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ANNOUNCEMENT EFFECT OF CASH DIVIDEND CHANGES AROUND EX-DIVIDEND DAYS：EVIDENCE FROM TAIWAN

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ABSTRACT

Dividend policy has been a puzzle in corporate finance for many decades. So far, the dividend policy continues to be a puzzle in the strategic firm development process. This paper studied the effect of ex-dividend date for cash-dividend policy in the Taiwan Stock Exchange (TWSE) from 2001 to 2012. We try to demonstrate the existence of abnormal returns by examining stock trading situations before and after the ex-dividend date. We discovered the cumulative abnormal returns ratio reached 2.07% during the 10 days before and after the ex-dividend date. This paper further analyzes whether firms adopting cash-dividend changes have different abnormal returns on stock price performance depending on different variables. We discovered the average abnormal return ratio of the group with a cash dividend increase was 1.96%. The average abnormal return ratio of the group with a cash dividend decrease was 0.48%. Moreover, we analyze whether different industries impact cumulative abnormal return ratios. Finally, we discuss whether the cumulative abnormal return ratios were different before and after financial crisis.

JEL: G12, G14

KEYWORDS：Cash Dividend, Abnormal Returns, Event Study

INTRODUCTION

Dividend policy has been a puzzle in corporate finance for many decades. So far, the dividend policy continues to be a puzzle in the strategic firm development process. Elton and Gruber (1970) discovered the decrease of stock prices on the ex-dividend date was smaller than the total amount of the stock dividends paid out. This finding led to a body of literature examining stock price changes on ex-dividend dates. According to the dividend-signaling hypothesis, cash dividends function as a good signaling vehicle of a firm's future cash flow, thus implying that unanticipated dividend changes should be accompanied by share price changes in the same direction. Yilmaz and Gulay (2006) used data from the Istanbul Stock Exchange (ISE) from 1995 to 2003. They discovered that, due to the payout of cash dividends, stock prices before and after ex-dividend dates showed an increasing tendency. The decreasing range of the stock price was smaller than the amount of the dividends paid out, resulting in significant abnormal returns.

Taiwan stock market is one of the most important capital markets in Asia. The Taiwan Stock Exchange was founded in 1962. It has a history of about 50 years, and has developed from manual settlement to fully computerized operations today. The Taiwan stock market not only activates capital movements but also enables firms in Taiwan to acquire the funds needed for expansion. The complete stock market was a key factors leading to the economic expansion of Taiwan in the 1960s.

In the past, the majority of listed firms and investors in Taiwan valued stock dividends. However, stock dividends lead to equity inflation, and dilute the earnings. Moreover, a preference for cash dividend exists in the current market. The percentage of listed firms adopting cash-dividend payouts has shown a significant

increase across all the listed firms. In 2001 it topped 10% for the first time, reaching 14.73%. Since then, the percentage has increased year by year, topping 50% in 2011. That is to say, one in every two firms now adopts the dividend policy of cash payouts. The cash dividend policy is a more important subject in Taiwan This paper studies the effect of ex-dividend date for cash-dividend policy. We try to prove the existence of abnormal returns by examining stock trading situations before and after the ex-dividend date. In Taiwan, if an investor buys the stock of a firm who adopts a cash-dividend payout at the closing price 11 days before the ex-dividend date, and sells them at the closing price 10 days after the ex-dividend date, the investor will obtain an average of about 2.07% abnormal returns, regardless of the transaction cost. We also investigate any difference in the investment behavior of investors with respect to the cash dividend changes in the Taiwan Stock Exchange (TWSE) from 2001 to 2012. We discovered the average abnormal return ratio of the group with a cash dividend increase was 1.96%. The average abnormal return ratio of the group with a cash dividend decrease was 0.48%. We conclude cumulative abnormal return ratios of the two groups is different. Moreover, we analyze whether different industries impact cumulative abnormal return ratios. And we discuss whether the cumulative abnormal return ratios were different before and after financial crisis.

The rest of this paper proceeds as follows. The next section provides a literature review of the subject of this study. Next, we describe data and methodology. Empirical results are presented in the following section. The final section is conclusions and some closing remarks.

LITERATURE REVIEW

Despite the rich literature on the overall issue of dividend policy and its relation to firm value. The dividend policy continues to be a puzzle in the strategic firm development process. Many researchers have investigated stock price reactions to announcements and implementations of various types of dividend payments, as well as the ex-dividend date behavior of stock prices. Ofer and Siegel (1987) believed that changes in dividends reflected the prediction in changes of earnings. DeAngelo (1992) pointed out that when a firm anticipated it would have stable cash flow in the future, it would tend to pay out cash dividends.

Much literature has pointed out that dividend declaration is accompanied by positive abnormal returns. For example, Miller and Rock (1985), and Allen et al. (2000) both considered the payout of dividends as positive information, while Guay and Harford (2000) proved that stock prices had a positive response to the declaration of cash dividends. Milonas et al. (2006) analyzes the ex-dividend day stock price behavior in the Chinese stock market. The findings from non-taxable stocks show that their price, on the ex-dividend day, falls by an amount that is not statistically different from the dividend. For the taxable sample, stock prices of small dividend yield stocks fall proportionally to the dividend paid. For the large dividend yield stocks, the price adjustment depends on the effective tax rate on dividend income. The overall findings are consistent with the tax hypothesis.

Elton and Gruber (1970) discovered the decrease of stock prices on the ex-dividend date was smaller than the total amount of the stock dividends paid out. This finding led to a body of literature examining stock price changes on ex-dividend dates. They believed this phenomenon occurred because the capital gains tax was higher than the tax on dividends. However, Pettit (1972) pointed out that a significant price increase follows announcements of dividend increases, and a significant price drop follows the announcement of cash dividend decreases whether the earnings performance was positive or negative. Aharony et al. (1980) discover that shareholders of firms announcing cash dividend increases realize positive abnormal returns and shareholders of firms decreasing cash dividends sustained negative abnormal returns during the 20 days surrounding the announcement day. Divecha and Morse (1983) show that the announcement effect of the cash dividend increases is positive.

Frank and Jagannathan (1998) drew a different conclusion from their study on the Hong Kong stock market. Both dividends and capital gains in Hong Kong are duty free. Under such a circumstance, according to the

theory of the burden of taxation effectiveness, there should be no abnormal returns on ex-dividend dates. However, empirical evidence showed there were positive abnormal returns on ex-dividend dates, which were almost irrelevant to the amount of the stock dividends. Additionally, Bali and Hite (1998) studied the New York Stock Exchange (NYSE) and American Stock Exchange (ASE). They also discovered that, on ex-dividend dates, the decrease in stock prices was unequal to the dividends paid out.

Fehrs et al. (1988) discovered that on declaration dates, there was a significantly positive (negative) relationship between the returns and the increase (decrease) in dividends. The stock price response was directly correlated with the increase in dividends earned. Michaely et al. (1995) used materials from the NYSE and the ASE to study market responses to firms starting to pay out dividends and firms stopping dividends. They found that short-term stock price responses of firms stopping cash dividends were stronger than that for firms starting to pay cash dividends. Yilmaz and Gulay (2006) used materials from the Istanbul Stock Exchange (ISE) from 1995 to 2003. They discovered that, due to the payout of cash dividends, stock prices before and after ex-dividend dates showed an increasing trend. The decreasing stock price range was smaller than amount of dividends paid out and there exists significant abnormal returns.

Chen et al. (2009) used a sample of cash dividend changes from all listed A-share firms in China during the period from 2000 to 2004 to investigate the announcement effect of cash dividend changes and examine whether the dividend-signaling hypothesis holds in China's stock markets. The results indicate that the announcement of cash dividend changes has a positive influence on share prices, but only partly support the dividend-signaling hypothesis. The study also found that there is no great dissimilarity between the announcement effects of cash dividend changes for different stock markets in China. Yahyaee et al. (2011) show that announcements of dividend increases are associated with increased stock prices, while announcements of dividend decreases cause decreases in stock prices. Firms that do not change their dividends experience insignificant negative returns. These results contradict tax-based signaling models, which argue that higher taxes on dividends relative to capital gains are a necessary condition for dividends to be informative.

Xingzhi Kang (2013) used the sample from the securities listed and traded on the New York Stock Exchange and NASDAQ to research the impact of cash dividend announcement on the stock price. The results suggest that the average abnormal return and the average cumulative abnormal return, which are surrounding the event date, are not significantly equal to zero. In addition, Yang and Wu (2014) used a sample from all listed firms in Taiwan during the period from 2001 to 2011 to investigate the announcement effect of cash dividend. Finds that abnormal returns exist for listed Taiwan firms before and after the ex-dividend date. This paper further analyzes whether firms adopting cash-dividend payouts have different abnormal returns depending on three dimensions of cash-dividend payout ratio, stock trading turnover rate, and the firm size. The results indicate that there was insufficient evidence to show that the cumulative abnormal return ratios had any differences.

DATA AND METHODOLOGY

This paper retrieved the data on dividend policies of all listed firms from 1990 to 2012 from the Taiwan Economic Journal (TEJ) database. We studied the dividend payout situations for each firm during this period. We discovered that the percentage of listed firms paying out cash dividends was increasing year by year. This percentage topped 10% in 2001, and 50% by 2011.

This study used daily data to examine whether the dividend policy of paying out only cash dividends, adopted by listed firms, had an influence on stock prices. Related information on the dividend policies of listed firms from 2001 to 2012 was collected, and adjusted data on the closing prices was used to carry out an analysis on the anomaly of prices. The researchers tried to examine whether firms paying out just cash dividends showed abnormal price performances? If there were abnormal situations, then investors could

use this anomaly to carry out arbitrage trades.

Firstly, with respect to data screening, this study covered daily data on prices for the ten trading days before and after the ex-dividend dates. The stocks selected conformed to the following criteria 1.) In the same year, only cash dividends are paid out. There were no stock dividends, capital increase, capital decrease or stock settlement, 2.) Data on trading prices 10 days before and 10 days after ex-dividend dates (expressed by [-10, + 10]) were complete, 3.) The cash-dividend payout is conducted only once a year.

The event study criteria was used to analyze samples screened out by the above rules to verify the existence of the ex-dividend date effect. The concept of abnormal returns, or so called excess returns, was used to examine the cash-dividend policy of listed firms, and whether there was a significant influence on stock prices.

The abnormal return $AR_{i,t}$ of stock *i* in period *t* was defined as the difference between the return $R_{i,t}$ of the stock and the market return M_t.

$$\therefore\ AR_{i,t} = R_{i,t} - M_t \tag{1}$$

Return $R_{i,t}$ of stock *i* in period *t* was defined as:

$$R_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}} \tag{2}$$

Where $P_{i,t}$ and $P_{i,t-1}$ stand for the adjusted stock prices of the stock *i* in period *t* and *t-1* , respectively.

Additionally, the market return Mt has similar definition. This paper adopted the Market Index as the base for the market return. According to the above definition, the following mean abnormal return AR_t of stocks *n* in period *t* was obtained:

$$AR_t = \sum_{i=1}^{n} AR_{i,t} / n \tag{3}$$

With respect to the stocks of *n* firms, the cumulative mean abnormal returns (CMAR) for 10 days before and after the ex-dividend date could be expressed as follows:

$$CMAR_t = \sum_{t=-10}^{10} AR_t \tag{4}$$

EMPIRICAL RESULTS

A survey of the cash dividend policies adopted by listed firms in Taiwan revealed that from 1990 to 2012, the number of firms paying out only cash dividends showed an increasing trend from year to year. In 1990, the number of firms paying out cash dividends represented 2.01% of all listed firms, with the number increasing to 51.67% by 2012 as shown in Table 1. In 2001, the percentage topped 10% for the first time. As the method of cash dividend payout is widely used by listed firms in Taiwan, there is a strong motivation to examine abnormal returns for the trading stocks of firms adopting a cash-dividend policy.
There were 2,785 firms paying out only cash dividends from 2001 to 2012. Excluding firms without complete data, the samples includes 2,695 firms. These samples were collected from firms paying out cash

dividends during the 12 years from 2001 to 2012. The objective is to determine if abnormal returns exist as a result of ex-dividends.

Table 1： Percentage of Firms Paying Out Only Cash Dividends for All Listed Firms from 1990 to 2012

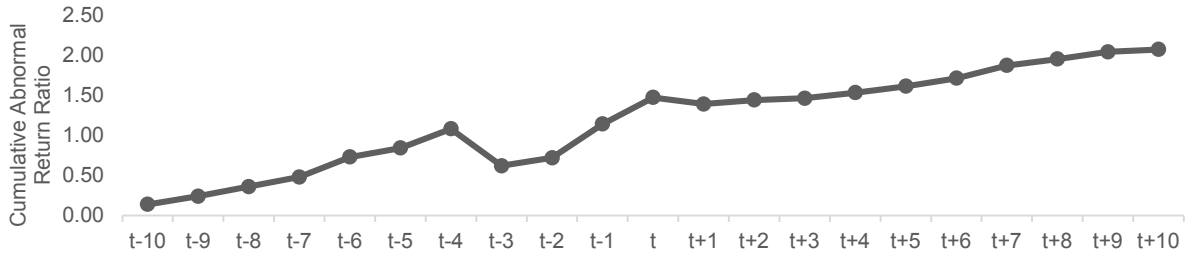
Year	The Total Number of Listed Firms	The Number of Firms Paying out Cash Dividends	Percentage
1990	199	4	2.01%
1991	221	14	6.33%
1992	256	12	4.69%
1993	285	12	4.21%
1994	313	11	3.51%
1995	347	19	5.48%
1996	382	8	2.09%
1997	404	9	2.23%
1998	437	17	3.89%
1999	462	22	4.76%
2000	531	52	9.79%
2001	584	86	14.73%
2002	638	113	17.71%
2003	669	115	17.19%
2004	697	135	19.37%
2005	691	163	23.59%
2006	688	188	27.33%
2007	698	199	28.51%
2008	718	228	31.75%
2009	741	335	45.21%
2010	758	377	49.74%
2011	790	428	54.18%
2012	809	418	51.67%

This table shows the number of firms paying out just cash dividends from 1990 to 2012. The results show an increasing tendency year by year. In 1990, the number of firms paying out cash dividends represented 2.01% of all listed firms, with the number increasing to 51.67% by 2012.

The Study of Abnormal Return Ratios during the Event Session

Next, we examine abnormal return ratios 10 days before and after the ex-dividend date, as well as on the actual ex-dividend date. During the time period of these 21 days, the 2,695 sample firms were preliminarily examined. We discovered the cumulative abnormal return ratio reached 2.07%. In other words, if an investor bought the stock 11 days before the ex-dividend date at the closing price, carried them, and then sold them 10 days after the ex-dividend date at the closing price, the investor could achieve an average excess return ratio of 2.07% as shown in Figure 1.

Figure 1： Cumulative Abnormal Return Ratio during the Event Session



This figure shows cumulative abnormal return ratios 10 days before and after the ex-dividend date, as well as on the actual ex-dividend date. During this 21 day time period, the 2,695 sample observations were preliminarily examined. The results show the cumulative abnormal return ratio reached 2.07%. t stands for ex-dividend date. Figures on the vertical axis stand for cumulative abnormal return ratios with the unit of %.

Second, the event session was divided into three parts for examination. We discovered the cumulative abnormal return ratio for the 10 days before the ex-dividend date was 1.14%, the abnormal return ratio on

the ex-dividend date was 0.33%, and the cumulative abnormal return ratio of the 10 days after the ex-dividend date was 0.60%. The abnormal return ratio for holding the stocks before the ex-dividend date was almost twice that for holding them after the ex-dividend date.

Finally, the abnormal return ratio for each day of the event session was tested. Results show significant abnormal return ratios on the dividend dates of the 10th, 8th, 7th, 6th, 4th, 3rd, 2nd days and the day before the ex-dividend date as show in Table 2.

Table 2： Analysis of Abnormal Return Ratios before and after Ex-dividend Date

Session$_t$	AR Mean (%)	*t*-Statistic	CMAR (%)
−10	0.14	2.427 **	0.14
−9	0.10	1.353	0.24
−8	0.12	1.985 *	0.36
−7	0.12	2.110 *	0.48
−6	0.25	5.638 ***	0.73
−5	0.11	1.530	0.84
−4	0.24	5.584 ***	1.08
−3	-0.46	-16.342 ***	0.62
−2	0.10	2.031 *	0.72
−1	0.42	3.771 ***	1.14
0	0.33	5.120 ***	1.47
+1	-0.08	-1.960 *	1.39
+2	0.05	0.922	1.44
+3	0.02	0.475	1.46
+4	0.07	1.184	1.53
+5	0.08	1.694	1.61
+6	0.10	2.042 *	1.71
+7	0.16	2.178 *	1.87
+8	0.08	1.516	1.95
+9	0.09	1.290	2.04
+10	0.03	0.503	2.07

*This table shows the abnormal return ratio for each day of the event session. Results show the significant abnormal return ratios on the ex-dividend date and occurred on the 10th, 8th, 7th, 6th, 4th, 3rd, 2nd days and the day before the ex-dividend date. ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.*

The Analysis of Abnormal Return Ratios with Cash-dividend Changes

We discovered the cumulative abnormal return ratio reached 2.07% above analysis. In other words, if an investor bought the stock 11 days before the ex-dividend date at the closing price, carried them, and then sold them 10 days after the ex-dividend date at the closing price, the investor could achieve an average excess return ratio of 2.07%.

According to the dividend-signaling hypothesis, published by Miller and Modigliani, cash dividends function as a good signaling vehicle of a firm's future cash flow, thus implying that unanticipated dividend changes should be accompanied by share price changes in the same direction. Therefore, we further analyze whether firms adopting cash-dividend changes have different abnormal returns on stock price. If a corporation with pure cash dividend in two years. We compare the cash dividend with the next year and classify these firms into two groups (with a cash dividend increase and a cash dividend decrease). We try to discover the influences of cash dividend changes on the cumulative abnormal returns of the stock price.

This paper tries to prove the existence of abnormal returns by examining stock trading situations before and after the ex-dividend date. Here we classify the firms into cash dividend increase and cash dividend decrease. The Market Index Adjustment Model of analyzing abnormal returns of stock prices was adopted. Then we analyze the data for abnormal returns before and after the ex-dividend date. The cumulative abnormal return

ratios classification by cash dividend changes for each year are presented in Table 3. The average abnormal return ratios and the cumulative abnormal return ratios during the event session [- 10, + 10] are presented in Table 4 and Figure 2. We discovered the average abnormal return ratio of the group with a cash dividend increase was 1.96%. The average abnormal return ratio of the group with a cash dividend decrease was 0.48%.

Table 3: Cumulative Abnormal Return Ratios Classification by Cash Dividend Changes for Each Year

Year	Cumulative Abnormal Return Ratio [−10，+10] Cash Dividend Decrease Group	Unit: % Cash Dividend Increase Group
2002	-1.93	-2.55
2003	-1.11	3.43
2004	1.80	0.90
2005	2.03	3.65
2006	3.13	4.85
2007	-0.28	0.94
2008	2.19	3.26
2009	-0.34	2.18
2010	-1.67	1.77
2011	1.67	0.97
2012	-0.18	2.16
Average	**0.48**	**1.96**

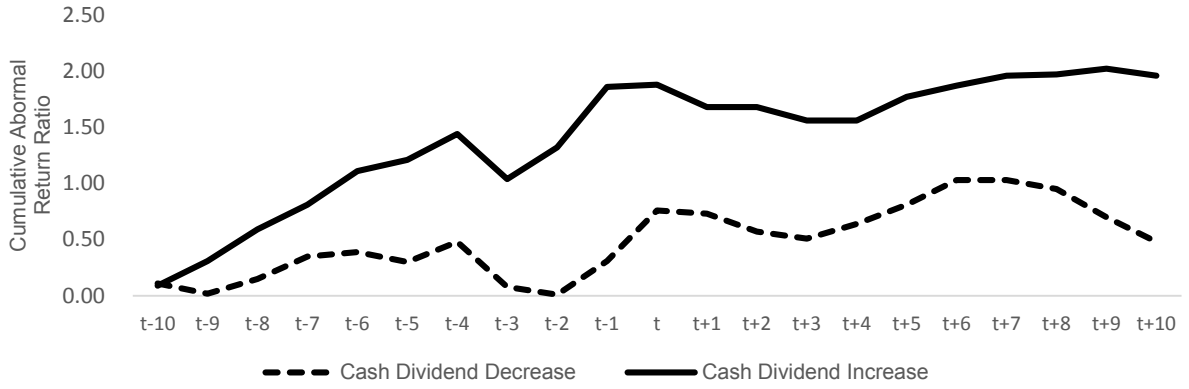
The cumulative abnormal return ratios classification by cash dividend changes for each year are presented in this table. Results show the average cumulative abnormal return ratio of the group with a cash dividend increase was 1.96%. The average cumulative abnormal return ratio of the group with a cash dividend decrease was 0.48%.

Table 4: Abnormal Return Ratios during the Event Session with Cash Dividend Changes

$Session_t$	Cash Dividend Decrease Group		Cash Dividend Increase Group	
	AR	CMAR	AR	CMAR
-10	0.11	0.11	0.09	0.09
-9	-0.09	0.02	0.22	0.31
-8	0.13	0.15	0.28	0.59
-7	0.20	0.35	0.22	0.81
-6	0.04	0.39	0.30	1.11
-5	-0.09	0.30	0.10	1.21
-4	0.18	0.48	0.23	1.44
-3	-0.40	0.08	-0.40	1.04
-2	-0.70	0.01	0.28	1.32
-1	0.30	0.31	0.54	1.86
0	0.45	0.76	0.02	1.88
+1	-0.03	0.73	-0.20	1.68
+2	-0.16	0.57	0.00	1.68
+3	-0.06	0.51	-0.12	1.56
+4	0.13	0.64	0.00	1.56
+5	0.17	0.81	0.21	1.77
+6	0.22	1.03	0.10	1.87
+7	0.00	1.03	0.08	1.96
+8	-0.08	0.95	0.01	1.97
+9	-0.25	0.70	0.05	2.02
+10	-0.22	0.48	-0.06	1.96

The average abnormal return ratios and the cumulative abnormal return ratios during the event session [- 10, + 10] with cash dividend changes are presented in this table. Results show the cumulative average abnormal return ratio of the group with a cash dividend increase was 1.96%. The cumulative average abnormal return ratio of the group with a cash dividend decrease was 0.48%.

Figure 2: Cumulative Abnormal Return Ratios Classification by Cash Dividend Changes



This figure shows cumulative abnormal return ratios classification by cash dividend increase and cash dividend decrease. The results show the cumulative abnormal return ratio of the group with a cash dividend increase was 1.96%. The average abnormal return ratio of the group with a cash dividend decrease was 0.48%. t stands for ex-dividend date. Figures on the vertical axis stand for cumulative abnormal return ratios with the unit of %.

Next we tested whether the cumulative abnormal return ratios were larger than zero. If μ is defined as the cumulative abnormal return ratio, then the hypothesis is stated:

$$H_0 : \mu \leqq 0$$
$$H_1 : \mu > 0$$

The results with respect to the cumulative abnormal return ratios of the group with a cash dividend increase, show significant at 1% level. With respect to the group with a cash dividend decrease were not significant. The cash dividend increase group reject the null hypothesis, indicating the cumulative return ratio was larger than zero. The cash dividend decrease group failed to reject the null hypothesis that we can't assert the cumulative abnormal return ratio was larger than zero as show in Table 5.

Table 5: The Analysis of Abnormal Return Ratios with Cash Dividend Changes

Classification	CMAR (%)	Standard Deviation	*t*-Statistic
Cash dividend decrease group	0.48	1.738	0.922
Cash dividend increase group	1.96	1.965	3.308 ***

*This table shows that, with respect to the cumulative abnormal return ratios of the group with a cash dividend increase, they were significant under the significance level of 1%. With respect to the group with a cash dividend decrease were not significant. The cash dividend increase group reject the null hypothesis, indicating the cumulative return ratio was larger than zero. The cash dividend decrease group failed to reject the null hypothesis that the cumulative abnormal return ratio was equal to or smaller than zero. Where ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.*

Next, we examine whether the cumulative abnormal return ratios of the group with a cash dividend increase were larger than the group with a cash dividend decrease. The following test was carried out:

$$H_0 : \mu_1 - \mu_2 \leqq 0$$
$$H_1 : \mu_1 - \mu_2 > 0$$

μ_1: equals the cumulative abnormal return ratios of the group with a cash dividend increase
μ_2: equals the cumulative abnormal return ratios of the group with a cash dividend decrease

Empirical results show a P-Value = 0.0383, at the significant level of $\alpha = 0.05$, reject the null hypothesis.

There was sufficient evidence to conclude cumulative abnormal return ratios of the two groups is different. Therefore, we were able to assert that the cumulative abnormal return ratios of the group with a cash dividend increase were larger than those of the group with a cash dividend decrease.

The Analysis of Abnormal Return Ratios with Different Industries

The analysis between different industries is always a study object. In Taiwan, the total traded value of financial industry and electric industry almost topped 75%. Here we choose these two industries to examine whether different industries impact cumulative abnormal return ratios. Table 6 shows results that average abnormal return ratios for the group with financial industry was 1.15%, and for electric industry equals 1.88%. The average abnormal return ratios and the cumulative abnormal return ratios during the event session [- 10, + 10] are presented in Table 7 and Figure 3.

Table 6: Cumulative Abnormal Return Ratios Classification by Different Industries

Year	Cumulative Abnormal Return Ratio【－10，＋10】		Unit: %
	Financial Industry	Electric Industry	
2001	2.55	5.50	
2002	-6.24	-4.70	
2003	3.76	0.86	
2004	4.29	3.71	
2005	1.05	5.03	
2006	4.73	2.23	
2007	-1.76	2.07	
2008	-1.79	6.62	
2009	0.57	-0.40	
2010	1.06	-1.89	
2011	3.65	1.96	
2012	1.89	1.61	
Average	**1.15**	**1.88**	

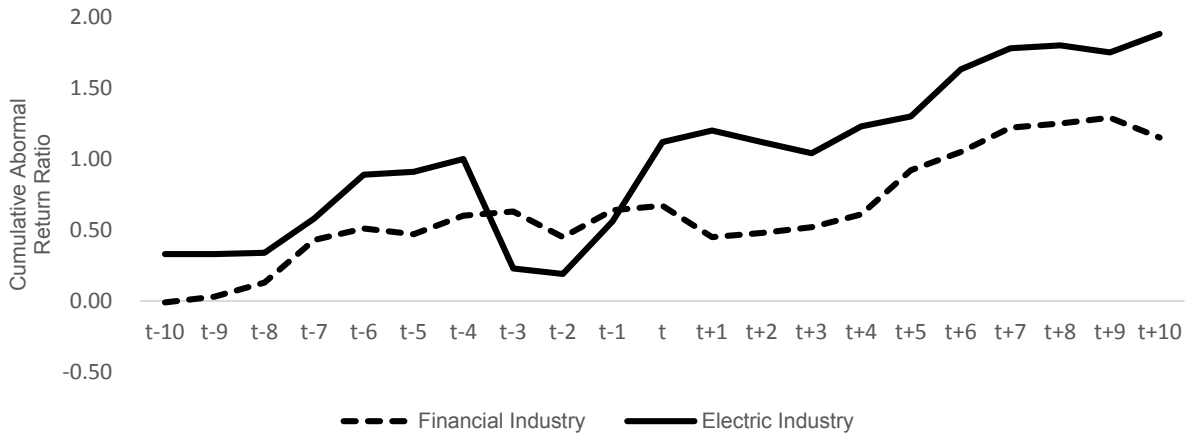
The cumulative abnormal return ratios of [- 10, + 10] for each year were discussed. It was discovered that the average cumulative abnormal return ratio of the group with financial industry was 1.15%, and the average cumulative abnormal return ratio of the group with electric industry was 1.88%.

Table 7: Abnormal Return Ratios during the Event Session with Different Industries

$Session_t$	Financial Industry		Electric Industry	
	AR	CMAR	AR	CMAR
-10	-0.01	-0.01	0.33	0.33
-9	0.04	0.03	0.00	0.33
-8	0.10	0.13	0.01	0.34
-7	0.30	0.43	0.24	0.58
-6	0.08	0.51	0.31	0.89
-5	-0.04	0.47	0.02	0.91
-4	0.13	0.60	0.09	1.00
-3	0.03	0.63	-0.77	0.23
-2	-0.18	0.45	-0.04	0.19
-1	0.19	0.64	0.37	0.56
0	0.03	0.67	0.56	1.12
+1	-0.22	0.45	0.08	1.20
+2	0.03	0.48	-0.08	1.12
+3	0.04	0.52	-0.08	1.04
+4	0.09	0.61	0.19	1.23
+5	0.31	0.92	0.06	1.30
+6	0.13	1.05	0.34	1.63
+7	0.17	1.22	0.15	1.78
+8	0.03	1.25	0.02	1.80
+9	0.04	1.29	-0.06	1.75
+10	-0.14	1.15	0.14	1.88

The average abnormal return ratios and the cumulative abnormal return ratios during the event session [- 10, + 10] of different industries are presented in this table. Results show the cumulative average abnormal return ratio of financial industry was 1.15%. The cumulative average abnormal return ratio of electric industry was 1.88%.

Figure 3: Cumulative Abnormal Return Ratios Classification by Different Industries



This figure shows cumulative abnormal return ratios classification by different industries. The results show the cumulative abnormal return ratio of financial industry was 1.15%. The cumulative average abnormal return ratio of electric industry was 1.88%. t stands for ex-dividend date. Figures on the vertical axis stand for cumulative abnormal return ratios with the unit of %.

The cumulative abnormal return ratios were further tested by the following hypothesis:

$H_0 : \mu \leqq 0$

$H_1 : \mu > 0$

μ: stands for the cumulative abnormal return ratio

Cumulative abnormal returns of the financial industry group, the results were not significant. For those with electric industry group, the results were significant at the 5% level. The financial industry group failed to reject the null hypothesis. We have not sufficient evidence to say the cumulative abnormal return ratio was larger than zero. The other electric industry group rejected the null hypothesis, indicating the cumulative abnormal return ratio was larger than zero as show in Table 8.

Table 8: The Analysis of Abnormal Return Ratios with Different Industries

Classification	AR mean (%)	Standard Deviation	*t*-Statistic
Financial Industry	1.15	3.166	1.255
Electric Industry	1.88	3.203	2.036 **

*This table shows that, with respect to the cumulative abnormal returns of the group with financial industry were not significant and with respect to those of the group with electric industry were significant at 5%. The financial industry group failed to reject the null hypothesis. We have not sufficient evidence to say the cumulative abnormal return ratio was greater than zero. The other electric industry group rejected the null hypothesis, indicating the cumulative abnormal return ratio was greater than zero. Where ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.*

Next, we identified where the cumulative abnormal return ratios of the electric industry group were larger than those of the financial industry group. The following test was carried out:

$H_0 : \mu_1 - \mu_2 \geqq 0$

$H_1 : \mu_1 - \mu_2 < 0$

μ_1: equals the cumulative abnormal return ratios of the group with a financial industry
μ_2: equals the cumulative abnormal return ratios of the group with an electric industry

The empirical results reveal a P-Value＝0.2884. There was insufficient evidence to show the cumulative abnormal return ratios of the two groups were different. Therefore, we cannot conclude the cumulative abnormal return ratios of the electric industry group were larger than those of the financial industry group.

The Analysis of Abnormal Return Ratios before and after Financial Crisis

The financial crisis of 2008 frequently referred to as the global financial crisis. It resulted in the threat of total collapse of large financial institutions, the bailout of banks and other businesses by national governments, and downturns in stock markets around the world. The reflection of the Taiwan stock market is Taiwan Stock Exchange Capitalization Weighted Stock Index (TAIEX) from 9309 falls to 3955, decline 57.57% in half a year. We discuss whether the cumulative abnormal return ratios were different before and after financial crisis.

In this section, the sample are classified by the year before and after financial crisis. We find the average cumulative abnormal return ratios before crisis was 2.49% and the average cumulative abnormal return ratios after crisis was 1.56%. The results are presented in Table 9 and Figure 4.

Table 9: Abnormal Return Ratios during the Event Session Classification by Financial Crisis Event

Session	Before the Financial Crisis		After the Financial Crisis	
	AR	CMAR	AR	CMAR
-10	0.11	0.11	0.15	0.15
-9	0.11	0.22	0.10	0.25
-8	0.09	0.31	0.15	0.40
-7	0.10	0.41	0.15	0.55
-6	0.19	0.60	0.31	0.86
-5	0.13	0.73	0.09	0.95
-4	0.32	1.05	0.16	1.11
-3	-0.49	0.56	-0.44	0.67
-2	0.12	0.68	0.10	0.77
-1	0.53	1.21	0.31	1.08
0	0.42	1.63	0.23	1.31
+1	-0.04	1.59	-0.13	1.18
+2	0.10	1.69	0.00	1.18
+3	0.00	1.69	0.03	1.21
+4	0.14	1.83	-0.01	1.20
+5	0.06	1.89	0.11	1.31
+6	0.11	2.00	0.09	1.40
+7	0.26	2.26	0.04	1.44
+8	0.08	2.34	0.05	1.49
+9	0.19	2.53	-0.01	1.48
+10	-0.04	2.49	0.08	1.56

The average abnormal return ratios and the cumulative abnormal return ratios during the event session [- 10, + 10] before and after financial crisis are presented in this table. Results show the cumulative average abnormal return ratio are 2.49% and 1.56% respectively.

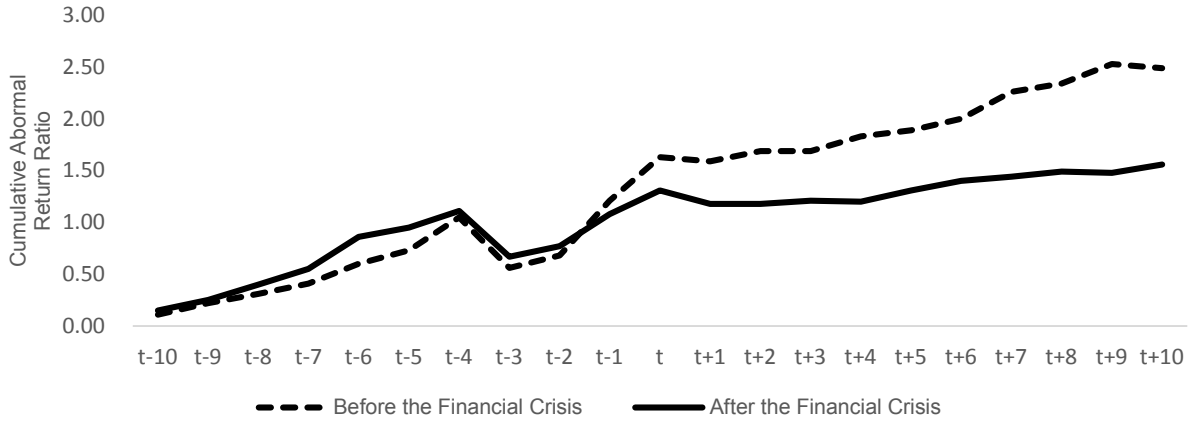
Next, we tested whether the cumulative abnormal return ratios were larger than zero. If μ is defined as the cumulative abnormal return, then the hypothesis is stated：

H_0：$\mu \leqq 0$

H_1：$\mu > 0$

The results with respect to the cumulative abnormal returns of the group before financial crisis, show significance at the 10% level. With respect to the group after financial crisis, significance occurs at the 5% level. Both groups rejected the null hypothesis, we have sufficient evidence to say the cumulative abnormal return ratio were larger than zero as shown in Table 10. Therefore, a preliminary conclusion was obtained that both groups before and after financial crisis had cumulative abnormal returns.

Figure 4： Cumulative Abnormal Return Ratios Classification by Financial Crisis Event



This figure shows cumulative abnormal return ratios classification by the year before and after financial crisis. The results show the cumulative abnormal return ratio were 2.49% and 1.56% respectively. t stands for ex-dividend date. Figures on the vertical axis stand for cumulative abnormal return ratios with the unit of %.

Table 10：The Analysis of Abnormal Return Ratios with Financial Crisis Event

Classification	AR mean (%)	Standard Deviation	*t*-Statistic
Before Financial Crisis	2.49	3.211	1.896 *
After Financial Crisis	1.56	1.158	3.307 **

*This table shows that, with respect to the cumulative abnormal return ratios of the group before financial crisis, they were significant under the significance level of 10%. With respect to the group after financial crisis were significant at the 5% level. Both groups rejected the null hypothesis, we have sufficient evidence to say the cumulative abnormal return ratio were larger than zero. Where ***, ** and * indicate significance at the 1, 5 and 10 percent levels respectively.*

Next, we examine whether the cumulative abnormal return ratios of the group before financial crisis were larger than for those of the group after financial crisis. The following test was carried out:

H_0：$\mu_1 - \mu_2 \leqq 0$

H_1：$\mu_1 - \mu_2 > 0$

μ_1: equals the cumulative abnormal return ratios of the group before financial crisis
μ_2: equals the cumulative abnormal return ratios of the group after financial crisis

The empirical results showed that P-Value＝0.2614. There was insufficient evidence to show the cumulative abnormal return ratios of the two groups were different. Therefore, we were not able to assert that the cumulative abnormal return ratios of the group before financial crisis were larger than those of the group after financial crisis.

CONCLUSIONS

This paper adopts cash dividend samples from all listed firms in Taiwan during the period from 2001 to 2012, applying an event study in order to investigate the impact of cash-dividend policy on share prices. In this paper we examine the effect of ex-dividend date for cash-dividend policy, and tried to demonstrate the existence of abnormal returns by examining the stock trading situations before and after the ex-dividend date. In addition, we discuss the relationships between cash dividend changes and cumulative abnormal return ratios. We explored whether there were relationships between these variables and cumulative abnormal return ratios. Moreover, we analyze whether different industries impact cumulative abnormal

return ratios. And we discuss whether the cumulative abnormal return ratios were different before and after financial crisis.

We used t-tests to determine whether cumulative abnormal returns exist. We found that cumulative abnormal returns exist during the period of 10 days before and after the ex-dividend date for firms adopting an exclusive cash-dividend policy for the year. If an investor buys the stocks of a firm which elects to pay only cash-dividends at the closing price 11 days before the ex-dividend date, and sells the stock at the closing price 10 days after the ex-dividend date, she will earn an average 2.07% abnormal return, regardless of the transaction cost.

Next, we took the cash dividend changes as a variable for classification. We used this variable to classify firms who paid only cash dividends into two groups. We examine if cumulative abnormal returns during the event session [- 10, +10] were different by this classification. The results showed the average abnormal return ratio of the group with a cash dividend increase was 1.96%. The average abnormal return ratio of the group with a cash dividend decrease was 0.48%. The cash dividend increase group reject the null hypothesis, indicating the cumulative return ratio was larger than zero. The cash dividend decrease group failed to reject the null hypothesis that we can't assert the cumulative abnormal return ratio was larger than zero.

Further, we examine whether the cumulative abnormal return ratios of the group with a cash dividend increase were larger than the group with a cash dividend decrease. Empirical results show a P-Value = 0.0383, at the significant level of $\alpha = 0.05$, reject the null hypothesis. Therefore, we were able to assert that the cumulative abnormal return ratios of the group with a cash dividend increase were larger than those of the group with a cash dividend decrease.

The results of our analysis for different industries reveal a P-Value = 0.2884. There was insufficient evidence to show the cumulative abnormal return ratios of the two groups were different. Therefore, we cannot conclude the cumulative abnormal return ratios of the electric industry group were larger than those of the financial industry group. Further, we examine whether the cumulative abnormal return ratios of the group before financial crisis were larger than for those of the group after financial crisis. The empirical results showed that P-Value = 0.2614. There was insufficient evidence to show the cumulative abnormal return ratios of the two groups were different.

In this paper, we use the Market Index Adjustment Model to analysis the abnormal return ratios. This assumes stock prices have a linear relationship with the Taiwan stock exchange capitalization weighted stock index. If not, then the abnormal return ratios could have statistic errors. Moreover, the Taiwan stock transaction market has a daily fluctuation range. The increasing or decreasing range of the opening price is limited in 7%. Thus, the stock price would be restricted. We discuss the dividend policy of the cash dividend changes. However, we did not analyze the effect between different nations and different scale of stock exchange market. This research is relegated to a future paper.

Finally, we note the sample data showed the cumulative abnormal return ratio of the 10 day period before the ex-dividend date was higher than that of the 10 day period after the ex-dividend date. However, since 2012 the competent authority has been charging an additional 2% of the dividends paid out as a supplementary fee for healthcare. This fee increases the cost to investors who participate in ex-right and ex-dividend payments, and decrease their willingness to get involved in ex-right and ex-dividend payments. Therefore, the phenomena mentioned in this paper may be reversed. Further research will determine the impact of this tax.

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