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Do Firms Announcing Cash Refund Capital Reductions have Investment Value?

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Abstract

Cash refund capital reduction is a unique financial tool used by listed firms in Taiwan. This study investigates announcements of cash refund capital reductions to explore two topics. First, we examine the short-term, mid-term, and long-term buy-and-hold excess returns after the announcement. The results indicate that no excess returns are seen in the short and mid-term, whereas long-term excess returns are positive and statistically significant. Second, we investigate the critical determinants of long-term excess return. The findings suggest that if a firm announces a cash refund capital reduction becomes more attractive to investors, the firm shall accompany with reduced firm size, reduced capital expenditure ratio, and improved return on equity (ROE) and an increased debt ratio.

Keywords: Cash refund capital reduction; buy and hold; excess returns; ROE
***JEL* code**: G10, G14, G30, G32, G34, G35

I. Introduction

Cash refund capital reduction is a unique financial tool used by listed firms in Taiwan. According to article 168 of the Company Act, a firm may cancel its shares through the approval of shareholders' meeting. Meanwhile, a firm reducing its capital shall return share prices to shareholders in cash. For instance, on October 22, 2002, Formosa International Hotels Corporation became the first company to conduct a cash refund capital reduction program in Taiwan. After the 50% capital reduction, shareholders reduced their shares in hand by half while the firm simultaneously refunded half of the par value of NTD5 per share to shareholders.[1] In addition, the stock price was adjusted from NTD19.6 to NTD29.2 per share. For each shareholder, the shares in hand were reduced by half, but the total wealth was unchanged[2]. For firms conducting cash refund capital reduction programs, the total capital (i.e., stockholders' equity) is downsized to half of the original capital by refunding cash (half of the par value) to shareholders after this program.

Because a firm's equity capital decreases during a cash refund capital reduction program, the financial reports linked with equity capital, such as return on equity (ROE), can be improved. In addition, companies returning internal cash to shareholders can avoid manager waste free cash flow and thus reducing agency problems between shareholders and managers (Jensen and Meckling, 1976; Jensen, 1986). However, conducting a cash refund capital reduction may also imply that the internal cash of the company greatly exceeds what is needed for the company's growth, industry integration, or operation. In other words, the cash cannot be effectively used to improve performance because growth opportunities for the company no longer exist and its prospects in the industry are worrisome.

Based upon, companies convey two different signals to investors while announcing cash

[1] The par value of the stock is NTD10 per share.
[2] Before conducting the reduction program, the total wealth was NTD19.60 for each shareholder with one share. After the capital reduction, this shareholder received NTD5 per share and the capital invested in the firm was NTD14.6 per share (29.2 × 0.5); the total wealth is the same as before the reduction.

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refund capital reductions. On one hand, they convey a positive signal regarding the improvement of financial reports. On the other hand, they may also convey a negative signal that the company no longer possesses further growth momentum. Therefore, we are interested in investigating the reactions of stock prices after announcements of cash refund capital reduction.

Past literatures regarding price behavior after announcements of cash refund capital reduction are rare for two main reasons. First, foreign studies have been unable to provide any relevant empirical evidence or theoretical framework regarding cash refund capital reduction due to inadequate real or actual practice of adopting capital reduction in security markets outside Taiwan. Second, although Taiwan's Company Act has allowed firms to conduct cash refund capital reduction programs since 2002, few companies have engaged in this practice. Hence, scholars have done little relevant research on these programs.

To our knowledge, only a few current studies in Taiwan have examined the market reaction to cash refund capital reduction. Lin and Chen (2011) find that companies announcing cash refund capital reduction experience significantly positive abnormal returns on the announcement day and the day after the announcement, whereas the response is insignificant two days afterward. Wang and Hsiao (2013) find that companies announcing cash refund capital reduction tend to gain significantly positive cumulative abnormal returns (CARs) from the announcement day to seven trading days afterward.

Although the literature mentioned above explores the market reaction to cash refund capital reduction in Taiwan, the observations of these studies are quite limited[3] and mainly concentrate on short-term market reactions. Since the first case in 2002, close to 70 cases of cash refund capital reduction have occurred, meaning that more cases are available for investigation today compared with the previous studies. The increased number of samples means that the empirical results of our study shall be more solid and robust.

In addition to following the previous research investigating short-term stock price behavior, this study investigates two other topics. First, we explore the short-term, mid-term, and long-term investment values of firms announcing cash refund capital reductions. We utilize the buy-and-hold strategy to investigate the short-term, mid-term, and long-term excess returns of firms announcing cash refund capital reduction[4]. Observing the buy-and-hold excess returns in different time windows enables us to capture the price behaviors of firms that announce cash refund capital reductions. Discovering the price behaviors of the middle and long-term reactions of stock prices helps investors realize the long-term investment value of announcing firms. The relevant literature includes no investigations related to long-term market reactions.

Second, this study further investigates the determinants of abnormal returns after the announcement of cash refund capital reduction. We investigate the cross-sectional factors that affect short-term, mid-term, and long-term post-announcement excess returns, such as firm-specific characteristics and financial statements. Understanding the critical determinants

[3] Lin and Chen (2011) applied 39 observations from 2002 to 2009, and Wang and Hsiao (2013) adopted 40 observations from 2002 to the end of 2009.
[4] This study defines a short-term holding period as not over one month. The announcement effect is also included in the short-term period. A holding period of one-quarter to one-half year is defined as middle term, whereas a long-term holding period is defined as one year

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of stock price behaviors of firms with cash refund capital reductions helps investors make better investment decisions regarding stock portfolio management and in turn increase their investment returns.

The empirical results show that the short and mid-term buy-and-hold excess returns are statistically insignificant for firms announcing cash refund capital reductions. This indicates that no investment value is seen in the short and mid-terms. The excess returns are positive and statistically significant in the long-term, which indicates that investors should buy and hold announcing firms up to one year post-announcement. Accordingly, we next examine the critical determinants with regard to long-term buy-and-hold excess returns. The results reveal that changes in the company size and capital expenditure ratio have significantly negative effects on long-term buy-and-hold excess returns. Conversely, changes in ROE and debt ratio have significantly positive influences on long-term buy-and-hold excess returns. The ratio of cash refund capital reduction, however, is unrelated to long-term buy-and-hold excess returns. The findings suggest that a firm conducting cash refund capital reduction program will become more attractive to investors if the firm reduces firm size, reduces capital expenditure ratio, improves ROE, and increases debt ratio.

The rest of the paper is organized as follows. Section II discusses the methodology and data used in the study. Section III presents the empirical results of the study. Section IV presents the conclusions.

II. Methodology and Data

II.1. Methodology

The most common methods used in the previous studies to estimate abnormal returns are the event study and the buy-and-hold strategy. The event study is mainly used to investigate short-term reactions to a certain event, whereas the buy-and-hold strategy is mainly utilized to investigate long-term phenomena. In addition, Blume and Stambaugh (1983) and Conrad and Kaul (1993) indicate that using the event study method to estimate CARs would easily lead to biased results. Estimating CARs through the buy-and-hold strategy is more accurate. Barber and Lyon (1997) note that the advantages of the buy-and-hold strategy are that it can truly reflect both the actual experiences of investors who hold stock and the effects of mixed months, which are ignored in the event study method.

Because this study investigates the short-, mid-, and long-term investment values of companies announcing cash refund capital reductions, we estimate excess returns using the buy-and-hold strategy. The measurement of excess returns is based on a comparison with matched firms that do not announce cash refund capital reductions. Therefore, we match observations of each announcing firm with observations of a non-announcing firm with a very similar size, industry, and market-to-book value. We first sort universe-listed firms based on their market values one fiscal quarter prior to the announcement. The universe stocks are then sorted into 10 portfolios based on each firm's market values. The announcing firms could be sorted into any one of the 10 portfolios. Then, the matched firm is selected; it should be in the same industry as the announcing firm and with a similar market-to-book ratio (MTB)[5].[6] Most importantly, the matched firm must not have announced a cash refund

[5] Table A1 of appendix in this study presents the information of the matched-firm selected based on firm size (SIZE), industry (IND), and market to book ratio (MTB).

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capital reduction within the last year. The excess return (*ER*) of the buy-and-hold strategy for each sample firm is calculated as follows:

$$ER^{i}(t,T) = \left[\prod_{t}^{T}(1 + r_t^{i}) - \prod_{t}^{T}(1 + r_t^{im})\right]$$

where r_t^i is the raw return on firm *i* on day *t*, r_t^{im} is the raw return on the matched firm *i* for day *t*, *t* represents the initial day of the event relative to the announcement date, and *T* represents the last day of the event. Then, the portfolio excess return (*AER*) of the buy-and-hold strategy is the average of $ER^i(t, T)$:

$$AER(t,T) = \frac{1}{n}\left(\sum_{i=1}^{n} ER^{i}(t,T)\right)$$

where *n* equals the number of sample firms in the event period with available returns.

The announcement day for a cash refund capital reduction is defined as the event day, i.e., day 0. The observed event periods cover the following days: (−1, −20), (−1, −2), (0, +1), (0, +2), (0, +20), (0, +60), (0, +120), and (0, +240). Specifically, the windows (−1, −20) and (−2, −1) show the buy-and-hold abnormal returns prior to the announcement day and are used to check for any information leakage regarding the cash refund capital reduction program. The short-term reactions after the announcement are observed from the event periods (0, +1), (0, +2), and (0, +20). The event periods (0, +60) and (0, +120) show the mid-term responses, and the long-term reactions are revealed from the event period (0, +240).

II.2 Data Source

The samples for the study are firms listed on the Taiwan Stock Exchange Corporation (TWSE) and GreTai Securities Market (GTSM) that conducted cash refund capital reductions from January 2002 to December 2011[7]. Our initial sample includes 70 announcements of firms adopting cash refund capital reductions. We exclude the delisted companies and companies with incomplete financial data. Ultimately, we obtain a final sample comprising 57 announcements made by 45 firms. All the data used in this study are taken from the Taiwan Economic Journal (TEJ), which is a prominent data vendor in Taiwan.

III. Empirical Analysis

III.1. Summary Statistics

In this section, we conduct annual and industry analyses on the sample firms that announced cash refund capital reductions. Formosa International Hotels Corporation, a TWSE-listed company, announced a cash refund capital reduction in 2002, becoming the first company to do so in Taiwan. Following this announcement, the trend of listed companies adopting cash refund capital reductions began. However, in the initial phase, only a few companies conducted cash refund capital reduction programs and returned their internal cash to their shareholders. As illustrated in Table 1, the number of cash refund capital reduction cases in each year between 2002 and 2006 is one, one, one, three, and four, respectively. This indicates that companies generally do not use cash refund capital reductions as a primary

[6] Table A1 of the appendix in this study presents information on the matched firms selected based on firm size (SIZE), industry (IND), and market-to-book ratio (MTB).
[7] Cash refund capital reduction cases first appeared in 2002 in Taiwan.

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means of financial operation before 2007, possibly because of the continuously booming economy during the first five years[8].

Refer Table 1

During this boom period, firms enjoyed sustained earnings and considerable investment opportunities. To retain internal funds for future investment, companies rarely conducted cash refund capital reductions.

Table 1 shows the dramatic increase in the number of companies conducting cash refund capital reduction programs after 2007. The total number of cases during this period accounts for 80% of the total sample. This high number of cases could be due to the economic recession caused by the subprime mortgage crisis in the United States in 2007 and the EMU sovereign-debt crisis in Europe in 2009[9]. During the recession period, the growth momentum of companies disappeared. They faced drastic reductions in investment opportunities, which result in higher levels of cash holdings. To increase the efficiency of cash holdings, companies became more prone to return their idle funds in the form of cash to their shareholders.

We further categorize the sample companies into different industries, as illustrated in Table 2. Table 2 indicates that the 57 samples included 41 (71.93%) TWSE-listed companies and 16 (28.07%) GTSM-listed companies that conduct cash refund capital reduction programs. This indicates that more TWSE-listed companies adopted cash refund capital reductions and that these companies, in general, are larger in size than GTSM-listed companies. The above results imply that larger companies are more inclined to adopt cash refund capital reductions.

Of all industries, the electronics industry conduct cash refund capital reduction programs most frequently. The companies that announced cash refund capital reduction programs include 30 (73.17%) TWSE-listed electronics companies and 9 (56.25%) GTSM-listed electronics companies, which together account for over two-thirds of the total sample. In fact, the industrial structure of Taiwan is dominated by the electronics industry, and more than half of the listed companies belong to the electronics industry. Therefore, the samples are mostly clustered in the electronics industry.

Refer Table 2

In addition, electronics companies prefer to distribute their earnings via stock dividends[10], which could lead to dramatic increases in their capital. Once the economy declined, the

[8] The economic data indicates that, during the five years, Taiwan's economic growth rate is 5.26% in 2002, 3.67% in 2003, 6.19% in 2004, 4.70% in 2005, and 5.44% in 2006. Meanwhile, the annual return of Taiwan Stock Exchange Capitalization Weighted Stock Index (TAIEX) is -22.057% in 2002, 27.992% in 2003, 4.140% in 2004, 6.444% in 2005, and 17.795% in 2006.

[9] In the middle of 2007, the U.S. financial crisis, which was triggered by subprime mortgages, spread around the world, causing a devastating global financial crisis. The EMU sovereign-debt crisis followed the U.S. financial crisis. The EMU crisis was induced by Greece; it then spread to other highly indebted European countries such as Italy, Ireland, Portugal, and Spain, resulting in the standstill and depression of global economies. Taiwan's economic growth rate fell from 5.98% in 2007 to 0.73% in 2008 and even entered a recession in 2009 (−1.81%). The annual return of the TAIEX also fell from 8.365% in 2007 to −61.666% in 2008.

[10] Generally, two types of dividend payments occur in Taiwan: cash dividends and stock dividends. The former involves distributing dividends to shareholders in the form of cash, and the latter involves distributing dividends

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excessively increased capital diluted the companies' earnings, resulting in a rapid decline in their financial performances. This, coupled with inadequate investment opportunities, meant that the electronics companies therefore tended to return their idle funds to their shareholders and reduce their firm size to improve their financial reports.

III.2 Market Response to Cash Refund Capital Reduction

Table 3 represents the buy-and-hold excess returns of the sample firms that announce cash refund capital reductions. To observe the short-, mid-, and long-term buy-and-hold abnormal returns, the study uses the event windows *AER*(0, +1), *AER*(0, +2), and *AER*(0, +20) to observe the short-term excess returns; the event windows *AER*(0, +60) and *AER*(0, +120) to observe the mid-term excess returns; and the event window *AER*(0, +240) to observe the long-term excess returns. We also present the results from before the companies' announcements to determine the possibility of information leakage before the event day. The study uses the event windows *AER*(−2, −1) and *AER*(−20, −1) to observe the buy-and-hold abnormal returns two days and one month prior to the announcement day.

The results show that the 20-day pre-announcement buy-and-hold return is −0.530% for announcing firms and −2.199% for non-announcing firms. The difference between them is 1.699%, which is statistically insignificant. It seems that no information leakage occurs prior to the announcement. We further narrow our event period to a two-day excess return. The results show that the two-day pre-announcement buy-and-hold excess return is 2.333%, which is statistically significant; this indicates that information leakage occurs prior to the announcement of cash refund capital reductions in Taiwan. In other words, when the announcement day is close, the possibility of prior information leakage exists.

Refer Table 3

We further examine firms' investment values after announcing cash refund capital reductions. The excess returns for *AER*(0, +1) and *AER*(0, +2) are 0.143% and 0.200%, respectively, and are not significant[11], suggesting that no announcement effect is present. In addition, the 20-day buy-and-hold return is 1.701% for announcing firms and 3.508% for firms in the benchmark portfolio. The difference between them is −1.807%, which is statistically insignificant. This indicates that investors are unable to obtain short-term buy-and-hold abnormal returns from announcing firms, leading to a lack of short-term investment value.

The mid-term buy-and-hold excess returns, including *AER*(0, +60) and *AER*(0, +120), are all insignificant. This implies that investors cannot make any positive buy-and-hold abnormal returns from firms announcing cash refund capital reductions even if they hold the shares for one quarter or one half of a year. Finally, the one-year buy-and-hold return is 6.061% for announcing firms and −3.941% for firms in the benchmark portfolio. The excess return is

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to shareholders in the form of additional shares in the company. Cash dividends are immediate returns on capital for shareholders, whereas stock dividends give shareholders a chance to gain greater returns on capital (if the share prices increase, stockholders can earn greater capital gains). However, this payment method increases the total equity in the market circulation, thereby diluting the equity of other shareholders who receive cash dividends.

[11] This study also adopts the market model of the event study method to estimate two-day cumulative abnormal returns (CARs). The estimated results are consistent with the results of buy-and-hold abnormal returns (i.e., there is no announcement effect).

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10.001%, which is statistically significant; this indicates that investors cannot obtain excess profit from firms conducting cash refund capital reductions unless they hold the stock for at least one year after the announcement.

It is interesting to find that firms conducting cash refund capital reduction have long-term investment value, whereas it is not the case in the short- and mid-term. As mentioned previously, companies announcing cash refund capital reductions convey two signals to investors. One refers to the improvement of financial reports, and the other is connected with companies losing further growth momentum. Therefore, it may take a longer time for individual investors to weigh the pros and cons between the improvement of financial reports and the loss of further growth momentum. Unless the improvement of financial reports has been recognized, the market regards the announcement of cash refund capital reductions as a neutral signal. This results in insignificant short- and mid-term investment values.

III.3 Analysis of the Factors of Long-term Buy-and-hold Returns

The aforementioned findings indicate that investors should hold the shares of announcing firms for about one year to obtain positive excess returns. We therefore are interested in investigating the critical determinants of long-term buy-and-hold excess returns. The model is constructed as below:

$$AER(0,+240) = \alpha + \beta_1 TECH_i + \beta_2 CDR_i + \beta_3 \Delta SIZE_i + \beta_4 \Delta ROE_i + \beta_5 \Delta CAP_i + \beta_6 \Delta LEV_i + \beta_7 \Delta CDV_i + \beta_8 \Delta FCF_i + \varepsilon_i$$

where $AER(0, +240)$ denotes the one-year buy-and-hold excess return and *TECH* denotes a dummy variable for the electronics industry that takes the value of 1 for the electronics industry and 0 for other industries. The statistical distribution of the samples in Table 2 indicates that the electronics industry accounted for more than half of the samples. Hence, this industry is set as the variable to observe price behavior. *CDR* denotes the ratio of the cash refund capital reduction, which is measured as the ratio of the number of cancelled shares to the number of shares outstanding. A larger ratio of reduction may imply more improvement in the financial statements, but it also implies a lack of investment opportunities. Thus, *CDR* can be positive or negative in relation to abnormal returns. Δ denotes changes to the variable in the year of the announcement (t) and the year previous to the announcement (t-1). *CAP* denotes the capital expenditure ratio, which is defined as the ratio of the fixed capital expenditure to the average book value of total assets. The capital expenditure ratio represents a company's investment opportunity. When the capital expenditure ratio is higher, a company will have more investment opportunities (and vice versa). Companies with no investment opportunities may gain positive market responses if they adopt cash refund capital reduction. This suggests a negative relationship between the capital expenditure ratio and the investment value of companies announcing cash refund capital reductions.

Firm size, denoted by *SIZE*, is measured by the natural logarithm of a company's market value. *ROE* denotes the return on equity and is the ratio of earnings to total equity. *LEV* denotes the debt ratio, which is defined as the ratio of total liability to total assets. Generally, conducting a cash refund capital reduction can reduce the firm size and adjust a company's financial structure, thus enhancing its profitability. Through the above three variables, we observe whether the abnormal returns of announcing firms are related to changes in the firm's size, financial structure, and profitability. *CDV* denotes the cash dividend yield and is

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defined as the percentage of cash dividends to stock prices. Firms are believed to be financial healthy if they can pay out more cash dividends while conducting a cash refund capital reduction program. Therefore, a higher cash dividend yield may receive positive feedback from the market. The free cash flow ratio, denoted by *FCF*, is the ratio of the difference between cash flow from operations and cash flow from investments to total assets. Free cash flow is the amount of funds that can be arbitrarily used by managers. The literature suggests that more free cash flow tends to lead to agency problems between the shareholders and managers. Therefore, it is expected that reducing free cash flow convey favorable information to the market and generates positive abnormal returns. ε_t denotes the residual. Table A2 shows a detailed description of the construction of all variables used in this model.

Refer Table 4

Before performing a regression examination, it is worth noting whether the magnitudes of some of the regression coefficients are important and whether multicollinearity exists among the independent variables. To check if some of the variables are highly correlated, we use the Pearson correlation coefficient test between the variables. As illustrated in Table 4, the result indicates a correlation coefficient of 0.525 between changes in *SIZE* and changes in *ROE*, which is statistically significant at the 1% level. This suggests that once the company size in the current year has increased compared to the previous year, the *ROE* in the current year will also increase compared to the previous year. In addition, changes in company size and changes in the cash dividend yield are highly and negatively correlated with a correlation coefficient of −0.671, which is statistically significant at the 1% level. This implies that if the company size increases in the current year compared to the previous year, the cash dividend yield will decrease in the current year.

Although other significant correlation coefficients between variables are seen in Table 4, they are not specifically discussed in the study because they are not particularly high. The purpose of Table 4 is to stress the probability of multicollinearity problems when we conduct the ordinary least squares (OLS) regression analysis. Table 4 indicates that some of the variables may be highly correlated. Thus, it is appropriate to evaluate the effects of multicollinearity among variables of interest. A common technique for evaluating the effects of multicollinearity among the regressors is the variance inflation factor (VIF). Because the results of the VIF tests in Table 5 are less than 10, multicollinearity does not pose a problem in interpreting our results.

Refer Table 5

Table 5 demonstrates the regression analysis results of the determinants of long-term buy-and-hold excess returns. The coefficient of *TECH* is 0.046 but is not significant, indicating that although electronics firms comprised a major portion of companies announcing cash refund capital reductions, the long-term buy-and-hold excess returns are irrelevant to whether the firms are in the electronics industry. In addition, the ratio of reduction is not correlated with long-term abnormal returns because the coefficient for the ratio of cash refund capital reduction is −0.004 but is insignificant. Lin and Chen (2011) and Wang and Hsiao (2013) find that the ratio of cash refund capital reduction has a significantly positive effect on short-term CARs. Their findings suggest that the ratio of cash refund capital reductions is informative to investors in the short run. However, our findings are based on long-term analysis and could lead to a different conclusion. If the announcement of the reduction ratio conveys a firm's internal information, the market reaction would occur around the

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announcement day, and the intensity of the reaction would decay over time. Therefore, our finding that the ratio of cash refund capital reduction is not correlated with long-term buy-and-hold excess returns is reasonable and does not contradict previous studies.

Moreover, the findings reveal that changes in company size, ROE, capital expenditure ratio, and debt ratio can explain the long-term buy-and-hold excess return. Specifically, the coefficient of company size is −0.664, which is statistically significant, indicating that a decrease in firm size will raise the long-term buy-and-hold abnormal returns. The result implies that investors believe that it is important for companies to conduct cash refund capital reduction programs and reduce their firm size to enhance future development. In addition, a significant and negative correlation is seen between changes in the capital expenditure ratio and long-term abnormal returns. In other words, when the capital expenditure ratio in the current year is less than it is the previous year, the long-term buy-and-hold abnormal returns will increase. This implies that investors will give positive feedbacks to announcing firms that are short of future investment opportunities.

The effects of changes in ROE and changes in the debt ratio on long-term buy-and-hold abnormal returns are both positive and significant. The coefficients for changes in ROE and changes in the debt ratio are 0.019 and 0.014, respectively. These indicate that after companies announce cash refund capital reductions, the increased ROE and debt ratio will raise long-term stock prices. An increase in the company's liability ratio implies that the ROE, which uses total equity as the denominator, will increase. The results of these two variables indicate that the increases in ROE and adjustment of capital structures for firms conducting cash refund capital reduction programs are of great concern to investors.

Overall, the regression results show that changes in company size and changes in the capital expenditure ratio negatively impact on long-term buy-and-hold excess returns. Conversely, changes in ROE and the debt ratio are positively correlated with long-term buy-and-hold excess returns. However, the cash refund capital reduction ratio is not linked with long-term buy-and-hold excess returns. In general, the main purpose for a firm to conduct a cash refund capital reduction is to improve its financial reports by reducing its capital. We find that investors identify with companies conducting cash refund capital reduction strategies and especially prefer firms with reduced company size, reduced capital expenditure ratios, improved ROE, and increased debt ratios after an announcement.

IV. Conclusions

Cash refund capital reduction is gradually becoming an important financial tool adopted by TWSE- and GTSM-listed firms in Taiwan. By investigating the announcement of cash refund capital reduction programs, this study explores the short-, mid-, and long-term buy-and-hold excess returns of announcing firms. The results indicate that investors should hold the announcing firms over the long term to obtain positive buy-and-hold excess returns. Second, this study investigates the determinants of long-term excess returns. The results indicate that changes in company size and the capital expenditure ratio negatively affect long-term buy-and-hold excess returns. Conversely, changes in the ROE and the debt ratio positively affect long-term buy-and-hold excess returns. This result indicates that if a firm announcing a cash refund capital reduction becomes more attractive to investors, the firm shall accompany with reduced firm size, reduced capital expenditure ratio, and improved return on equity (ROE and an increased debt ratio. The aforementioned regression analysis seems to be consistent with the objectives of cash refund capital reduction programs. In general, a company's purpose in implementing a cash refund capital reduction program is to improve its financial reports by

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reducing capital size. This study indeed finds that announcing firms will be more favored by investors and will enjoy higher excess returns if the firms decrease company sizes and capital expenditure ratios and increase debt and ROEs after the reduction program.

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Table 1: Descriptive statistics by year

Year	Number	%	*CDR* (%)	*TAIEX* (%)	*Growth* (%)
total	57	100.000	24.928	2.4214	4.491
2002	1	1.754	50.000	-22.057	5.260
2003	1	1.754	30.000	27.992	3.670
2004	1	1.754	10.000	4.140	6.190
2005	3	5.263	23.017	6.444	4.700
2006	4	7.018	51.670	17.795	5.440
2007	13	22.807	22.889	8.365	5.980
2008	9	15.789	27.404	-61.666	0.730
2009	9	15.789	16.461	57.854	-1.810
2010	7	12.281	20.467	9.148	10.720
2011	9	15.789	24.883	-23.801	4.030

CDR is the ratio of cash refund capital reduction which is measured by the ratio of the number of cancelled shares to the number of shares outstanding. *TAIEX* is the annual return of Taiwan Stock Exchange Capitalization Weighted Stock Index. *Growth* is the annual growth rate of GDP in Taiwan.

Table 2: Descriptive statistics by industry

Industry	TWSE	GTSM	TOTAL	%	No. of Firms	*CDR*(%)
Total	41	16	57	100.00	45	24.928
Textile	2	0	2	3.509	1	9.691
Electric Machinery	0	1	1	1.754	1	30.000
Chemical	2	1	3	5.263	3	21.667
Glass & Ceramic	1	0	1	1.754	1	10.000
Electronics	30	9	39	68.421	32	25.135
Shipping & Transportation	0	4	4	7.018	1	20.000
Tourism	2	1	3	5.263	2	52.391
Financial & Insurance	1	0	1	1.754	1	20.000
Trading & Consumers Goods	1	0	1	1.754	1	30.000
Others	2	0	2	3.509	2	14.525

TWSE denotes Taiwan Stock Exchange Corporation, and GTSM is GreTai Securities Market. *CDR* is the ratio of cash refund capital reduction which is measured by the ratio of the number of cancelled shares to the number of shares outstanding.

Table 3: Buy and hold return and excess return

Period	Window	*BNHRC* (%)	*BNHRB* (%)	*AER* (%)
Pre-announcement				
	(-20,-1)	-0.530	-2.199	1.669 (1.334)
	(-2,-1)	1.249	-1.084	2.333* (1.844)
Post-announcement				
Short-term	(0,+1)	0.874	0.732	0.143 (0.362)
	(0,+2)	0.874	0.634	0.240 (0.463)
	(0,+20)	1.701	3.508	-1.807 (-0.927)
Mid-term	(0,+60)	1.878	1.616	0.261 (0.102)
	(0,+120)	-1.628	-1.242	-0.386 (-0.101)
Long-term	(0,+240)	6.061	-3.941	10.001** (2.063)

BNHRC is the buy and hold return for firms announcing cash refund capital reduction. *BNHRB* is the buy and hold return for benchmark firms ◦ *AER* is the buy and hold excess return and is measured by the difference between *BNHRC* and *BNHRB*. "**" and "*" indicate significance at the 5 and 10 percent levels, respectively.

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Table 4: Pearson correlation coefficients

	CDR	Δ SIZE	Δ ROE	Δ CAP	Δ LEV	Δ CDV
Δ SIZE	0.253					
	(0.058)					
Δ ROE	0.181	0.525				
	(0.178)	(0.000)				
Δ CAP	0.191	0.130	0.164			
	(0.155)	(0.334)	(0.224)			
Δ LEV	0.333	0.001	0.165	0.060		
	(0.011)	(0.994)	(0.221)	(0.658)		
Δ CDV	0.176	0.671	0.186	0.231	0.049	
	(0.190)	(0.000)	(0.166)	(0.083)	(0.719)	
Δ FCF	0.036	0.011	0.120	0.004	0.232	0.053
	(0.792)	(0.937)	(0.376)	(0.979)	(0.083)	(0.693)

CDR is measured by the ratio of the number of cancelled shares to the number of shares outstanding. *SIZE* is measured by the natural logarithm of a company's market value. *ROE* is measured by the ratio of earnings to total equity. *CAP* is defined as the ratio of the fixed capital expenditure to the average book value of total assets. *LEV* is defined as the ratio of total liability to total asset. *CDV* is defined as the percentage of cash dividends to stock prices. *FCF* is the ratio of the difference between cash flow from operation and cash flow from investment to total assets. Δ denotes the changes of the variable in the current year of the announcement (t) and the previous year of the announcement (t-1). Numbers in parentheses are p-value.

Table 5: Determinants of long-term buy and hold excess returns

$$AER_i(0,+240) = \alpha + \beta_1 TECH_i + \beta_2 CDR_i + \beta_3 \Delta SIZE_i + \beta_4 \Delta ROE_i + \beta_5 \Delta CAP_i + \beta_6 \Delta LEV_i + \beta_7 \Delta CDV_i + \beta_8 \Delta FCF_i + \varepsilon_i$$

Independent variables	Depend variable: AER (0,+240)			
	Anticipated results	coefficients	t-statistics	VIF
α	?	0.118	0.977	NA
TECH	?	0.046	0.404	1.483
CDR	+	-0.004	-1.444	1.634
Δ SIZE	-	-0.664	-2.698***	2.846
Δ ROE	+	0.019	2.904***	2.738
Δ CAP	-	-0.009	-3.016***	1.922
Δ LEV	?	0.014	1.923*	2.503
Δ CDV	+	-0.001	-0.137	2.100
Δ FCF	-	0.001	0.438	2.807
R^2 = 23.745%				
Adj-R^2 = 11.036%				
F-statistics = 1.868*				

AER is the long-term buy and hold excess return. *CDR* is measured by the ratio of the number of cancelled shares to the number of shares outstanding. *TECH* is a dummy variable that takes the value of 1 for electronic firms and 0 otherwise. *SIZE* is measured by the natural logarithm of a company's market value. *ROE* is measured by the ratio of earnings to total equity. *CAP* is defined as the ratio of the fixed capital expenditure to the average book value of total assets. *LEV* is defined as the ratio of total liability to total asset. *CDV* is defined as the percentage of cash dividends to stock prices. *FCF* is the ratio of the difference between cash flow from operation and cash flow from investment to total assets. Δ denotes the changes of the variable in the current year of the announcement (t) and the previous year of the announcement (t-1). Variance inflation factor (VIF) is used to check the possibility of multicollinearity. All reported t-statistics (Two-tailed) are corrected for heteroskedasticity using the White (1980) algorithm. "***", "**", and "*" indicate significance at the 1, 5, and 10 percent levels, respectively.

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Appendix

Table A1: The information for firms announcing cash refund capital reduction and benchmark companies

Announcement	Cash refund capital reduction			Benchmark companies		
date	Company	SIZE	MTB	Company	SIZE	MTB
2010/6/17	NIEN HSING TEXTILE CO., LTD.	9.299	0.92	LI PENG ENTERPRISE	9.216	1.58
2011/6/15	NIEN HSING TEXTILE CO., LTD.	9.454	1.07	LEALEA ENTERPRISE CO.,LTD	9.424	1.34
2007/5/15	SESODA CORPORATION	8.170	1.05	SINON CORPORATION	8.206	0.81
2007/6/25	HOCHENG CORPORATION	8.701	0.99	CHAMPION BUILDING MATERIALS CO.,LTD.	8.537	1.40
2007/1/11	LITE-ON TECHNOLOGY CORP.	11.761	2.13	ACER INCORPORATED	11.976	2.21
2007/6/11	UNITED MICROELECTRONICS CORP.	12.809	1.32	MediaTek Inc.	12.816	6.17
2007/6/8	D-LINK CORPORATION	10.560	2.9	CyberTAN Technology Inc.	10.038	5.44
2010/6/18	TAIWAN MASK CORP.	8.413	1.04	GTM CORPORATIPN	8.386	1.29
2008/3/14	SOLOMON TECHNOLOGY CORP.	8.922	1.31	TOPCO SCIENTIFIC CO.,LTD.	9.004	2.33
2009/5/21	SOLOMON TECHNOLOGY CORP.	7.567	0.46	AUDIX CORPORATION	7.629	0.52
2007/6/13	KYE SYSTEMS CORP.	9.202	2.36	DFI Inc.	9.134	3.35
2008/6/13	KYE SYSTEMS CORP.	9.182	1.93	DFI Inc.	9.071	2.94
2007/1/18	Realtek Semiconductor Corp	10.756	2.37	SILICONWARE PRECISION INDUSTRIES CO.,LTD.	11.904	2.62
2006/12/8	SUNPLUS TECHNOLOGY CO.,LTD.	10.383	1.88	VIA TECHNOLOGIES, INC.	10.432	1.99
2007/6/15	Chunghwa Telecom Co., Ltd	13.337	1.59	Compal Communications, Inc.	10.951	5.18
2008/8/14	Telecom Co., Ltd	13.528	1.85	AU Optronics Corp.	12.836	1.18
2009/6/19	Telecom Co., Ltd	13.305	1.55	TAIWAN MOBILE CO., LTD.	12.138	3.83
2010/6/18	Telecom Co., Ltd	13.308	1.61	Far EasTone Telecommunications Co., Ltd.	11.727	1.79
2009/6/19	unitech computer co., ltd.	7.938	0.98	Promate Electronic Co.,Ltd.	7.912	0.95
2006/6/9	RALEC ELECTRONIC CORPORATION	8.088	1.03	Teapo Electronic Corporation	7.959	0.91
2010/6/15	PHIHONG TECHNOLOGY CO., LTD.	9.328	1.77	HannStar Board Corp.	9.384	1.26
2008/6/13	STARK TECHNOLOGY, INC.	8.234	1.06	TRADE-VAN INFORMATION SERVICES CO.	8.078	1.45
2010/6/17	HANPIN ELECTRON CO., LTD.	7.377	0.99	UNIFORM INDUSTRIAL CORP.	7.371	1.87
2005/6/24	LONG BON INTERNATIONAL CO.,LTD	8.616	0.74	Great China Metal Ind. Co., Ltd	8.654	1.19
2002/6/11	FORMOSA INTERNATIONAL HOTELS CORPORATION	9.057	1.77	THE LEOFOO DEVELOPMENT CO., LTD.	8.012	0.62
2006/10/5	FORMOSA INTERNATIONAL HOTELS CORPORATION	9.873	4.27	THE AMBASSADOR HOTEL,LTD.	9.320	1.6
2009/6/19	China Bills Finance Corporation	9.411	0.60	UNION BANK OF TAIWAN	9.322	0.64
2008/6/13	Collins Co., Ltd.	8.387	1.00	Les enphants Co.,Ltd.	8.265	1.65
2007/6/15	TAIWAN MOBILE CO., LTD.	12.085	2.05	Compal Communications, Inc.	10.951	5.18
2011/6/15	TAIWAN MOBILE CO., LTD.	12.480	5.52	Far EasTone Telecommunications Co., Ltd.	11.873	2.08

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2008/6/13	Spirox Corporation	8.596	1.32	Promate Electronic Co.,Ltd.	8.569	1.75
2011/4/15	STATS ChipPAC Taiwan Semiconductor Corp.	8.601	1.36	TAIWAN SEMICONDUCTOR CO., LTD.	8.748	1.36
2011/6/17	RoyalTek Company Ltd.	7.830	1.57	Universal Microwave Technology,Inc.	7.713	2.59
2008/10/21	ELITE ADVANCED LASER CORPORATION	7.298	0.88	HANPIN ELECTRON CO., LTD.	7.278	0.82
2007/6/15	EXCELSIOR MEDICAL CO.,LTD	8.653	2.54	Apex Biotechnology Corp.	8.366	4.35
2010/5/28	PACIFIC HOSPITAL SUPPLY CO., LTD.	8.498	5.35	BIOTEQUE CORPORATION	8.165	2.92
2007/10/18	GOLDEN FRIENDS CORPORATION	8.453	1.06	FINE BLANKING & TOOL CO., LTD	8.511	3.43
2007/6/12	Far EasTone Telecommunications Co., Ltd.	11.889	2.06	Compal Communications, Inc.	10.951	5.18
2011/6/24	TAINET COMMUNICATION SYSTEM CORP.	7.081	1.30	GLOBALSAT WORLDCOM CORPORATION	7.048	1.34
2011/6/22	Cyberlink Co.,	9.272	2.12	SYSTEX CORPORATION	9.288	0.83
2007/5/30	Penpower Technology LTD.	7.063	2.70	HYWEB TECHNOLOGY CO., LTD.	7.093	3.69
2005/6/22	SYNTEK SEMICONDUCTOR CO.,LTD.	8.247	1.11	Episil Technologies Inc.	8.161	0.76
2011/11/30	Myson Century, Inc.	7.146	1.10	SYNTEK SEMICONDUCTOR CO.,LTD.	7.200	1.11
2011/6/22	GALLANT PRECISION MACHINING CO., LTD.	8.113	1.13	LIGITEK ELECTRONICS CO.,LTD	8.093	1.96
2003/4/29	CHUNG LIEN TRANSPORTATION CO., LTD	7.971	0.86	Dimerco Express Corporation	6.943	1.29
2004/4/16	CHUNG LIEN TRANSPORTATION CO., LTD	8.120	1.25	Dimerco Express Corporation	6.974	1.24
2005/6/10	CHUNG LIEN TRANSPORTATION CO., LTD	8.307	1.60	Dimerco Express Corporation	6.968	1.14
2006/6/6	CHUNG LIEN TRANSPORTATION CO., LTD	8.236	1.28	Dimerco Express Corporation	7.147	1.21
2010/4/28	Hotel royal chihpen	7.045	1.65	The Landis Taipei Hotel Co., Ltd	7.454	2.29
2009/6/16	SYSAGE THCHNOLOGY CO., LTD	6.833	0.57	SYSCOM COMPUTER ENGINEERING CO.	6.686	0.54
2008/6/13	FULLERTON TECHNOLOGY CO., LTD.	7.966	0.75	BILLION ELECTRIC CO., LTD.	7.732	1.41
2009/6/19	ADE-VAN INFORMATION SERVICES CO.	7.940	1.24	104 CORPORATION	7.747	2.27
2008/6/13	SYSTEX CORPORATION	9.210	0.67	Cyberlink Co.,	9.565	3.4
2009/6/19	Professional Computer Technology Limited	7.357	0.74	Sunfar Computer Co., Ltd	7.283	1.42
2009/8/28	E-LIFE MALL CORPORATION	8.420	1.72	WT MICROELECTRONICS CO., LTD.	8.278	0.67
2009/6/22	PRINCO CORP.	7.974	0.35	GALLANT PRECISION MACHINING CO., LTD.	7.796	0.79
2010/6/17	HOLIDAY ENTERTAINMENT CO.,LTD	8.474	1.65	TAIWAN SAKURA CORPORATION	8.705	1.92

We match each announcing firm observation with a non-announcing firm that has a very similar size, industry and market to book value. We first sort universe listed firms based on their market values one fiscal quarter prior to the announcement. The universe stocks are then sorted into 10 portfolios based on each firm's market values. The announcing firms could be sorted into any one of the 10 portfolio. Then, the matched firm is selected if it is in same industry with the announcing firm and has similar market to book ratio (MTB) to the announcing firm. Most important of all, the matched-firms must have never announced or not announced cash refund capital reduction within one year.

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Table A2: Variable Definition

Variables	Abbreviation	Description
The ratio of cash refund capital reduction	*CDR*	The ratio of the number of cancelled shares to the number of shares outstanding.
Firm size	*SIZE*	The natural logarithm of a company's market value
Dummy variable for the electronics industry	*TECH*	It takes the value of one for electronic firms and 0 otherwise.
Return of equity	*ROE*	The ratio of earnings to total equity
Capital expenditure ratio	*CAP*	The ratio of the fixed capital expenditure to the average book value of total assets
Debt ratio	*LEV*	The ratio of total liability to total asset
Cash dividend yield	*CDV*	The percentage of cash dividends to stock prices
Free cash flow ratio	*FCF*	The ratio of the difference between cash flow from operation and cash flow from investment to total assets