



## AN ANALYSIS FOR CREDIT RATING AND MOMENTUM STRATEGY

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### ABSTRACT

*In recent years, investors are increasingly concerned about whether the credit risk will affect the return on investment. This paper discusses the credit rating and momentum investment strategy relationship. The research period is from January 2005 to December 2010, and the sample is the ordinary shares of companies listed on Taiwan Stock Exchange (TSE). By calculating the cumulative returns of the investment portfolio of the holding period, and grouping the research samples by credit rating, this paper tests the relationship between credit rating and momentum investment strategy in Taiwan's stock market. Second, in the exploration of the factors affecting credit rating and stock returns, this paper uses variables including firm size, financial leverage, turnover rate, company age and industry to analyze the impact of factors including information asymmetry and industry on the investment strategy. Moreover, this paper probes into the impact of January Effect and business cycle on credit rating. The empirical results reveal that Taiwan's stock market does not have the momentum effect, although there is reverse investment strategy. In other words, the returns of stocks of investment portfolio of better credit rating are higher than those of poorer credit rating; and the results are reverse if the reverse investment strategy is applied. The empirical results are not affected by adding variables such as firm size, financial leverage, turnover rate, company age and industry. Hence, momentum investment strategy of Taiwan's stock market is not affected by credit rating.*

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## Contribution/ Originality

This study has been provided to investors as a decision making according to Taiwan's information. For testing the relationship between credit rating and momentum investment strategy in Taiwan's stock market. The returns of stocks of investment portfolio of better credit rating are higher than those of poorer credit rating; The momentum investment strategy of Taiwan's stock market is not affected by credit rating.

## 1. INTRODUCTION

### 1.1. Research Background

Fama and French (1970) proposed the Efficient Market Hypothesis (EMH), arguing that no investors can predict stock price by using the existing information and obtain abnormal returns by arbitrage if the stock market is efficient. Jegadeesh and Titman (1993) proposed the momentum investment strategy, arguing that investors can obtain excess returns through momentum investment strategy by buying the previous winner portfolio and selling the previous loser portfolio at the same time. Debondt and Thaler (1985) argued that investors can obtain excess returns through the so-called reverse investment strategy by buying the previous the loser portfolio and selling the previous winner portfolio. These arguments are different from the market efficiency point of view insisted by Fama and French (1970), causing heated debates. Chan *et al.* (1996) used the standardized unexpected earnings, abnormal return around earnings announcement, and analyst forecasts to construct the dynamic combination.

The method can obtain significant positive average returns for 6 to 12 months. Moskowitz and Mark (1999) proposed that stock price continuation may be affected by industrial factor as investors scramble to chase popular industries. Reinganum (1981) analyzed the investment portfolios based on the annual benefit-cost ratio and quarterly benefit-cost ratio, and found that investment portfolio of a smaller size has more excess returns. Chordia and Shivakumar (2002) explored the relationship between business cycle and price momentum, and discovered that momentum strategy has the significant positive average returns only in booming period and insignificant negative average returns in recession. According to the above literature, the momentum effect has been explained in different ways. However, there is no consensus and explanation regarding factors affecting momentum strategy as business cycle (Chordia and Shivakumar, 2002), annual and quarterly benefit-cost ratios (Reinganum, 1981), industry (Moskowitz and Mark, 1999), trading volume (Lee Charles and Bhaskaran, 2000) or any other risk factor or cross-section difference of individual stocks.

### 1.2. Research Motives

Regarding the momentum investment strategy, most studies focus on whether there is a momentum effect in the stock market, if there is, whether the momentum effect is persistent. Jegadeesh and Titman (1993) found that the stocks of better (poorer) returns in the past 3 to 12 months would have the better (poorer) returns in the following one year of time. Rouwenhorst

(1999) found that there are significant positive price momentum average returns in only six countries of 20 emerging countries.

Referring to Avramov *et al.* (2007), this paper analyzes the relationship between credit rating and momentum strategy. Regarding the momentum investment portfolio, the winner and loser investment portfolios are built according to the method proposed by Jegadeesh and Titman (1993) to conduct the momentum strategy analysis of stocks listed in Taiwan Stock Exchange (TSE) by controlling other factors, such as financial leverage, industrial category, turnover rate, business cycle, January Effect, company age and firm size.

### 1.3. Research Purposes

The main research purposes are:

1. To test the existence of significant momentum strategy in Taiwan's stock market with or without credit rating;
2. To explore the relationship between momentum investment portfolio and credit rating in the case of different holding periods;
3. To explore the relationship with momentum strategy of different credit rating groups;
4. To discuss the relationship between momentum investment strategy and credit rating under different factors by adding other control variables.

## 2. LITERATURE REVIEW

### 2.1. Price Momentum Investment Strategy

Levy (1967) proposed the relative strength strategy, suggesting that it is unable to reject the random walk hypothesis of stock price change in the short term. However, the relative strength of stock does exist in the long term. Jegadeesh and Titman (1993) found that investors can buy winner and sell loser portfolios to gain excess returns according to the short-term price continuation, which is known as the momentum investment strategy. However, Debondt and Thaler (1985) proposed the contrarian strategy, arguing that the market has the overreactions, namely, stocks of previous better performance will have reverse returns in the future; on the contrary, stocks of weaker performance may gradually rise in price in the future. Rouwenhorst (1998) found the existence of price momentum profits in 11 out of 12 European countries' stock markets. The findings are consistent with Jegadeesh and Titman (1993) on the U.S. stocks. Using NYSE, AMEX and NASDAQ markets during the period from 1977 to 1993 as the research subjects, Chan *et al.* (1996) developed the momentum investment strategy by four indicators including the stock returns of the past 6 months, the cumulative abnormal returns around the announcement of earnings, standardized unexpected earnings, and the earnings corrected amplitude by analysts in the past 6 months. The empirical results indicated that the price continuation does exist in the stock market.

## 2.2. Credit Rating Momentum Strategy

Avramov *et al.* (2007) found that momentum benefits differ according to the level of credit rating. When the risk is high, momentum benefits is more obvious; therefore, momentum benefits can reach the significance level in companies of low credit rating and do not exist in the company of high credit rating. Moreover, by considering different business cycle and January Effect, when the momentum investment strategy is implemented, companies of low credit rating have significant momentum effect. The momentum effect will increase with lowering score of credit rating. This result is the same even under different business cycles. The results after eliminating January Effect are also significant

## 2.3. Factors Affecting Momentum Investment Returns

### 2.3.1. Industry (Industrial Category)

Moskowitz and Mark (1999) argued that besides the factors of firm size and book-to-market ratio, the factor of industrial category can explain more abnormal returns generated by the “momentum strategy” formed by the return rates of individual stocks and even the momentum strategy of industrial return rate, and is better than the momentum strategy by individual return rate. They suggested that the price momentum returns of individual stock are derived from industrial momentum returns. George and Hwang (2004) ranked the stocks by the ratio of the previous period price and 52-week highest price by dividing into 10 groups. Stocks in each group form an investment portfolio by average weight. The investment portfolio of the highest ratio is the winner portfolio and the investment portfolio of the lowest ratio is known as the loser portfolio, and the rest are known as the middle portfolios. They conducted the pairwise comparison of the performance of the three momentum strategies including the conventional JT strategy, the MG industrial momentum strategy, and the 52-week highest price strategy. The investment portfolios of JT (winner, loser, middle portfolios) were further categorized by the 52-week highest price strategy. According to the empirical results, the momentum strategy using the 52-week highest price strategy had the significant profitability without inversion phenomenon as compared to the JT and MG indicators.

### 2.3.2. Size Effect

Lintner (1965) proposed the CAPM (Capital Asset Pricing Model), arguing that there is a positive, significant linear relationship between the expected returns of securities and market risk value ( $\beta$  value) for efficient portfolio. Moreover, the market factor ( $\beta$  value) is sufficient to describe the cross-section changes in the expected returns. Fama and French (1992) proposed the Fama-French three-factor model, arguing that there are three factors including the market factor, size factor and book-to-market factor that can affect asset returns.

Banz (1981) found that, on average, the returns of small firms' ordinary shares have higher risk-adjusted returns as compared with large firms. The coefficient of size variable is significantly below zero, indicating that the contribution of stock size to the stock returns rate is negative. This is

known as the “size effect”. Reinganum (1981) conducted the empirical study by using the quarterly and yearly data of ordinary stocks of companies listed on NYSE and AMEX. The results indicate that smaller investment portfolio has greater excess returns, verifying the existence of size effect. The excess returns of the investment portfolio of small companies will continue for at least two years. Therefore, Reinganum argued that the effect is not caused by market inefficiency but by the lack of complete error descriptions of CAPM. Hence, the findings are consistent with those of Banz (1981) that CAPM has description error.

### 2.3.3. Turnover Rate

By following the research method of Datar *et al.* (1998) used the stock turnover rate (turnover shares divided by the number of outstanding shares) to represent liquidity. Empirical results show that the previous average monthly turnover rate and the average stock returns have a significant negative cross-sectional relationship, namely, the stock returns have the liquidity effect.

Lee Charles and Bhaskaran (2000) found that stocks of higher turnover rate can result in fewer turns in the future, while the stocks of lower turnover rate can have more future returns. In addition, previous turnover rate can be used to predict the profits and continuation of price momentum.

### 2.3.4. Financial Leverage

Crane (1964) pointed out that the systemic risk and financial leverage ratio are highly correlated. When the company is raising funds by debt, the instability of shareholders' ROE and EPS will increase. The increase of instability in business performance of the company is the so-called financial leverage or financial risk.

Bhandari (1988) studied the stocks traded in NYSE from 1948 to 1979. The empirical results show that when factors such as  $\beta$  and firm size are under control, the debt ratio and the returns rate of ordinary share are proportional and the financial leverage can explain the change in stock returns, and the explanatory power is stronger than Beta value. It is also found that there are many companies of high debt ratio among small companies. As these companies are in business operational difficulty, the demand on the returns rate is also higher.

According to the research method proposed by Fama and French (1992), Barber *et al.* (1996) found that that debt ratio and stock returns rate are positively correlated, while net value to market value ratio and firm size and stock returns rate have no significant relationship. They also pointed out that financial leverage ratio has more explanatory power as compared to book value/market value and firm size regarding the stock returns.

In summary of the above, this paper argues that risk of credit rating will affect stock returns rate. Therefore, by constructing a momentum investment portfolio with the addition of the credit rating, this paper tests whether the momentum investment strategy is affected by credit rating. In addition, this paper also includes factors such as firm size, financial leverage, company age, turnover rate, and industry as the variables that may possibly affect the research results in the sensitivity test.

### 3. RESEARCH METHOD

This chapter is divided into three sections: Section 1 explains how to construct winner and loser investment portfolios; Section 2 is the data source and sample selection of the study; Section 3 is the definitions of variables.

#### 3.1. Investment Strategy Construction Method

##### 3.1.1. Momentum Investment Portfolio

After calculating the cumulative returns of stocks of all the listed companies in the formation period, this paper identifies the winner portfolio and loser portfolio for momentum strategy according to the cumulative returns rate of individual stocks. The construction of the investment strategy is to set the formation period as the past 6 months in the calculation of the cumulative returns of the original returns represented by  $J$  ( $J=6$ ). As for the holding period, this paper calculates the average returns rate of the winner and loser portfolios by weighted average of the stocks in the holding periods of 3, 6, 9, 12 months represented by  $K$  ( $K=3, 6, 9, 12$ ). In the case of four holding periods of 3, 6, 9, 12 months after the formation of the investment portfolio, this paper observes the returns of the investment portfolio in the holding period. Second, by applying the overlapping method, this paper constructs the formation period and holding period in order to avoid the deviation of the research sample and improve the effectiveness of the validation of the research samples. The cumulative returns of the individual stocks in the formation period are sorted in the descending order into 10 investment portfolios. The winner portfolio (Winner,  $W$ ) is the top 10%, and the loser portfolio (Loser,  $L$ ) is the last 10% by performance. After the construction of the winner and loser investment portfolios, the zero investment portfolio strategy is adopted, namely, buying the winner portfolio and selling the loser investment portfolio. Then,  $t$ -test is applied to determine whether there is significant momentum effect of stock returns during the holding period.

The research period is set as 72 months from January 1, 2005 to December 31, 2010. The momentum investment strategy can produce  $J-1$  months overlapping (as shown in Figure 3-1). For example, in the case of the formation period and holding period of 6 months ( $J=6, K=6$ ), the first investment strategy is based on July, 2005, the formation period of the investment portfolio is from January to June 2005, and the corresponding period from June 2005 to December 2005. Next, according to the formation period, the winner and loser portfolios can be identified, and the average monthly return rate of all the investment portfolios of holding period of 3 months (6 months, 9 months, 12 months) is calculated. The second investment strategy is based on August 2005, the formation period of the investment portfolio is from February to July, 2005, and the corresponding holding period is from August 2005 to January 2006. According to the formation period, the winner and loser portfolios are identified, and the average monthly return rate of all investment portfolios of the holding period of 3 months (6 months, 9 months, 12 months) is calculated. Each investment portfolio is inferred by the same method.

### 3.1.2. Momentum Investment Strategy and Credit Rating

The investment strategy is constructed according to the method as proposed by Avramov *et al.* (2007). This paper first applies the method of dependent sorts to classify the individual stocks into three groups by the credit rating scores in the ascending order. The top 30% by individual stock credit rating are the groups of optimal credit rating, the last 30% are groups of poorer credit rating, and the remaining 40% are groups of medium credit rating. According to the method as proposed by Jegadeesh and Titman (1993) of investment strategy construction, the investment portfolios are divided into 10 momentum investment portfolios by the cumulative returns rate of the formation period in the descending order. The top 10% portfolios of returns in the formation period are known as the winner portfolios (P10). On the contrary, the last 10% of portfolios by the cumulative returns during the formation period are known as the loser portfolios (P1). Finally, t-test is performed to test the existence of momentum effect of the results (as shown in Figure-2).

## 3.2. Research Sample Data Source

### 3.2.1. Research Period

The research period is from January 1, 2005 to December 31, 2005 of 72 months. The research subjects are the stocks of companies listed on TSE.

### 3.2.2. Data Source

1. The data of monthly returns of the stocks of listed companies are sourced from the database of Taiwan Economic Journal (TEJ).
2. The data of credit rating of the stocks of listed companies are taken from TCRI (Taiwan Corporate Credit Risk Index) of TEJ.
3. The data of sensitivity test variables including industry, turnover rate, firm size, company age, financial leverage are all taken from the database of TEJ.
4. Business cycle data are based on the economic boom index of the Council for Economic Planning and Development, Executive Yuan.

## 3.3. Variable Definitions

### 3.3.1. Credit Rating (TCRI)

TEJ credit rating is divided into nine levels (see Figure-2). Companies at levels 1 to 4 are of low risk, companies of levels 5 to 6 are of medium risk, companies at levels of 7 to 9 are of high risk, companies at level 10 D (Default) are those involved in bankruptcy, restructuring.

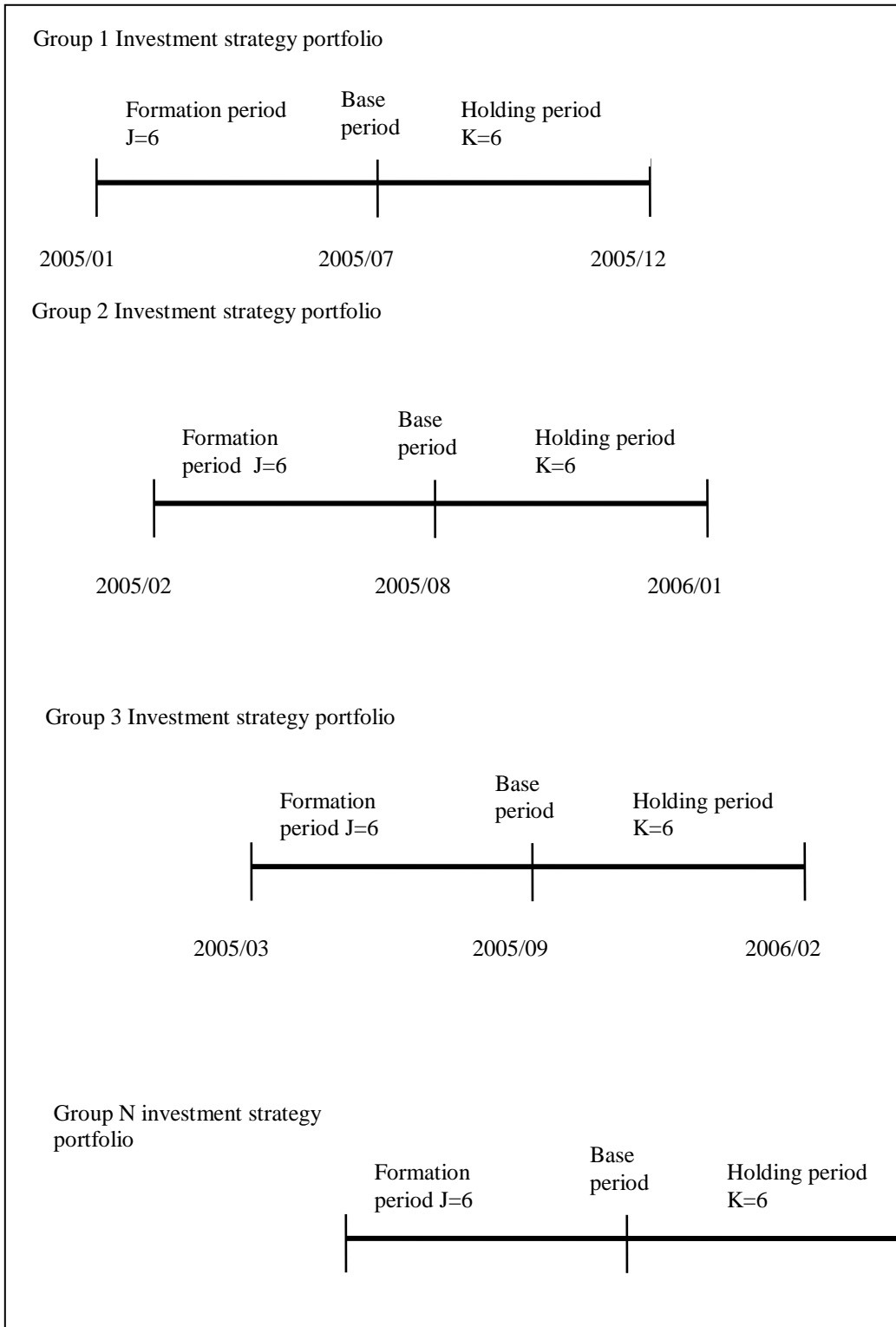


Figure-1. Construction of the investment strategy formation period and holding period



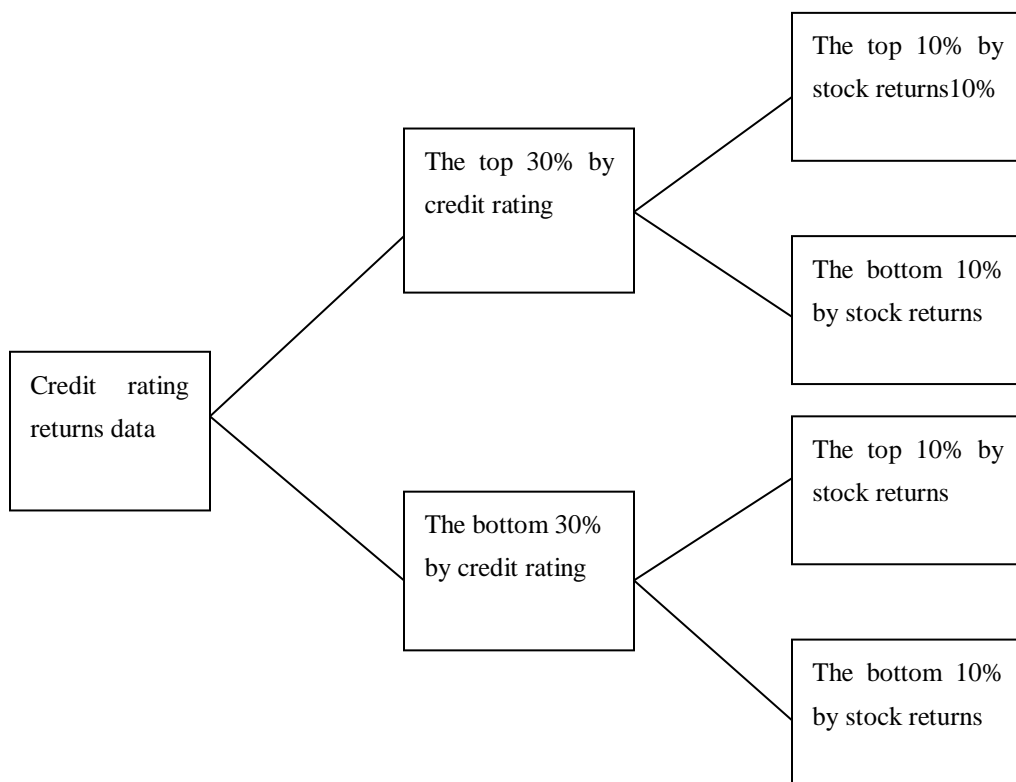


Figure-2. Credit rating and momentum investment portfolio construction

run-on and bail-out help or companies, of which CPA (accountant) is concerned about business continuation, companies of negative net value and companies of financial trouble.

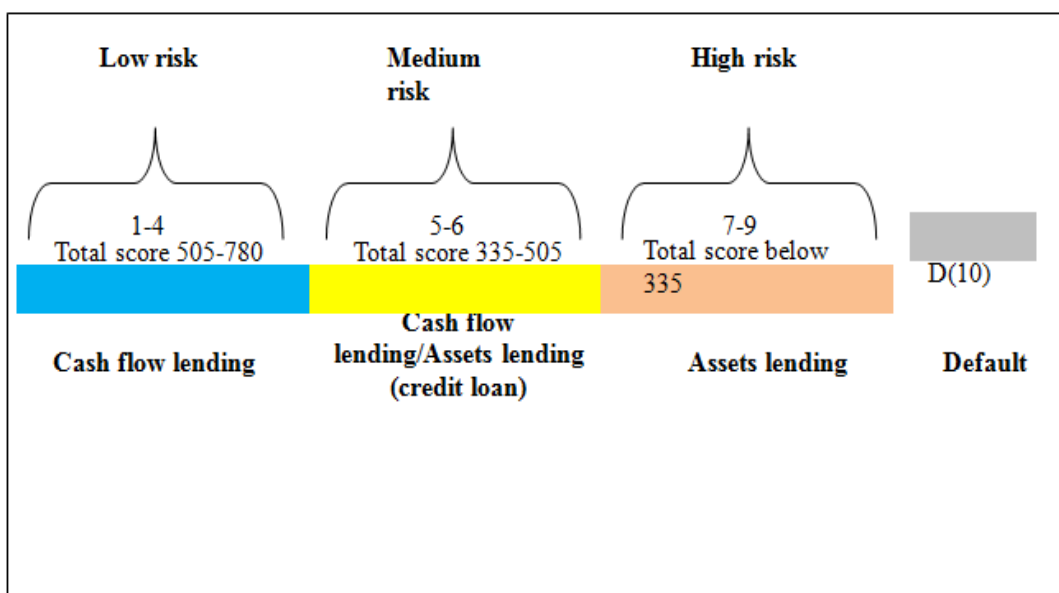


Figure-.3. TCRI risk level and credit types

Data Source: Taiwan Economic Journal

### 3.3.2. Stock Returns Rate (Return)

This paper uses the return rate data of all listed companies provided by TEJ. The return rate is calculated based on the monthly data of the formation period and holding period of the investment portfolios.

### 3.3.3. Size Risk (Size)

In this study, firm size is defined as: the natural logarithm of the market value of the ordinary stocks of the listed company (million NTD).

### 3.3.4. Turnover Rate (TOV)

Previous studies have found that turnover rate has a significant impact on stock price momentum, and can effectively link and explain the medium term momentum continuation and the long term stock price reversal (Cohen *et al.*, 1976; Datar *et al.*, 1998; Lee Charles and Bhaskaran, 2000). In addition, Campbell *et al.* (1993) argued that the actual turnover of stocks is highly correlated to firm size. Hence, this paper uses stock turnover rate as a variable. Therefore, turnover rate is defined as: the division of the current month turnover of individual sample stocks by the number of outstanding shares.

### 3.3.5. Financial Leverage (Leverage)

By reference to Crane (1964), the financial leverage rate is defined as the division of total debts by the total shareholder equities. It is the sum of the long term debts, short term debts and preferred shares in the corresponding month of the previous year of the winner and loser portfolios by the weighted average of the end of month market value of the holding period of the stocks each month to form the financial leverage ratio of each portfolios in each month.

### 3.3.6. Business Cycle

In this paper, business cycle is divided into the expansion period and recession period. The economic state is defined by the comprehensive economic performance score by CEPD. The comprehensive economic performance scores from the lowest 9 points to the highest 45 points are divided into the red light (45-38 points), yellow-red light (37-32 points), green light (31-23 points), yellow-blue light (21-17 points) and blue light (16-9 points). The median value of the economic performance signal of green light is 27.5 points, and thus the economic state is divided into the expansion period (>27.5 points) and recession period (<27.5 points).

### 3.3.7. Company Age (Age)

The company age is measured by the subtraction of the year of listing by the year of establishment of the company.

### 3.3.8. Industry (Ind)

To understand whether momentum strategy has different results in different industries, this paper categorizes the Total Sample into samples of the electronics industry and the samples of non-electronics industry to verify the momentum benefits in between different industries.

## 4. EMPIRICAL RESULTS ANALYSIS

### 4.1. Analysis of Momentum Benefits With/Without Credit Rating

As shown in Table-1, the momentum investment portfolio of companies with credit rating have high points as compared to the companies without credit rating in the non-January and recession period, and lower points in January and expansion period. The research results suggest that there is a reverse investment strategy effect in Taiwan's stock market. Therefore, when the reverse investment strategy is adopted, companies without credit rating have higher returns, and it is opposite in January and expansion period.

**Table-1.** Simple credit rating grouping

With/without credit rating momentum benefits (%)				
		Total Sample	with credit rating	without credit rating
Total Sample	P10-P1	-2.65	-2.74	-3.17
		(-18.04)***	(-17.71)***	(-6.10)***
	P1	4.95	5.05	4.71
		(43.25)***	(42.00)***	(10.79)***
Non-January	P10	2.30	2.31	1.54
		(24.79)***	(24.08)***	(5.74)***
	P10-P1	-0.05	-2.02	-2.69
		(-0.43)	(-12.33)***	(-4.46)***
January	P1	1.72	4.53	4.22
		(15.79)***	(35.84)***	(7.03)***
	P10	1.67	2.51	1.53
		(15.73)***	(24.76)***	(5.40)***
January	P10-P1	-2.16	-8.57	-7.46
		(-5.29)***	(-18.49)***	(-5.71)***
	P1	3.19	8.79	7.99
		(8.73)***	(23.73)***	(7.20)***
January	P10	1.03	0.23	0.54
		(3.60)***	(0.84)***	(-0.60)

(Continued)

**Table-1.** Single credit rating grouping (continued)

With/without credit rating momentum benefits (%)				
		Total Sample	with credit rating	without credit rating
Boom Expansion	P10-P1	-1.29	-1.37	0.81
				<i>Continue</i>

		(-7.10)***	(-7.37)***	(1.22 )
	P1	0.49	0.53	-0.07
		(4.40)***	(4.59)***	(-0.12)
	P10	-0.80	-0.84	0.74
		(-5.68)***	(-5.72)***	(1.91)*
Recession	P10-P1	-2.87	3.86	1.49
		(-16.158)***	(33.70)***	(4.22)***
	P1	6.69	0.03	0.21
		(47.83)***	(46.01)***	(13.73)***
	P10	3.82	3.89	1.70
		(34.49)***	(33.96)***	(4.84)***

Note: \*\*\* indicates 1% significance level, \*\* indicates 5% significance level, \* indicates 10% significance level

#### 4.2. Formation Period's Credit Rating and Momentum Strategy

As shown in Table-2, in different formation periods, winner and loser momentum investment portfolios are composed of companies of high credit rating points (high risk), regardless of companies of high and low credit rating. The returns rate of the momentum investment portfolio is negative. Next, after dividing the samples into high, medium, and low levels, the returns rate of companies of low credit rating are better. However, it is opposite when the reverse investment strategy is adopted.

Figure-5 illustrates that the credit rating of the winner and loser portfolios in the formation periods of 3, 6, 9, 12 months will gradually decrease with the lengthening of the formation period. The winner credit rating points are slightly lower than the points of the loser, suggesting that winner credit risk is lower than that of the loser. In 10 momentum investment portfolios, credit rating points are all at Levels 4~5, and the differences by level are extremely slight.

**Table-2.** Momentum investment portfolios and credit rating in the case of different formation period

Investment portfolio	J=3	J=6	J=9	J=12	Average
P1	5.69	5.73	5.78	5.68	5.6900
P2	5.12	5.18	5.22	5.20	5.1800
P3	5.00	5.05	5.03	5.03	5.0275
P4	4.86	4.91	5.00	4.95	4.9300
P5	4.83	4.91	4.90	4.86	4.8750
P6	4.85	4.90	4.92	4.86	4.8825
P7	4.90	4.83	4.93	4.90	4.8900
P8	4.97	4.93	4.95	4.93	4.9450
P9	5.15	5.07	5.15	5.10	5.1175
P10	5.57	5.62	5.58	5.45	5.5850

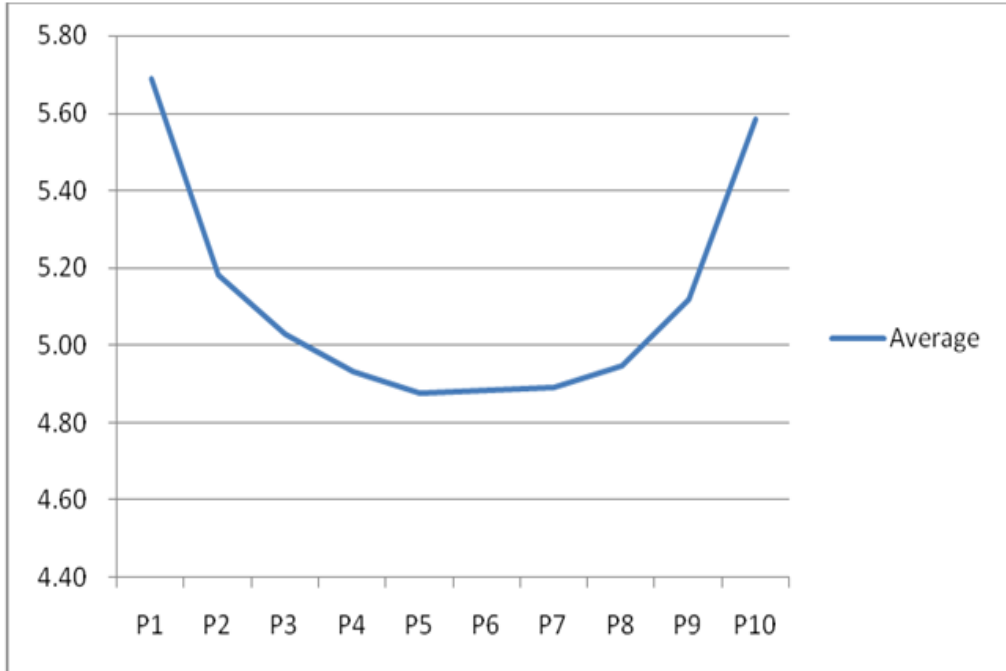


Figure-4. Investment portfolio P1 to P10 credit rating

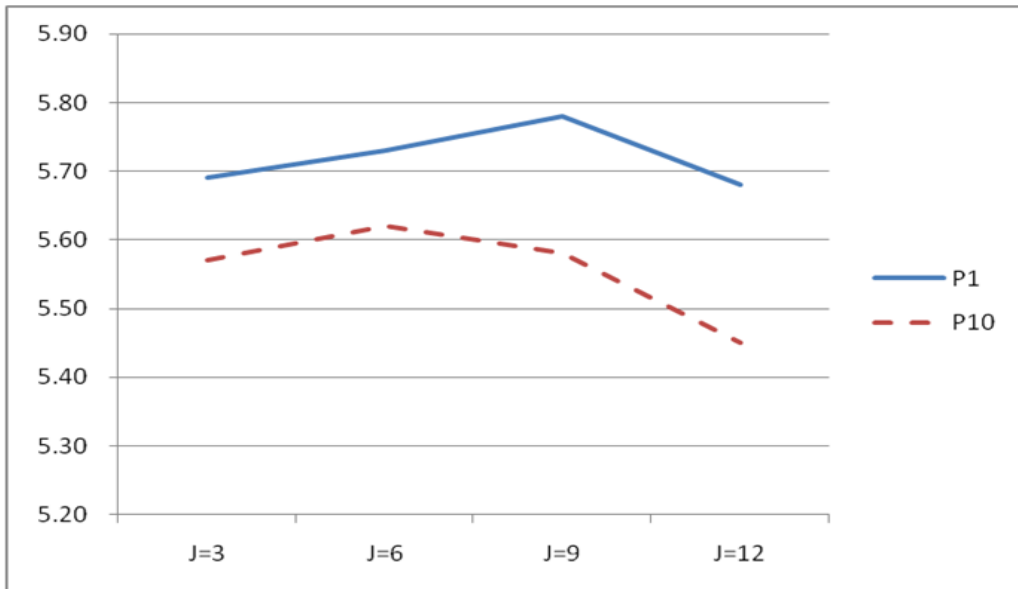


Figure-5 Winner and loser credit rating

### 4.3. Credit Rating and Momentum Benefits

This section applies the method of Dependent sort<sup>1</sup> to group the momentum investment portfolios by credit rating and validate whether the grouping has a significant impact on the returns

rate of Taiwan's stock market for different credit ratings. Table-3 shows the grouping of 10 investment portfolios of stocks in terms of monthly cumulative returns for the formation period of 6 months in descending order. The top 10% portfolios are winner portfolios P10, and the bottom 10% portfolios are the loser portfolio P1. These investment portfolios (P1~P10) are then classified into three groups of HIG (High Investment Grade), MIG (Medium Investment Grade) and LIG (Low Investment Grade) to review the momentum investment portfolios and credit rating profitability for different investment levels.

As shown in Table -3 to Table-5, after classification of the samples by credit rating into three groups and 10 groups, in the credit rating of classification of three groups, the top 30% portfolios of better credit rating of January Effect and business cycle (expansion period ) have higher returns rate as compared with the bottom 30% portfolios. It is opposite if the reverse investment is adopted. However, when the samples are classified into 10 groups, it is found that the returns rates of companies of better credit rating and poorer credit rating are not significantly improved. However, when the reverse investment strategy is adopted by the companies of poorer credit rating, the returns rate will be better.

Next, this paper classifies the credit rating points and eliminate the companies of poorer credit rating points (low investment level) for analysis. It is found that the returns rate of the momentum investment portfolios of better credit rating points (high investment level) is higher than that of the companies of poorer credit rating points, and the return rates are negative in both cases. Therefore, when the reverse investment strategy is adopted, the companies of poorer credit rating points can have higher returns.

**Table-3** Momentum Investment Portfolio Architecture

Portfolio	Company (number %)			Returns (per month %)		
	HIG	MIG	LIG	HIG	MIG	LIG
P1	28.05	46.52	25.43	4.44	5.19	4.45
P2	20.07	50.56	29.37	2.07	2.61	2.47
P3	17.39	48.85	33.76	1.91	2.22	2.41
P4	16.87	46.50	36.63	1.68	2.10	1.74
P5	16.28	46.95	37.85	1.25	1.94	1.58
P6	17.88	46.32	35.79	0.83	1.25	1.44
P7	18.49	46.62	34.88	0.36	0.90	1.22
P8	20.54	47.34	32.12	0.00	0.25	0.77
P9	23.94	48.37	27.69	0.08	0.25	1.04
P10	24.94	52.85	22.21	1.62	2.65	2.25
P10-P1				-2.82	-2.54	-2.20
				(-10.26)***	(-11.36)***	(-6.33)***

The numbers in brackets are the simple t statistics.

Note: \*\*\* indicates 1% significance level, \*\* indicates 5% significance level, \* indicates 10% significance level

**Table-4** Momentum benefits by credit rating grouping

Panel A: momentum effects of credit rating grouping of three groups				
Credit rating combination (Group 1=low risk, Group 3=high risk)				
		<b>Group 1</b>	<b>Group 2</b>	<b>Group 3</b>
Average credit rating points		3.52	5.31	7.42
Total Sample	P10-P1	-2.53	-2.54	-3.17
		(-10.96)***	(-11.01)***	(-9.68)***
	P1	4.17	4.80	6.09
		(22.37)***	(27.20)***	(23.68)***
	P10	1.64	2.26	2.92
		(11.69)***	(15.59)***	(14.58)***
Non-January	P10-P1	-1.76	-2.13	-2.21
		(-7.08)***	(-8.82)***	(-6.46)***
	P1	3.76	4.50	5.33
		(18.96)***	(24.03)***	(19.97)***
	P10	2.00	2.37	3.12
		(13.04)***	(15.36)***	(14.67)***

**Table-4** Momentum benefits by credit rating grouping (continued)

Panel A: momentum effects of credit rating grouping of three groups				
Credit rating combination (Group 1=low risk, Group 3=high risk)				
		<b>Group 1</b>	<b>Group 2</b>	<b>Group 3</b>
Average credit rating points		3.52	5.31	7.42
January	P10-P1	-8.92	-7.39	-10.59
		(-16.94)***	(-11.51)***	(-10.57)***
	P1	8.13	8.00	10.90
		(20.64)***	(15.76)***	(13.13)***
	P10	-0.79	0.61	0.31
		(-2.18)***	(-1.49)	(-0.51)
Expansion period	P10-P1	-1.73	-1.09	-0.95
		(-6.29)***	(-3.86)***	(-2.47)**
	P1	0.66	0.04	0.60
		(3.99)***	(0.28)	(2.59)**

*Continue*

	P10	-1.07	-1.05	-0.35
		(-4.87)***	(-4.68)***	(-1.12)
Recession period	P10-P1	-2.11	-1.86	-2.56
		(-7.47)***	(-6.66)***	(-6.32)***
	P1	5.25	5.90	7.09
		(23.46)***	(26.75)***	(22.33)***
	P10	3.14	4.04	4.53
		(18.03)***	(23.61)***	(18.13)***

Note: \*\*\*indicates 1% significance level, \*\*indicates 5% significance level, \*indicates 10% significance level

Table-4 Momentum benefits by credit rating grouping (continued)

Panel-B. Momentum effect of credit rating grouping of 10 groups											
Credit rating combination (1=low risk,10=high risk)											
Group		1	2	3	4	5	6	7	8	9	10
Expansion period	P3-P1	-0.15	-0.41	-0.95	-0.19	-1.16	-0.46	-0.88	-0.16	-1.37	-1.34
		(-0.62)	(-1.57)	(-3.54)***	(-0.62)	(-4.74)***	(-1.50)	(-3.02)***	(-0.44)	(-3.77)***	(-3.43)***
	P1	0.23	-0.22	0.95	-0.24	0.45	0.99	0.14	1.23	1.44	1.16
		(1.44)	(-1.36)	(5.79)***	(-1.26)	(2.67)***	(5.32)***	(0.80)	(6.07)***	(6.02)***	(4.96)***
	P3	0.08	-0.63	-0.00	-0.43	-0.71	0.53	-0.74	1.07	0.07	-0.18
		(0.43)	(-3.03)***	(-0.02)	(-1.77)*	(-3.74)***	(2.12)**	(-3.23)***	(3.90)***	(0.26)	(-0.61)
Recession period	P3-P1	1.03	0.90	0.86	1.31	0.73	1.58	1.69	0.80	0.75	-0.37
		(3.92)***	(3.28)***	(2.98)***	(4.18)***	(2.46)**	(4.53)	(5.25)***	(2.10)**	(1.98)**	(-0.83)
	P1	1.65	1.11	2.93	1.52	2.84	3.11	1.97	3.95	3.49	3.61
		(7.68)***	(5.08)***	(12.85)***	(6.55)***	(12.29)***	(11.17)***	(7.93)***	(13.84)***	(11.94)***	(10.95)***
	P3	2.68	2.01	3.79	2.83	3.57	4.69	3.66	4.75	4.24	3.24
		(18.21)***	(12.64)***	(22.58)***	(13.92)***	(20.31)***	(22.79)***	(18.76)***	(19.43)***	(17.91)***	(12.03)***

Note: \*\*\*indicates 1% significance level, \*\*indicates 5% significance level, \*indicates 10% significance level

Table-4 Momentum benefits by credit rating grouping (continued)

Panel-B. Momentum effect of credit rating grouping of 10 groups											
Credit rating combination (1=low risk,10=high risk)											
Group		1	2	3	4	5	6	7	8	9	10
Total Sample	P3-P1	0.47	0.33	0.14	0.76	-0.01	0.90	0.69	0.31	0.20	-0.53
		(2.25)**	(1.51)	(0.64)	(3.21)***	(-0.03)	(3.36)***	(2.77)***	(1.07)	(0.69)	(-1.64)*
	P1	1.18	0.64	2.39	0.78	2.07	2.40	1.31	3.08	2.66	2.66
		(7.26)***	(3.95)***	(14.26)***	(4.50)***	(12.07)***	(11.61)***	(7.16)***	(14.55)***	(12.03)***	(10.71)***
	P3	1.65	0.97	2.53	1.54	2.06	3.30	2.00	3.39	2.86	2.13
		(13.55)***	(7.55)***	(18.20)***	(9.44)***	(14.45)***	(19.61)***	(12.59)***	(17.80)***	(15.15)***	(10.07)***
Non-January	P3-P1	0.99	0.58	0.66	0.98	0.37	1.40	0.95	0.88	0.71	-0.13
		(4.66)***	(2.72)**	(2.84)***	(3.77)***	(1.50)	(4.98)***	(3.67)***	(2.92)***	(2.32)**	(-0.36)
	P1	0.90	0.45	2.14	0.53	1.87	2.12	1.10	2.80	2.28	2.34
		(5.44)***	(2.64)***	(12.09)***	(2.86)***	(10.43)***	(9.88)***	(5.72)***	(12.74)***	(9.92)***	(9.00)***
	P3	1.89	1.03	2.80	1.51	2.24	3.52	2.05	3.68	2.99	2.21
		(14.54)***	(7.64)***	(19.21)***	(8.83)***	(14.80)***	(19.83)***	(12.12)***	(18.28)***	(14.91)***	(9.93)***
January	P3-P1	-2.54	-1.92	-4.85	-1.96	-3.76	-4.17	-2.33	-5.70	-4.91	-5.07
		(-3.81)***	(-3.05)***	(-7.98)***	(-2.69)***	(-5.77)***	(-5.01)***	(-3.47)***	(-6.59)	(-5.88)***	(-5.09)***
	P1	3.15	2.69	4.86	3.23	4.15	5.17	3.49	6.30	6.08	6.10
		(5.91)***	(4.89)***	(9.73)***	(6.31)***	(7.80)***	(7.12)***	(6.06)***	(8.71)***	(7.93)***	(7.64)***
	P3	0.61	0.77	0.01	1.27	0.39	1.00	1.16	0.60	1.17	1.03
		(1.76)*	(1.86)*	0.04	(2.37)**	(0.95)	(2.05)**	(3.12)***	(1.2)	(2.47)**	(1.64)

Table-5 Momentum strategy in the case of different credit rating samples

Credit rating range	Momentum benefits	Number of companies	Number of companies by percentage
Credit rating 1-4	-2.32 (-9.92)***	14,548	31.05%
Credit rating 1-5	-2.17 (-12.03)***	26,931	57.48%
Credit rating 1-6	-2.36 (-14.59)***	36,781	78.51%

Continue



Credit rating 1-7	-2.60 (-16.49)***	42,156	89.98%
Credit rating 1-8	-2.57 (-16.87)***	44,710	95.43%
Credit rating 1-9	-2.72 (-17.58)***	45,567	97.26%
Credit rating 1-10	-2.79 (-17.93)***	46,850	100%

Note: \*\*\* indicates 1% significance level, \*\* indicates 5% significance level, \* indicates 10% significance level

Next, this paper classifies the credit rating points and eliminate the companies of poorer credit rating points (low investment level) for analysis. It is found that the returns rate of the momentum investment portfolios of better credit rating points (high investment level) is higher than that of the companies of poorer credit rating points, and the return rates are negative in both cases. Therefore, when the reverse investment strategy is adopted, the companies of poorer credit rating points can have higher returns.

## 5. RESEARCH CONCLUSIONS

This paper finds that there is no momentum effect in Taiwan's securities market, and there is no momentum effect after the grouping test by using the credit rating. However, there is reverse investment strategy. Moreover, the returns rates of companies of poorer credit rating are even poorer than the companies of better returns rate. Therefore, if investors adopt the reverse investment strategy, they can obtain higher returns in the case of poorer credit rating. Furthermore, the results are the same when the credit rating is further categorized for test with the addition of other variables. The findings are different from [Avramov et al. \(2007\)](#).

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