the following are estimated for (6,6) and (6,12) strategies, respectively: $R_{it} = b_{0jt} + b_{1jt} R_{i,t-1} + b_{2jt} \text{size}_{i,t-1} + b_{3jt} JH_{i,t-1} + b_{4jt} JL_{i,t-1} + b_{5jt} FHH_{i,t-1} + b_{6jt} FHL_{i,t-1} + b_{7jt} KH_{i,t-1} + b_{8jt} KL_{i,t-1} + e_{it}$, where $R_{i,t}$ and $R_{i,t-1}$ are stock's return in months t and $t-1$, respectively; and $\text{size}_{i,t-1}$ is the market capitalization of stock i in month $t-1$. $JH_{i,t-j}$ ($JL_{i,t-j}$) is the JT winner (loser) indicator variable that take value 1 if stock i is ranked in the top (bottom) 30% in month $t-j$, and 0 otherwise. $FHH_{i,t-j}$ ($FHL_{i,t-j}$) is the 52-week high winner (loser) indicator variable that take value 1 if stock i is ranked in the top (bottom) 30% in month $t-j$, and 0 otherwise. $KH_{i,t-j}$ ($KL_{i,t-j}$) is the earning momentum winner (loser) indicator variable that take value 1 if stock i is ranked in the top (bottom) 30% in month $t-j$, and 0 otherwise. The coefficient of an independent variable are the average of the six ($j=2, \dots, 7$) estimates.

Table 4 also extended the holding period to 12 months to analyze whether there was a phenomenon of reversal in each long-term momentum strategy. First of all, the winner stock of price momentum with 6-month holding period was -0.031%, and it dropped to -0.083% with a 12-month holding period, and as for the loser investment portfolio established by the price momentum strategy, the average monthly return with a 6-month holding period was -0.287%, and it rose to -0.202% as the holding period extended to 12 months; therefore, we could discover that the winner investment portfolio established by JT would not reverse in the future, the JT's loser investment portfolio would reverse over 12 months, but slightly; therefore, the average monthly returns of the loser investment portfolio of 12-month was still negative. Whether the winner or loser investment portfolio, prices of the future 12 months would reverse in the 52-week high price momentum strategy, among which, the reversal strength of the loser investment portfolio could be stronger than that of the winner investment portfolio. Lastly, in the analysis concerning the long-term and short-term earnings momentum strategies, the average monthly returns of the winner (loser) investment portfolio with a 6-month holding period was 0.192% (-0.207%), the average monthly return with a 12-month holding period was 0.043% (-0.134%), and both could decline, among which, the declining range of the loser investment portfolio would be stronger than that of the winner investment portfolio.

To compare the three momentum strategies in terms of the mid-term and long-term, the results showed that the average monthly returns of the price momentum strategy with a 6-month holding period (winner minus loser) was 0.256%, and it fell to 0.118% with a 12-month holding period, but both did not reach the statistical significance. In addition, the average monthly returns of the 52-week high price momentum strategy (winner minus loser) with a six month holding period was -0.156%, and the average monthly returns with a 12-month holding period was -0.297%; the longer the period the worse the performance, and the average monthly returns of the earnings momentum strategy (winner minus loser) with a 6-month holding period was 0.399%, and it dropped slightly to 0.177% with a 12-month holding period, but still did not reach a statistical significance. From the above results, showed that the price momentum strategy and 52-week high price momentum did not exist in Taiwan's stock market, but the earnings momentum strategy did, and the excess earnings could be maintained up to 12 months.

5. Conclusion

This paper used the past returns and earnings per share in Taiwan's stock market to analyze whether there were the price momentum investment strategy proposed by Jegadeesh and Titman (1993), the 52-week high price momentum investment strategy proposed by George and Hwang (2004), and the earnings momentum strategy proposed by Chan, Jegadeesh, and Lakonishok (1996) to provide investors references towards decision-making through the comparison of the profitability of different investment strategies. This paper has discovered that to base on the formation period of the past 6 months, no mid-term momentum effect was found in Taiwan's stock market, such results were different from the results proposed by Jegadeesh and Titman (1993), and the mid-term returns were not predictable. As for the 52-week high price momentum investment strategy, only weak supporting evident of the results proposed by George and Hwang (2004) could be found in Taiwan's stock market. In these three momentum strategies, there was a significant phenomenon of earnings momentum in Taiwan's stock market.

In all periods, the momentum strategy was not found in Taiwan's stock market, but if it was divided into the sub-sample period, the JT momentum effect was more obvious. The results suggest that the JT momentum effect does not exist in Taiwan Stock Market is not related to structural differences in the market investors. This study further used the regression analysis to compare the three momentum strategies, and according to the results, during the 6-month holding period, the performance of earnings momentum strategy was the best, followed by the price momentum strategy, and the 52-week high price momentum strategy's performance was the worst. During the 12-month holding period, no momentum strategy and 52-week high price momentum could be found in Taiwan's stock market, but the earnings momentum strategy could be found, and the excess earnings could be maintained up to 12 months.

References

- [1] Bernard, V. and J. Thomas, 1989. "Post-earnings-announcement drift: delayed price response or risk premium?" *Journal of Accounting Research*, 27, pp. 1-36.
- [2] Chan, L., Jegadeesh, N., Lakonishok, J., 1996. "Momentum strategies," *Journal of Finance*, pp. 51, 1681-1713.
- [3] Chordia, T., and L. Shivakumar, 2002. "Momentum, business cycle, and time-varying expected returns," *Journal of Finance*, 57, pp. 985-1019.
- [4] Chui, A.C.W., S. Titman, and K.C.J. Wei, 2010. "Individualism and momentum around the world," *Journal of Finance*, 65, pp. 61-392.
- [5] Fama, E. F., and K. R. French, 1996. "Multifactor Explanations of Asset Pricing Anomalies." *Journal of Finance* 51, pp. 55-84.
- [6] Fama, E. and J. MacBeth, 1973. "Risk, return, and equilibrium: empirical tests," *Journal of Political Economy* 81, pp.607-636.
- [7] Foster, K.R. and Kharazi, A. , 2008. "Contrarian and momentum returns on Iran's Tehran stock exchange," *Journal of International Financial Markets, Institutions and Money*, 18 , pp. 16-30.
- [8] Foster, G., Olsen, C., Shevlin, T., 1984. "Earnings releases, anomalies and the behavior of security returns," *The Accounting Review*, 59, pp. 574-603.
- [9] Forner, C., and Marhuenda, J., 2003. "Contrarian and momentum strategies in the Spanish stock market," *European Financial Management Journal*, 9, pp. 67-88.
- [10] George, T., Hwang, C.Y., 2004. "The 52-week high and momentum investing," *Journal of Finance*, 59, pp. 2145-2176.
- [11] Gutierrez, R.C., and E.K. Kelley, 2008. "The long-lasting momentum in weekly returns," *Journal of Finance*, 63, pp. pp. 415-447.
- [12] Hameed, A. and Kusunadi, Y., 2002. "Momentum strategies: evidence from Pacific Basin stock markets," *Journal of Financial Research*, 25, pp. 383-97.

- [13] Hong, H. and J. Stein, 1999. "A unified theory and underreaction, momentum trading, and overreaction in asset markets," *Journal of Finance*, 54, pp. 2143-2184.
- [14] Jegadeesh, N. and S. Titman, 1993. "Returns to buying winners and selling losers: Implications for stock market efficiency," *Journal of Finance*, 48, pp.65-91.
- [15] Jegadeesh, N. and S. Titman, 2001. "Profitability of momentum strategies: an evaluation of alternative explanations," *Journal of Finance*, 56, pp. 699-720.
- [16] Lee, C. and Swaminathan, B., 2000. "Price momentum and trading volume," *Journal of Finance*, 55, pp.2017-2069.
- [17] Liu, W., N. Strong and X. Xu, 1999. "The profitability of momentum investing," *Journal of Business Finance & Accounting*, 26, pp.1043-1091
- [18] Moskowitz, T. J., and M. Grinblatt, 1999. "Do industries explain momentum?" *Journal of Finance*, 54, pp.1249-1290.
- [19] Rouwenhorst, K. Geert, 1998. "International Momentum Strategies," *The Journal of Finance*, 53, pp. 267-284.
- [20] Schwartz, R. & J.Shapiro, 1992. "The challenge of institutionalisation for the equity markets," " In: Saunders, A. (Ed) *Recent Developments in Finance*, New York University Centre, New York, NY.