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A STUDY ON THE DIFFERENCES IN ADOPTING CASH REFUND CAPITAL REDUCTION AND STOCK REPURCHASE BY COMPANIES IN BULL AND BEAR STOCK MARKETS

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ABSTRACT

This paper investigates the characteristic differences of variables relating to financial performance and corporate governance of companies in Taiwan implementing the policies of cash refund capital reduction or stocks repurchase, under considerations of market situations of bull and bear markets. Conversely, this paper employs Logistic regression to analyze how financial performance and corporate governance variables affect company decisions to choose the policies of cash fund capital reduction or stocks repurchase. According to the statistics, companies are more likely to conduct cash refund capital reduction in a bullish market period and stock repurchase in a bear market. The evidence results find that, companies have better profitability, lower debt ratio, higher foreign ownership, and increased potential growth opportunities in the period of cash refund capital reduction. Especially, in a bear market, the excellent characteristics of the sample company can be better highlighted by cash refund capital reduction. In the period of stock repurchase, the characteristic of a relatively higher level of privy ownership can be observed. According to the regression results, companies tend to adopt cash refund capital reduction when corporate profitability is better and have higher levels of foreign ownership. A company with greater cash flow per share and equity pledge ratio is more likely to adopt stock repurchase.

Keywords: Bull and bear markets, Cash refund capital reduction, Stock repurchase, Logistic regression, Financial performance, Corporate governance.

JEL Classification: G30, G32, G34, G35.

Contribution/ Originality

The study contributes in the existing literature to explore some financial characteristics of the company by taking two capital reduction strategies that include cash refund capital reduction and stock repurchase, and to consider the differences of these characteristics in bull and bear markets.

1. INTRODUCTION

Capital reduction has rarely been discussed in addition to stock repurchase (capital reduction by implementing treasury stock). In Taiwan, there are two types' three forms of capital reduction. First, Capital reduction with treasury shares is in the provisions of the Law of the Securities Exchange. To maintain the firm's credit and shareholders' equity, the firm will buy back its own shares for capital reduction. When the firms cancel the repurchased treasury shares, this has a substantial reduction effect. This method of capital reduction reduces the number of outstanding shares, improves the ROE and earnings per share. Second. Capital reduction, in accordance with Company Law, can further be divided into capital reduction to cover losses and cash refund capital reduction. Capital reduction to cover losses refers to a company recognizing loss by capital reduction, as resulted from the event of large accumulated losses and the failure to turn a profit in the short-term. In this case, the shareholders' equity will be reduced according to the ratio of capital reduction. A portion of company shares is written off without actually returning the funds to shareholders. Hence, it can be regarded as a form of capital reduction. Such type of capital reduction can help to enhance book value per share to avoid full-delivery transaction or cancellation of credit trading. Third, cash refund capital reduction can cause changing in assets and shareholder's equity, and is the real capital reduction. It generally occurs in a company with good earning capacity and abundant cash flow, however, the company has no appropriate investment channels for the short-term; in other words, company capital is excessive and profit growth tends to become slower. Therefore, to enhance EPS and returns on equity, the company returns cash to the shareholders through cash refund capital reduction.

In some countries, capital reduction is used to reduce the face value of the stock without changing the total number of outstanding shares. In the U.S., companies often use a reverse stock split (or consolidation), namely merging two shares into one, to reduce the number of shares. However, Taiwan's regulations do not allow stock splits or reverse splits. Lin *et al.* (2009) note that a stock split can lessen the liquidity risk by reducing the trading costs and the cost of equity capital. However, the approach of a reverse stock split often communicates a negative image. Lamoureux and Poon (1987) note that a reverse stock split will bring negative abnormal returns on the date of announcement (Hwang, 1995; Desai and Jain, 1997). Kim *et al.* (2008) report that during the three years after a stock split, the abnormal returns of the stock prices are significantly negative (Huang *et al.*, 2006). Masse *et al.* (1997) used the Toronto Stock Exchange in Canada; they found that 9.3% of reverse stock splits have positive abnormal returns with positive market reactions.

The above discussions can highlight the importance of capital reduction-related issues to the capital market and corporate finances. Capital reduction to cover losses is implemented when a

company is characterized by huge losses and capital reduction in form, which is different from companies implementing cash refund capital reduction and stock repurchase. In this study, we focus on the latter two actual capital reduction types.

The major difference between stock repurchase and cash refund capital reduction is as follows: cash refund capital reduction can only be implemented by holding a shareholders' meeting; while stock repurchase can be implemented with the approval of the board of directors. Therefore, stock repurchase is advantageous in timing. In addition, cash refund capital reduction is implemented according to the original holding ratios of all shareholders in the denomination of NTD 10 per share. By contrast, stock repurchase requires open tender or offering in the open market, at the market price, to non-specific shareholders. Both types of capital reduction can enhance earnings per share (EPS) and benefit all investors in concept.

In 2002, Taiwan's Regent Hotel was the first to implement cash refund capital reduction to refund shareholders, and its stock price rose about 47% in the short-term. In 2006, it announced the second cash refund capital reduction at a percentage of up to 72%. The two successful capital reduction events gradually changed the negative thoughts of the past regarding capital reduction, and brought a new way of thinking to the market.

In the sub-prime crisis of 2008, and the number and volume of companies adopting stock repurchase amounted to 214 and NTD 74 billion that was the top over the years. Most publicly listed companies can survive by repurchasing stock frequently, which leads to the rebound of Taiwan stocks from the lower price level. This suggests that stock repurchase can support the stock market to a certain degree.

From the perspective of investors, broadly speaking, corporate earnings returned to shareholders can be mainly paid out in three ways; including cash refund capital reduction, stock repurchase, and cash dividend payout. In the case of same corporate profitability, after capital reduction, EPS will increase and the returns on equity will be improved. Cash refund capital reduction mainly occurs when company profitability is good, and investors will regard the announcement as positive information (Lin *et al.*, 2009). Stock repurchase occurs when the stock price is underestimated, thus, investors will regard the announcement as positive (Chan *et al.*, 2004; Grullon and Michaely, 2004; Jain, 2006; Li and McNally, 2007; Bargeron *et al.*, 2011; Chen *et al.*, 2011). Skinner (2008) pointed out that stock dividend payout has gradually decreased over the last 30 years, and stock repurchase has become an important payout policy for companies. Although the two capital reduction methods have been widely used in recent years, there is no integrated study. Moreover, the macro environment of a bear or bull market may affect capital reduction, which is also rarely discussed in literature.

UMC (United Microelectronics Corporation) had implemented both types of capital reduction. In 2007, it announced the largest scale cash refund capital reduction in Taiwan, the capital reduction was nearly 30%. On the date of the announcement, the stock price of UMC ADR rose dramatically, by 11%. The time of this cash refund capital reduction was in a bull market; hence, this study preliminarily deduced that UMC conducted cash refund capital reduction in a bull

market. UMC announced stock repurchase in 2006 and 2008 to buy back stocks worth NTD 10 billion and NTD 80 billion, respectively, for cancellation at the capital reduction percentage of 5.04% and 1.51%, respectively. The time of this stock repurchase was in a bear market, and thus, this study preliminarily deduced that UMC implemented stock repurchase in a bear market.

Most previous studies focused on the impact of capital reduction on operating performance and stock price, and discussions from the perspective of management are rare in literature. This study explores some financial characteristics of the company by taking two capital reduction strategies, and considers the differences of these characteristics in bull and bear markets. This study also explores how the financial and corporate governance variables of the company can affect the decision-making of cash refund capital reduction and stock repurchase. Unlike past literature, this study explores the differences of two types of capital reductions in bull and bear markets. Similarly, the company's book assets are reduced. In some cases, the shareholders can receive additional cash flow (cash refund capital reduction). However, in other cases, although the shareholders have not directly obtained cash, they can obtain information regarding the operating performance of the company (stock repurchase).

According to statistical results, 82% of the cash refund capital reduction samples occurred in a bull market. In the bear market, capital reduction by stock repurchase accounted for 89% of the total samples. Logistic regression analysis results suggest that, when the company has better profitability performance, a growth prospect are more promising, and has a higher level of foreign ownership; those are major characteristics of companies implementing cash refund capital reduction. In a bear market, companies implementing cash refund capital reduction have relatively better corporate performance. While companies with greater corporate cash flow per share are more likely to implement stock repurchase. Capital structure is not the major factor affecting the selection of capital reduction.

The second section of this article illustrates relevant literature and hypothesis. The third section contains the sample and variable selection, as well as the judgment of a bull or bear market. The fourth section is the pair wise t-test and Mann-Whitney U test analysis. The fifth section is the empirical study of logistic regression, and the final section offers conclusions.

2. LITERATURE REVIEW AND HYPOTHESIS ESTABLISHMENT

2.1. Two Types of Capital Reduction

Akhigbe and Madura (1996) show that liquidating firms believed to exhibit a higher liquidation premium (above market value) should experience more favorable announcement effects (Skantz and Marchesini, 1987). Huang and Lu (2003) pointed out that companies implementing cash refund capital reduction have large amounts of idle funds without short or medium term capital expenditure plans; thus, the account cash will remain abundant after capital reduction. Hence, capital reduction can help enhance a company's financial operations. According to the findings of Lin *et al.* (2009), cash refund capital reduction can enhance stock liquidity and quickly increase asset turnover to enhance the short-term operating performance.

With respect to stock repurchasing, Liang (2012) argued that the purpose of stock repurchase is to send a message to investors, as management believes the company stock price has been underestimated or has a promising future. According to the conclusions, stock repurchase can enhance company stock price (Easterbrook, 1984; Stephens and Weisbach, 1998; Chan *et al.*, 2004; Grullon and Michaely, 2004; Liu and Chen, 2010; Bargeron *et al.*, 2011; Chen *et al.*, 2011)

Bagwell and Shoven (1988) argued that, when the equity ratio of capital structure is believed to be relatively higher, the company can achieve the optimal financial leverage ratio by adjusting the capital structure through stock repurchase. Dittmar (2000) argued that company management will refund shareholders by stock repurchase in order to avoid agency problems.

Literature mainly focuses on the characteristics on one kind of capital reduction. This study is interested in exploring the differences in company financial characteristics or corporate governance in the case of a same company implementing both types of capital reduction in two different time periods. Therefore, this study proposes hypothesis 1, as follows:

H-1: The relevant financial variable characteristics of a same company are different in cases of adopting cash refund capital reduction and stock repurchase.

2.2. Bull and Bear Markets

Lee *et al.* (2006) and Lee and Wu (2007) found the trading behaviors of different types of investors are subject to the influences of bull and bear market status Maheu and McCurdy (2000).

Investors have different investment behaviors in bull and bear markets. The company policy will differ in cases of different investment environments. The selected method of capital reduction represents the company's viewpoints regarding the current market environment. If we study the differences of a same company adopting the measures of two types of capital reduction in a bull or bear market, the operating and financial characteristics of the company may be presented. Therefore, this study proposes hypothesis 2, as follows:

H-2: The relevant financial variable characteristics of a same company are different in cases of adopting cash refund capital reduction and stock repurchase in a bull or bear market.

2.3. Factors Affecting Capital Reduction

(Fama and French, 2001; King and Lenox, 2001; Konar and Cohen, 2001; Lin *et al.*, 2009) used Tobin's Q, sales margin profit, and rate of return (ROA) as the proxy variables of operating performance. Lin *et al.* (2009) argued that, after cash refund capital reduction, the nominal performance indicators, such as ROA, can be improved.

According to Jagannathan *et al.* (2000) and Brav *et al.* (2005) most companies prefer a stable dividend policy. If the company has a temporary cash flow, it will pay out by stock repurchase. Barclay and Smith (1988) argued that institutional investors prefer stock repurchase, as institutional investors can gain more advantageous information. Allen *et al.* (2000) argued that companies with a greater level of information asymmetry usually have lower foreign ownership. The company tends to communicate to investors through stock repurchase.

Grullon and Michaely (2004) found that newly established companies prefer a stock repurchase payout to shareholders, as stock repurchase combined with high earnings volatility are more flexible. Large and mature companies have begun to prefer stock repurchase.

After capital reduction, the debt ratio naturally increases. Whether the capital reduction strategy is related to the financial structural adjustment of the company? Dittmar (2000) pointed out that, a company will adjust leverage levels through stock repurchase in order to achieve the optimal capital structure. Chan *et al.* (2004) argued that the leverage level of a company implementing stock repurchase is usually lower than the industrial average. Moreover, the company will not propose to change the capital structure by stock repurchase.

According to Dunsby (1994) when management has the right of stock options, the company will often choose to provide management with the option of stock repurchase. Stock repurchase can avoid EPS dilution, due to the exercise of options. Hence, a greater privy ownership ratio is one of the incentives of stock repurchase.

From the perspective of corporate governance, whether the capital reduction decision is in line with the expectations of investors? Claessens *et al.* (2000) studied Asian nations with concentrated ownership, and argued the deviation of control rights and cash flow rights can create new agency problems between controlling shareholders and minority shareholders. This study explores the impact of capital reduction according to the relevant corporate governance variables.

This article studies the differences of corporate characteristics of a same company in the cases of two different capital reduction periods in a bear or bull market. Meanwhile, this study also examines whether these variables affect cash refund capital reduction or stock repurchase decisions, and thus, proposes Hypothesis 3 and Hypothesis 4, as follows:

H-3: Financial variables will affect the company's decision of adopting cash refund capital reduction or stock repurchase

H-4: Corporate governance variables will affect the company's decision of adopting cash refund capital reduction or stock repurchase

3. SAMPLE, BULL AND BEAR MARKETS

3.1. Data Source and Sample Description

The research samples are mainly composed of the companies listed in Taiwan Stock Exchange and OTC traded companies and these sample firms had announced cash refund capital reduction and stock repurchase. The sample period is from 2002 to 2010, due to the case of the Regent Hotel cash refund capital reduction in March 2002.

The samples of paired t test are companies that implemented both types of capital reduction. This study matched the same firm's data of the first case of cash refund capital reduction with the first case of stock repurchase, and matched the same firm's data of the first case of cash refund capital reduction and the second case of stock repurchase, et cetera. In summary, we collected 72 observations of 18 companies. Afterwards, the samples of capital reduction are further

distinguished by bear or bull market. As the four groups consist of small samples, we conducted the non-parametric Mann-Whitney U test to analyze the differences.

Subsequent reverse empirical studies will use Logistic regression to explore how different financial information or corporate governance variables affect managerial decisions to adopt cash refund capital reduction or stock repurchase. In summary, 37 companies announced the implementation of cash refund capital reduction, while 362 companies announced the implementation of stock repurchase. After deleting samples of finance-related industries and samples lacking data, this study collected 48 samples implementing cash refund capital reduction and 989 samples implementing stock repurchase. The process of cash refund capital reduction can take up to half or one year, we used the average quarterly data. The relevant data are taken from "Cmoney" Institutional Investment Decision-making Support System, Market Observation Post System (MOPS), and Taiwan Economic Journal (TEJ).

3.2. Distinguish a Bull or Bear Market

Fabozzi and Francis (1997) depicted bull and bear markets through market trends. In the settings of different days, the moving average (MV) is used to judge whether investments can achieve positive returns (Bessembinder and Chan, 1995; Hudson *et al.*, 1996; Sullivan *et al.*, 1999; Parisi and Vasquez, 2000; Chiarella *et al.*, 2006).

Through line graphs and MV lines, this study summarized the distribution of samples of cash refund capital reduction and stock repurchase during bearish and bullish time periods. By referring to Brock *et al.* (1992) and Chang and Lin (2010) when 5-day MV>10-day MV>24-day MV>72-day MV, it is defined as a bull market. When 5-day MV<10-day MV<24-day MV<72-day MV, it is defined as a bear market. Furthermore, we classified the samples as bear or bull markets according to Stochastics (KD indicators) to recheck.

Regarding Taiwan's stock market during the period of 2002 to 2010, there are 17 bear-bull market turning points, according to the above determination criteria, including 10 turning points from a bear market to a bull market. There are 7 turning points from a bull market to a bear market. It can be learnt from Table 1 that, among the 22 samples implementing cash refund capital reduction, 18 cases occurred in a bull market, accounting for 82%. In contrast, among the 50 samples implementing stock repurchase, 32 samples (64%) occurred in a bear market

Table-1. Frequencies of capital reduction of a same company in a bull or bear market

	Bullish	**Bearish**	**Frequencies of Capital Reduction**
Cash refund capital reduction	18 (82%) (50%)	4 (18%) (11%)	22 (100%)
Stock repurchase	18 (36%) (50%)	32 (64%) (89%)	50 (100%)
Total frequencies of capital reduction	36 (100%)	36 (100%)	72

3.3. Research Variables

The explanatory variables for the research include profitability ratio, liquidity ratio, structural ratio, corporate governance variables, and market value ratio, we illustrate as below:

The profitability ratio is represented by return on assets (ROA) before tax and earnings per share. The liquidity ratio is represented by Cash ([cash and cash equivalents] / [current assets]) and cash flow per share (CFPS: [net cash flow of business activities] / (at the time of capital reduction [capitalization]). The structural ratio is represented by debt ratio (Debt: total liabilities / total assets × 100%) and interest multiple (Interest: [(profit before tax) + (interest expenses)] / [interest expenses]). There are seven relevant corporate governance variables, including 1) foreign ownership (Foreign: [foreign ownership market value] / total market value × 100%); 2) ownership concentration (Concentrate: calculated by the Herfindahl index, with the addition of the square sum of the shareholding ratios of the top five shareholders); 3) cash flow rights (CFR is the sum of the ultimate controllers' direct shareholding ratio and the multiplication of the indirect shareholding ratios of various control chains); 4) control rights (CR is the sum of the ultimate controllers' direct shareholding ratio and the minimum indirect shareholding ratios of various control chains) (Claessens *et al.*, 2000). 5) board seat-control (Board: the seats of directors and supervisors are controlled by the final control / total seats of directors and supervisors); 6) privy ownership (Privy: shareholding ratio of director and supervisor, major shareholders, and manager); 7) equity pledge ratio (Pledge: pledge ratio of director, supervisor, and manager).

The market value ratio is represented by the market to book ratio, Tobin's Q ((equity market value + debt carrying value) / book value of total assets), and firm size (Size: Ln (market value)).

In Table 2. it is found from the average that, comparing with the period of implementing stock repurchase, the profitability (ROA, EPS), Cash, interest multiple (Interest), foreign ownership (Foreign), control rights (Concentrate, CR, Board), market to book ratio (M/B), Tobin's Q, and firm size (Size) are greater during the period of cash refund capital reduction. On the contrary, at the time of implementing stock repurchase, debt ratio (Debt), CFPS, cash flow rights (CFR), all privy ownership (Privy), and equity pledge ratio (Pledge) are greater.

4. PAIRED SAMPLE T TEST AND MANN-WHITNEY U TEST

In this section, paired sample t test is used to verify Hypothesis 1, namely, whether the company characteristics of the above five variables are significantly different when a same company implementing cash refund capital reduction and stock repurchase. Afterwards, we further divided the samples of two types of capital reduction by bull and bear markets to observe whether the company characteristics are significantly different at the two different periods of capital reduction. The second study selects Mann-Whitney U non-parametric testing to test Hypothesis 2. The observations are illustrated as follows:

Table-2. Descriptive statistics of major variables

Classifications	Variables	Cash Refund Capital Reduction		Stock Repurchase	
		Mean	Standard Deviation	Mean	Standard Deviation
Profitability	ROA (%)	2.189	1.826	0.670	2.028
	EPS	0.555	0.606	0.222	0.761
Liquidity	Cash (%)	33.002	26.545	22.066	17.890
	CFPS	-0.166	0.938	0.033	0.518
Structural	Debt (%)	27.739	15.206	33.438	15.764
	Interest	5.567	3.224	3.197	2.291
Corporate governance (%)	Foreign	15.302	17.237	7.887	11.643
	Concentrate	3.967	5.691	2.381	4.625
	CFR	14.067	12.127	16.930	46.459
	CR	14.061	11.934	12.259	11.142
	Board	34.980	19.887	32.669	18.590
	Privy	22.563	12.039	62.695	36.670
	Pledge	24.498	39.013	29.215	35.758
Market Value	M / B (%)	1.389	0.875	1.012	0.656
	Tobin's Q	10.764	7.764	7.069	4.278
	Size	18.225	1.805	17.403	1.480
N		48		989	

Table-3. Paired sample t test results of a same company

Classifications	CR - SR	Paired Sample t Test
Profitability	ROA (%)	0.492*** (3.259)
	EPS	0.115*** (3.808)
Liquidity	Cash (%)	4.614* (2.608)
	CFPS	-0.116 (-0.669)
Structural	Debt (%)	-3.093** (-2.264)
	Interest	1.042 (1.450)
Corporate governance (%)	Foreign	2.796** (2.510)
	Concentrate	0.000 (0.147)
	CFR	1.095 (0.817)
	CR	0.273 (0.221)
	Board	-1.350 (-1.000)
	Privy	-48.509*** (-14.931)
	Pledge	-6.902 (-0.623)
Market value	M / B (%)	0.163*** (3.559)
	Tobin's Q	1.667*** (3.951)
	Size	0.178*** (3.807)
N	72	

Notes: CR: Cash Refund Capital Reduction, SR: Stock Repurchase, Column 3 refers to the average of the differences of paired sample t testing, where the content in ( ) is the t value. ***, **, and * indicate a significance level at the 1%, 5%, 10%, respectively.

4.1. Profitability Indicators

According to the paired sample t test results of Table 3, without the distinction of a bear and a bull market, it is found that the profitability of a company implementing cash refund capital reduction is significantly greater than that at the time of stock repurchase. As shown in Table 4, after classifying two types of capital reduction by bull and bear markets, in a bull market, ROA and EPS are significantly greater than that at the time of implementing the stock repurchase.

Table-4. Mann-Whitney U test results of a same company

Classifications	CR - SR	Mann-Whitney U(bullish)	Mann-Whitney U(bearish)
Profitability	ROA (%)	SR：15.28 CR：21.72*	SR：17.80 CR：24.13
	EPS	SR：14.61 CR：22.39**	SR：17.95 CR：22.88
Liquidity	Cash (%)	SR：16.61 CR：20.39	SR：17.58 CR：25.88
	CFPS	SR：21.31 CR：15.69	SR：17.67 CR：25.13
Structural	Debt (%)	SR：16.61 CR：20.39	SR：19.11 CR：13.63
	Interest	SR：16.22 CR：20.78	SR：18.45 CR：18.88
Corporate Governance (%)	Foreign	SR：13.72 CR：23.28***	SR：17.89 CR：23.38
	Concentrate	SR：18.56 CR：18.44	SR：18.22 CR：20.75
	CFR	SR：19.22 CR：17.78	SR：17.67 CR：25.13
	CR	SR：19.11 CR：17.89	SR：17.70 CR：24.88
	Board	SR：19.39 CR：17.61	SR：18.02 CR：22.38
	Privy	SR：26.89*** CR：10.11	SR：20.31*** CR： 4.00
	Pledge	SR：10.50 CR：12.42	SR： 8.79 CR：12.00
Market Value	M / B (%)	SR：17.22 CR：19.78	SR：17.05 CR：30.13***
	Tobin’s Q	SR：17.22 CR：19.78	SR：17.08 CR：29.88***
	Size	SR：18.17 CR：18.83	SR：17.86 CR：23.63***
N		36	36

Notes: Columns 3 and 4 refer to the Mann-Whitney U test results of distinguishing bear and bull markets. The SR denotes the mean rank value of the non-parametric testing of variables when a company implements stock repurchase. The following CR refers to the mean rank value of the non-parametric testing of variables when a company implements cash refund capital

reduction. Significance is judged by the difference of the two mean rank values of capital reduction. For example, the CR: 21.72*, under the column of Mann-Whitney U (bullish), indicates the mean rank value of CR is significantly greater than that of the SR at 15.28. ***, **, and * indicate a significance level at the 1%, 5%, 10%, respectively.

4.2. Liquidity

According to Table 3 paired sample t test results, it is found that the Cash ratio of a company at the time of implementing cash refund capital reduction is significantly greater than that at the time of implementing stock repurchase, indicating the company prefers implementing cash refund capital reduction during a time of abundant cash flow inside the company.

4.3. Structural Ratio

According to Table 3, the debt ratio of a company is significantly lower at the time of implementing cash refund capital reduction, as compared to that of the time of implementing stock repurchase. The variance of the debt ratio is not significant in bullish or bearish periods.

4.4. Corporate Governance Variables

It shows from Table 3 and Table 4 that, regardless of the total samples or samples distinguished by bull or bear markets, the foreign ownership (Foreign) of a company at the time of implementing cash refund capital reduction is higher than that of the time of implementing stock repurchase. The privy ratio (Privy) of a company at the time of implementing stock repurchase is significantly higher than that at time of implementing cash refund capital reduction. The privy ratio at a time of stock repurchase is apparently higher. The greater ratio denotes management right stability. Moreover, stock repurchase must be completed within two months of the application, and insiders cannot trade stocks during this frozen period (Article 28-2, the Securities and Exchange Act). The regulation of this mechanism is one of the causes for the higher ratio.

4.5. Market Value

In summary of Table 3 and Table 4, regardless of the total sample or samples classified by bear or bull markets, when implementing cash refund capital reduction, the M / B, Tobin's Q, and firm size are significantly greater than those at the time of implementing stock repurchase, especially in a bearish market. This indicates a company does not implement cash refund capital reduction because there is no investment opportunity. The testing results are not significant during bullish time periods, indicating companies implementing cash refund capital reduction can better highlight their excellent financial performance characteristics during a bear market.

In summary, regardless of a bear or bull market, when implementing cash refund capital reduction, corporate profitability, liquidity, firm value, and growth opportunity are better than those at the time of implementing stock repurchase. In addition, the debt ratio (financial risk) is significantly lower than that at the time of implementing cash refund capital reduction. It can also

find that the foreign ownership is relatively higher. Therefore, we support Hypothesis 1 and also support Hypothesis 2.

The above discussions are to explore the company characteristics of a same company in the cases of implementing two types of capital reduction. Below offers reverse verification to study how managerial decision-making, regarding the selection of cash refund capital reduction or stock repurchase, are affected under different financial characteristics and corporate governance mechanisms.

5. LOGISTIC REGRESSION MODEL ANALYSIS

In the empirical Logistic regression, the samples include all the companies implementing cash refund capital reduction or (and) stock repurchase.

5.1. Co-Linearity Test

First, this study conducted Pearson correlation test on variables. A few variables, such as ROA and EPS (correlation coefficient 0.684), EPS and Tobin's Q (0.6), foreign ownership and firm size (0.67), and cash flow rights and control rights (0.524) are found as correlated to a medium level. However, since each variable has a substantially different meaning, they remain in the study. Next, we used the Variance Inflation Factor (VIF) test, as proposed by Chatterjee *et al.* (2000) to test the co-linearity of the independent variables. The VIF of all variables is below 10; therefore, there is no co-linearity between the variables, and they will input into the Logistic regression model as explanatory variables.

Logistic regression analysis has two purposes, one is to obtain the independent variables with significant explanatory power, and the second is to obtain the variable probability values to predict the possible implementation of the two decisions of cash refund capital reduction or stock repurchase. When the regression model dependent variable $Y_{i,j}$ is 1, company j will implement cash refund capital reduction; when $Y_{i,j}$ is 0, company j will implement stock repurchase, and the model is as follows:

$$Y_{i,j} = \beta_0 + \beta_1 \text{ ROA} + \beta_2 \text{ EPS} + \beta_3 \text{ Cash} + \beta_4 \text{ CFPS} + \beta_5 \text{ Debt}$$

$$+ \beta_6 \text{ Interest} + \beta_7 \text{ Foreign} + \beta_8 \text{ Concentrate} + \beta_9 \text{ CFR}$$

$$+ \beta_{10} \text{ CR} + \beta_{11} \text{ Board} + \beta_{12} \text{ Privy} + \beta_{13} \text{ Pledge}$$

$$+ \beta_{14} \text{ Tobin's Q} + \beta_{15} \text{ Size} + \beta_{16} \text{ Market} + \beta_{17} \text{ Industry} + \varepsilon_i$$

$\boldsymbol{\beta_0}$ is the constant, $\boldsymbol{\beta_i}$ is the coefficient of the independent variables, ε_i is error term of the No. i observation value.

5.2. Empirical Analysis Results

The regression analysis results are as shown in Table 5. The empirical results are summarized below: For profitability, no matter what regression model, ROA has a significantly positive impact on the cash refund capital reduction decision, suggesting better profitability can lead to a higher

possibility of implementing cash refund capital reduction. In Models (2) and (4), EPS has a weak negative significance, suggesting companies with greater EPS tend to implement stock repurchase. In the regression analysis, no matter what model, companies with greater CFPS tend to implement stock repurchase.

According to the regression results, the structural ratio is not significant, indicating that capital structure is not the major factor affecting the selection of capital reduction. This is in line with the results of the Mann-Whitney U test. The results confirm the findings of Chan *et al.* (2004) that companies are not likely to change capital structure by stock repurchase.

For corporate governance-related variables, the coefficients of foreign ownership are positive, and are significantly positive in Models (1) and (3). The results suggest that higher foreign ownership can lead to more opportunities for companies to implement cash refund capital reduction. The variable difference analysis of Table 3 and Table 4 suggest that, the foreign ownership of companies implementing cash refund capital reduction is higher than that at the time of implementing stock repurchase.

In regression models (2) and (4), the privy pledge ratio shows a slight negative significance, indicating that a higher equity pledge ratio can result in the higher probability of selecting stock repurchase. The previous sample statistics pointed out that 84% of cases of stock repurchase occurred in a bear market. During economic recession, stock prices fall dramatically. In general, banks will require more collateral, which will result in personal financial distress of stakeholders. Once the stakeholders are released from the pledge, they must sell stocks that cause a further drop in stock price. Hence, when the stock price is relatively low, stock repurchase at a lower cost can raise stock price and help inside privy stakeholders to stabilize their wealth level. Furthermore, from the literature, the market reaction of stock repurchase is positive; it can create a win-win situation.

With respect to market value, the coefficient of Tobin's Q is not significant, suggesting that company growth does not affect decision making regarding capital reduction. Companies during bullish (bearish) times are more likely to implement cash refund capital reduction (stock repurchase), which is in line with the descriptive sample statistical results.

Among all the models, ROA and CFPS (cash flow per share) are key variables affecting the selection of the types of capital reduction. When the company ROA is greater, the company can refund all shareholders with redundant capital. When there is excessive cash for operations, the company is more flexible to repurchase company shares.

Variance analysis and regression analysis are most consistent in profitability performance ROA and foreign ownership, as both are higher at time of the company implementing cash refund capital reduction, and are the two major factors affecting capital reduction, in particular, ROA. The above results support Hypothesis 3 and Hypothesis 4.

Table-5. The Logistic regression analysis

Variables	Models(1)	Models (2)	Models (3)	Models (4)
ROA (%)	0.634*** (12.310)	0.580*** (11.041)	0.641*** (12.649)	0.573*** (11.141)
EPS	-0.723 (1.683)	-0.798* (2.967)	-0.705 (1.628)	-0.795* (3.217)
Cash (%)	0.005 (0.374)	0.003 (0.150)	0.008 (0.828)	0.006 (0.502)
CFPS	-0.732*** (8.321)	-0.967*** (11.800)	-0.768*** (8.807)	-1.013*** (12.782)
Debt (%)	-0.015 (1.139)	-0.012 (0.740)	-0.016 (1.255)	-0.013 (0.820)
Interest	0.000 (0.325)	0.000 (0.143)	0.000 (0.292)	0.000 (0.155)
Foreign (%)	0.028* (3.321)	0.022 (1.957)	0.030** (3.896)	0.024 (2.497)
Concentrate (%)	0.020 (0.311)	0.031 (0.655)	0.017 (0.232)	0.028 (0.525)
CFR (%)	-0.067 (0.454)	-0.058 (0.379)	-0.069 (0.469)	-0.068 (0.414)
CR (%)	0.076 (0.562)	0.062 (0.425)	0.081 (0.616)	0.079 (0.534)
Board (%)	-0.000 (0.000)	0.005 (0.175)	-0.001 (0.006)	0.004 (0.110)
Privy (%)	0.015 (0.165)	0.043 (1.155)	0.018 (0.251)	0.048 (1.430)
Pledge (%)	-0.007 (1.681)	-0.010* (2.800)	-0.008 (1.946)	-0.011* (3.292)
Tobin's Q	-0.019 (0.205)	0.018 (0.183)	-0.018 (0.192)	0.027 (0.426)
Size	0.046 (0.095)	0.084 (0.306)	0.045 (0.097)	0.095 (0.425)
Market		2.894*** (30.644)		2.974*** (31.003)
Industry			-0.488 (1.730)	-0.707* (3.233)
Constant	-4.307* (3.014)	-7.306*** (7.953)	-4.074* (2.833)	-7.303*** (8.453)
N	1,037	1,037	1,037	1,037
χ^2	64.592***	116.709***	66.279***	119.879***

Note: The dependent variable Y is 1, if company implements cash refund capital reduction; otherwise, Y is 0, companies implement stock repurchase. The regression analysis include four models, considering the market effect and industry effect, where the content in ( ) is the Wald test value. ***, **, and * indicate a significance level at the 1%, 5%, 10%, respectively.

6. CONCLUSIONS

For this study, we use the companies listed in Taiwan and OTC traded companies as samples. This study offers variable difference analysis of financial and corporate governance related variables of one company implementing cash refund capital reduction and stock repurchase, during different time periods with considerations of bull or bear markets. Conversely, we used the Logistic regression model to analyze how financial and corporate governance variables can affect companies in selecting cash refund capital reduction or stock repurchase.

According to statistics, companies are more likely to conduct cash refund capital reduction in a bullish market period and stock repurchase in a bear market. The profitability, future growth, and cash liquidity of the company at the time of implementing cash refund capital reduction are better than those at the time of implementing stock repurchase. The debt ratio is relatively lower when a company implements cash refund capital reduction, suggesting the company is more likely to adopt cash refund capital reduction at a time of lower financial risks. When company implements cash refund capital reduction, foreign ownership is apparently higher than that at a time of implementing stock repurchase. The privy ownership at the time of implementing stock repurchase is significantly higher.

The regression results show that, the greater ROA and foreign ownership, the company is more likely to adopt cash refund capital reduction. The higher CFPS, EPS, and equity pledge ratio, the company is more likely to implement stock repurchase. Among all models, ROA and CFPS are the key variables affecting the implementation of both types of capital reduction.

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