

# PRICE AND VOLUME REACTIONS TO CASH DIVIDEND ANNOUNCEMENTS: EVIDENCE FROM TAIWAN

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## ABSTRACT

*Are stock market investors concerned with obtaining abnormal returns by acquiring certain information? This paper studied the effect of ex-dividend date for cash-dividend policy. We try to demonstrate the existence of abnormal returns by examining stock trading situations before and after the ex-dividend date. We find that abnormal returns exist for listed Taiwan firms before and after the ex-dividend date. 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 2.13% abnormal return, regardless of the transaction cost. This paper further analyzes whether firms adopting cash-dividend payouts have different abnormal returns on stock price performance depending on different variables. Yilmaz and Gulay's (2006) method of analyzing abnormal returns of stock prices was adopted. Further studies were undertaken of the three dimensions of cash-dividend payout ratio, stock trading turnover rate, and the firm size.*

**JEL :** G12, G14

**KEYWORDS :** Cash Dividend, Abnormal Returns, Event Study

## INTRODUCTION

The 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 funds needed for expansion. The complete stock market was a key factor leading to the economic expansion of Taiwan in the 1960s.

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. 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 2.13% abnormal returns, regardless of the transaction cost. 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. They find a significant increase in volume before the ex-dividend date, but it tended to maintain stability after the ex-dividend date. We also investigate any difference in the investment behavior of investors with respect to the dividend payout ratio, stock trading turnover rates and firms size in the Taiwan Stock Exchange (TWSE) from 2001 to 2011.

The 11 year period, during which the market size expanded from 531 listed firms, with total market value of NTD (New Taiwan Dollar) 8.19 trillion in 2000, to 811 firms with total market value of NTD 22 trillion by July 2013. The number of listed firms increased by 52.73%, and total market value increased by 168.62%.

Listed stock trading in Taiwan was conducted following the provision of Article 150 of Taiwan Stock Exchange Act. The trading of listed negotiable securities is conducted in a centralized security exchange market launched by a stock exchange corporation. The detailed content includes 1.) The opening and the closing of the market: unless otherwise specified. The transaction period of the centralized security exchange market is from 9 a.m. to 1:30 p.m. every Monday to Friday. 2.) Trading types can be classified into three types (a) settlement trading on a regular date; (b) settlement trading on a closing date; and (c) settlement trading on an appointed date. Settlement trading on a regular date should be completed at the second closing date after the deal is agreed. Settlement trading agreed at a closing date should be completed on the same day with the written consent from both trading parties. The trading method for settlement trading on an appointed date should be generated by the Taiwan Stock Exchange Corporation, and put into practice after obtaining approval from the competent administrative authority. 3.) The trade matching method follows the principles of price priority and time priority. Information on volume and price, the amount of completed trades and five uncompleted best trades after matching should be revealed. The sequence of trading orders are decided by the following principles: (a) the principle of price priority where buying orders with higher prices come before those with lower prices, and selling orders with lower prices come before those with higher prices. (b.) Orders with the same price follow time priority; (b) under the principle of time priority orders entered before the market opens follow a random arrangement by computer. Orders entered after the market opens follow the time priority. 4.) Trading and fluctuation units should be one trading unit or its integral multiple. The value of each share is NTD 10, and 1,000 shares equal one trading unit. The trading price is subject to the price of one share. 5.) Daily fluctuation range implies an increasing or decreasing limit equal to 7% of the opening price.

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 dividends exists in the current market. Since 2000, 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 a dividend policy of cash payouts. 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 provides conclusions and some closing remarks.

## **LITERATURE REVIEW**

The decision of a firm's dividend policy depends on several factors, such as earning power, growth, cash flow ratio, and financial structure of the firm. 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.

Generally speaking, compared to small-sized firms, large-sized firms have the advantage of low external financing costs. It is easier for them to obtain financing. Therefore, large-sized firms have a higher cash-dividend payout ratio than small-sized firms. Research by Fama and French (2001) also supported the idea that firms which paid out cash dividends were characterized by large size. In addition, Brav, Graham, Harvey and Michaely (2005) directly investigated the management staff by questionnaire. The management staff pointed out that a stable cash-dividend policy was the main goal. However, unless they could confirm a stable cash flow in the future, they preferred to replace cash dividends with stock repurchase.

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.

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, 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.

Denis and Osoboy (2008) examined data from developed countries, including the US, Canada, the UK, Germany, France and Japan, to study dividend policies adopted by listed firms in these countries. They discovered a similar time trend. The research pointed out that from 1988 to 2001, the percentage of listed firms paying out dividends showed a decreasing trend. Those firms with larger sizes and higher profits preferred to pay out dividends. Moreover, among firms paying out dividends, the amount of capital and dividends were highly centralized in a number of major firms.

Fehrs et al. (1988) discovered that on declaration dates, there was a significantly positive (negative) relationship between 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. They identified significant volume increases before the ex-dividend date, but it tended to maintain stability after the ex-dividend date.

## **DATA AND METHODOLOGY**

This paper retrieved the data on dividend policies of all listed firms from 1990 to 2011 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 and trading volumes. Related information on the dividend policies of listed firms from 2001 to 2011 was collected, and adjusted data on the closing prices and trading volumes were used to carry out an analysis on the anomaly of prices and volumes. The researchers tried to examine whether firms paying out just cash dividends showed abnormal price and volume 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 and trading volumes for the ten trading days before and after 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 and trading volumes 90 days before and 10 days after ex-dividend dates (expressed by [- 90, + 10]) were complete, 3.) The cash-dividend payout is conducted only once a year.

The event study criteria was used to analyze samples screened 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 and trading volumes.

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  $M_t$ .

$$\therefore AR_{i,t} = R_{i,t} - M_t \quad (1)$$

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

$$R_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}} \quad (2)$$

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  $M_t$  has similar definition. This paper adopted the Market Index as a base for the market return. According to the above definition, the following mean abnormal return  $AR_t$  of stock  $n$  in period  $t$  was obtained:

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

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:

$$CMAR_t = \sum_{t=-10}^{10} AR_t \quad (4)$$

Finally, the concept of relative trading volume (RTV<sub>*i*</sub>) was used to verify whether there were abnormal phenomena for the trading volumes of stock  $i$  in period  $t$ , 10 days before and after the ex-dividend date [-10, +10].

The average trading volume of stock  $i$  was calculated from 90 days before the ex-dividend date to 11 days before the ex-dividend date as the base trading volume of the stock. Therefore, the following were obtained:

$$RTV_t = [V_{i,t} / ATV_i] - 1 \quad (5)$$

By Equation 5, we calculate whether there are significantly abnormal trading volumes 10 days before and after the ex-dividend date.

## EMPIRICAL RESULTS

A survey of the cash dividend policies adopted by listed firms in Taiwan revealed that from 1990 to 2011, 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 54.18% by 2011 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 strong motivation to examine abnormal returns for the trading stocks of firms adopting a cash-dividend policy.

There were 2,367 firms paying out only cash dividends from 2001 to 2011. Excluding firms without complete data, the samples includes 2,293 firms. These samples were collected from firms paying out cash dividends during the 11 years from 2001 to 2011. The objective is to determine if abnormal returns and abnormal trading volumes exist as a result of ex-dividends.

Table 1 : Percentage of Firms Paying Out Only Cash Dividends for All Listed Firms from 1990 to 2011

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%

*This table shows the number of firms paying out just cash dividends from 1990 to 2011. 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 54.18% by 2011.*

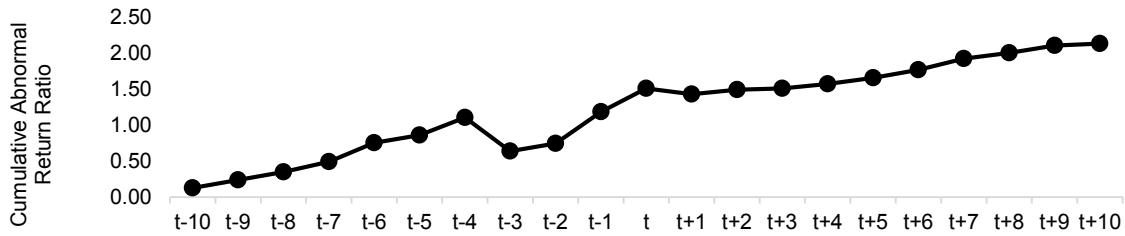
### The Study of Abnormal Return Ratios during the Event Session

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 2,293 sample firms were preliminarily examined. We discovered the cumulative abnormal return ratio reached 2.13%. 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 2.13% as shown in Figure 1.

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 1.19%, the abnormal return ratio on the ex-dividend date was 0.32%, and the cumulative abnormal return ratio of the 10 days after the ex-dividend date was 0.62%. 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, 7th, 6th, 4th, 3rd, 2nd days and the day before the ex-dividend date as shown in Table 2.

Figure 1 : Cumulative Abnormal Return Ratio during the Event Session



This figure shows 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 2,293 sample observations were preliminarily examined. The results show the cumulative abnormal return ratio reached 2.13%. *t* stands for ex-dividend date. Figures on the vertical axis stand for cumulative abnormal return ratios with the unit of %.

The Analysis of Abnormal Return Ratios with Different Cash-dividend Payout Ratio (DPORs)

Intuitively, investors should prefer firms they invest in to pay their earnings by payments of cash dividends thereby producing a stable investment income by receiving annual cash dividends. Therefore, if a firm enhanced the dividend payout ratio when it was going ex-dividend, would it cause a higher increase in the firm’s stock price?

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

Session <sub>t</sub>	AR mean (%)	t-Statistic	CMAR (%)
-10	0.13	2.085 *	0.13
-9	0.11	1.318	0.24
-8	0.11	1.756	0.35
-7	0.14	2.299 **	0.49
-6	0.26	5.380 ***	0.75
-5	0.11	1.404	0.86
-4	0.25	5.233 ***	1.11
-3	-0.47	-16.444 ***	0.64
-2	0.11	1.896 *	0.75
-1	0.44	3.661 ***	1.19
0	0.32	4.654 ***	1.51
+1	-0.08	-1.653	1.43
+2	0.06	0.995	1.49
+3	0.02	0.433	1.51
+4	0.06	1.028	1.57
+5	0.09	1.533	1.66
+6	0.11	1.994 *	1.77
+7	0.16	2.034 *	1.93
+8	0.08	1.383	2.01
+9	0.10	1.319	2.11
+10	0.02	0.391	2.13

This table shows the abnormal return ratio for each day of the event session. Results show the significant abnormal return ratios on the dividend date occurred on the 10th, 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.

We analyzing the cash-dividend payout ratios of firms, and tried to discover the influences of dividend payout ratios on the cumulative abnormal returns of the stock price. The equation of cash-dividend payout ratio is as follows:

$$\text{Dividend Payout Ratio} = \frac{\text{Cash Dividends}}{\text{Earnings per share}} \times 100\% \tag{6}$$

Yilmaz and Gulay’s (2006) method of analyzing abnormal returns of stock prices was adopted, taking DPOR=50% as the dividing point to classify cash-dividend payout ratios of different firms into two groups (with a DPOR < 50% and a DPOR ≥ 50%). Then we analyze the data for abnormal returns before and after the ex-dividend date. The results are presented in Table 3. Cumulative abnormal return ratios [- 10, + 10] for each year were examined. We discovered the average abnormal return ratio of the group with a DPOR < 50% was 1.74%. The average abnormal return ratio of the group with a DPOR ≥ 50% was 2.24%.

Table 3 : Abnormal Return Ratios Classification by Different Cash Dividend Payout Ratios

Year	Cumulative Abnormal Return Ratio [-10, +10]		Unit: %
	DPOR < 50%	DPOR ≥ 50%	
2001	6.67	5.83	
2002	-2.71	-2.80	
2003	-1.28	1.99	
2004	-0.26	2.02	
2005	3.90	2.69	
2006	5.42	5.80	
2007	-4.44	1.55	
2008	5.72	3.33	
2009	2.11	1.38	
2010	0.58	0.74	
2011	3.40	2.12	
Average	<b>1.74</b>	<b>2.24</b>	

The cumulative abnormal return ratios [- 10, + 10] for each year are presented in this table. Results show the average abnormal return ratio of the group with a DPOR < 50% was 1.74%. The average abnormal return ratio of the group with a DPOR ≥ 50% was 2.24%.

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

$$H_0 : \mu \leq 0$$

$$H_1 : \mu > 0$$

The results with respect to the cumulative abnormal return ratios of the group with a DPOR < 50%, show significance at the 10% level. With respect to the group with DPOR ≥ 50%, significance occurs at the 1% level. Both groups rejected the null hypothesis as the cumulative abnormal return ratio was no larger than zero as shown in Table 4. Therefore, a preliminary conclusion was obtained that both firms with a DPOR ≥ 50% and firms with a DPOR < 50% had cumulative abnormal returns.

Table 4 : The Analysis of Abnormal Return Ratios with Different Cash-dividend Payout Ratio

Classification	AR mean (%)	Standard Deviation	t-Statistic
DPOR < 50%	1.74	3.655	1.577 *
DPOR ≥ 50%	2.24	2.364	3.144 ***

This table shows that, with respect to the cumulative abnormal return ratios of the group with a DPOR < 50%, they were significant under the significance level of 10%. With respect to those of the group with a DPOR ≥ 50%, they were significant under the significance level of 1%. Both groups reject the null hypothesis as the cumulative abnormal return ratio was no 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 with a DPOR ≥ 50% were larger than for those of the group with a DPOR < 50%. The following test was carried out:

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

$$H_1 : \mu_1 - \mu_2 < 0$$

- μ1: equals the cumulative abnormal return ratios of the group with a DPOR < 50%
- μ2: equals the cumulative abnormal return ratios of the group with a DPOR ≥ 50%

Empirical results show a P-Value=0.353, at the significance level of α=0.1. There was insufficient evidence to conclude cumulative abnormal return ratios of the two groups had any differences. Therefore, we were not able to assert that cumulative abnormal return ratios of the group with a DPOR ≥ 50% were larger than those of the group with a DPOR < 50%.

Analysis of Abnormal Return Ratios with Different Stock Trade Turnover Rates

Generally, the stock trading turnover rate of a newly emerged market is higher than that of a mature market. Although high turnover rates indicate a stock is active in trading, and has good negotiability and comparatively high liquidity, it is worth noting that stocks with higher turnover rates are investing targets of short-swing funds, and have higher speculativeness, indicating they are more unstable.

In this section, the samples are classified by stock trading turnover rate to determine whether groups with different turnover rates have different cumulative abnormal return ratios. Annual turnover rate was adopted as the standard for classification, and stock trading turnover rate was determined by Equation 7:

$$\text{Stock Trading Turnover Rate} = \frac{\text{Total Trading Volume of the Year}}{\text{Total Amount of Shares Issued of the Year}} \times 100\% \quad (7)$$

The samples were arranged in ascending order by stock trading turnover rate. The first quartile (Q1) and the third quartile (Q3) were used as the classification standards to select two groups with turnover rates equal to or smaller than Q1 and turnover rates equal to or greater than Q3. The abnormal return ratios were then analyzed to identify abnormal returns before the ex-dividend date, and the cumulative abnormal return ratios of [- 10, + 10] for each year. We find the average abnormal return ratio for the group with turnover rate ≤ Q1 was 2.77%. The average abnormal return ratio of the group with turnover rate ≥ Q3 was 1.35%. The results are presented in Table 5.

Table 5 : Abnormal Return Ratios Classification by Different Stock Trading Turnover Rates

Year	Cumulative Abnormal Return Ratio [- 10, + 10]		Unit: %
	Turnover ≤ Q <sub>1</sub>	Turnover ≥ Q <sub>3</sub>	
2001	9.18	4.11	
2002	-3.59	-4.69	
2003	3.27	1.03	
2004	2.15	-1.59	
2005	0.68	4.69	
2006	5.55	8.00	
2007	1.53	0.84	
2008	4.15	2.93	
2009	1.19	0.98	
2010	4.46	-2.55	
2011	1.88	1.06	
<b>Average</b>	<b>2.77</b>	<b>1.35</b>	

*This table shows that the average abnormal return ratio of the group with the turnover rate ≤ Q1 was 2.77%, and the average abnormal return ratio of the group with the turnover rate ≥ Q3 was 1.35%.*

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

$$H_0 : \mu \leq 0$$



$$H_1 : \mu > 0$$

$\mu$ : stands for the cumulative abnormal return ratio of each year

Cumulative abnormal returns of the stock trading turnover rate  $\leq Q1$  group, results were significant at the 1% level. For those with stock trading turnover rate  $\geq Q3$ , the results were not significant. The stock trading turnover rate  $\leq Q1$  group rejected the null hypothesis, indicating the cumulative abnormal return ratio was equal to or less than zero. The stock trading turnover rate  $\geq Q3$  group failed to reject the null hypothesis that the cumulative abnormal return ratio was equal to or smaller than zero as shown in Table 6.

Table 6 : The Analysis of Abnormal Return Ratios with Different Stock Trade Turnover Rates

Classification	AR mean (%)	Standard Deviation	t-Statistic
Firm Sizes $\leq Q1$	2.86	3.223	2.849 ***
Firm Sizes $\geq Q3$	1.35	3.557	1.256

*This table shows the cumulative abnormal returns of the group with a stock trading turnover rate  $\leq Q1$ , were significant under at the 1%, level. Those with stock trading turnover rate  $\geq Q3$ , they were not significant. Those with the stock trading turnover rate  $\leq Q1$  rejected the null hypothesis, indicating the cumulative abnormal return ratio was equal to or smaller than zero. The group with stock trading turnover rate  $\geq Q3$  was unable to reject the null hypothesis that cumulative abnormal return ratio was equal to or smaller than zero. \*\*\*, \*\* and \* indicate significance at the 1, 5 and 10 percent levels respectively.*

Next, we identified whether the cumulative abnormal return ratios of the group with a turnover rate  $\leq Q1$  were larger than those of the group with a turnover rate  $\geq Q3$ . The following test was carried out:

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

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

$\mu_1$ : equals the cumulative abnormal return ratios of the group with a turnover rate  $\leq Q1$

$\mu_2$ : equals the cumulative abnormal return ratios of the group with a turnover rate  $\geq Q3$

The empirical results reveal a P-Value=0.1688. At the significance level of  $\alpha=0.1$ , 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 with a turnover rate  $\leq Q1$  were larger than those of the group with a turnover rate  $\geq Q3$ .

#### Analysis of Abnormal Return Ratios with Different Firm Sizes

Firm size is always a study object. Generally, large firms have greater risk tolerance than small firms, and their operations are comparatively stable with less dramatic changes. We therefore ask if stock prices of large firms perform better? We examine whether firm size impacts cumulative abnormal return ratios?

The samples were arranged in ascending order by year end market. The first (Q1) and third quartile (Q3) were used as classification standards to select two groups with market values equal to or smaller than Q1, and market values equal to or greater than Q3. Abnormal return ratios were calculated to identify abnormal returns before the ex-dividend date. Cumulative abnormal return ratios of [- 10, + 10] for each year were examined. Table 7 shows results that average abnormal return ratios for the group with firm sizes  $\leq Q1$  was 2.16%, and for firm sizes  $\geq Q3$  equals 2.38%. Cumulative abnormal return ratios were tested as follows

$$H_0 : \mu \leq 0$$

$$H_1 : \mu > 0$$

Table 7 : Abnormal Return Ratios Classification by Different Firm Sizes

Year	Cumulative Abnormal Return Ratio [-10, +10]		Unit: %
	Firm Size $\leq Q_1$	Firm Size $\geq Q_3$	
2001	5.36	6.11	
2002	-1.43	-3.64	
2003	-1.83	4.70	
2004	3.24	2.67	
2005	1.71	1.51	
2006	8.40	5.10	
2007	1.01	0.08	
2008	5.91	2.11	
2009	0.40	2.40	
2010	-1.19	2.71	
2011	2.20	2.42	
Average	<b>2.16</b>	<b>2.38</b>	

The cumulative abnormal return ratios of [-10, +10] for each year were discussed. It was discovered that the average abnormal return ratio of the group with firm sizes  $\leq Q_1$  was 2.16%, and the average abnormal return ratio of the group with firm sizes  $\geq Q_3$  was 2.38%.

The results show significance at the 5% level, with respect to cumulative abnormal returns of the group with firm size  $\leq Q_1$  and firm sizes  $\geq Q_3$ . Both groups rejected the null hypothesis, that the cumulative abnormal return ratio was equal to or smaller than zero as shown in Table 8. We conclude that during the event session, both firms with size  $\leq Q_1$  and with size  $\geq Q_3$  had cumulative abnormal returns. Next, we identified whether the cumulative abnormal return ratios of the firm group with size  $\geq Q_3$  were larger than those of the firm group with size  $\leq Q_1$ . The following test was carried out:

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

$$H_1 : \mu_1 - \mu_2 < 0$$

The results show a P-Value=0.4332. However, at the significance level of  $\alpha=0.1$ , there was insufficient evidence to show the cumulative abnormal return ratios of the two groups had differences. Therefore, we cannot conclude the cumulative abnormal return ratios of the firm group with size  $\geq Q_3$  were larger than those of the firm group with size  $\leq Q_1$ .

Table 8 : The Analysis of Abnormal Return Ratios with Different Firm Sizes

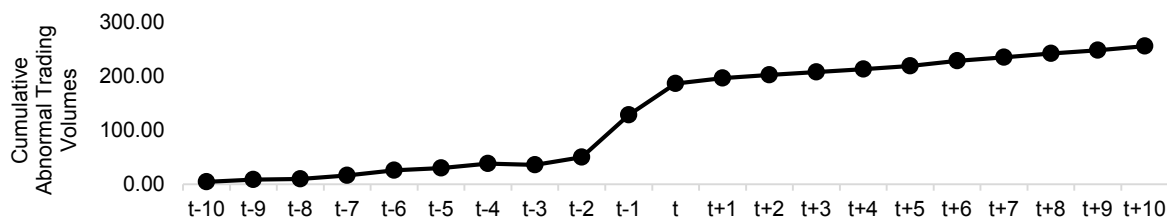
Classification	AR mean (%)	Standard Deviation	t-Statistic
Firm Size $\leq Q_1$	2.16	3.303	2.171 **
Firm Size $\geq Q_3$	2.38	2.631	2.999 ***

This table shows significant cumulative abnormal returns for the firm size  $\leq Q_1$  group at the 5% level. Results for the firm sizes  $\geq Q_3$  group were significant at the 1% level. Both groups rejected the null hypothesis, that the cumulative abnormal return ratio was equal to or smaller than zero. \*\*\*, \*\* and \* indicate significance at the 1, 5 and 10 percent levels respectively.

### The Study on Abnormal Trading Volumes during the Event Session

Next we examine whether stock trading of firms who paid cash dividends showed abnormal trading volumes before and after ex-dividend dates. The Mustafa and Guzhan method was adopted. Average trading volume was compared before and after the ex-dividend date with the period 90 to 11 days before the ex-dividend date. We calculated abnormal trading volumes with extreme values excluded, which accounted for 1.95% of the total sample. Extreme values are defined as having percentages of abnormal trading volumes  $\geq 1000\%$  and those  $\leq -90\%$  representing, 10 times larger than average trading volume or smaller than one tenth average trading volume.

Figure 2 : Cumulative Abnormal Trading Volumes during the Event Session



This figure shows the cumulative abnormal trading volume (CMAV) reached 255.93% during the event session [- 10, +10], where 1.) t stands for ex-dividend date. 2.) Figures on the vertical axis stand for cumulative abnormal trading volumes with the unit of%.

We find that during the event session [- 10, +10], the cumulative abnormal trading volume (CMAV) reached 255.93%. That is, total trading volume during the event session [- 10, +10] was 2.5 times as much as the previous average volume as shown in Figure 2. Thus, abnormal trading volume did exist. We further analyzed abnormal trading volumes for each trading day and tested whether abnormal trading volumes for each trading day equaled zero. We discovered that on the day before the ex-dividend date and the ex-dividend day, abnormal trading volumes were under the significant at the 1% level, and reject the hypothesis that the abnormal trading volume equaled zero. There was sufficient evidence to show the trading volumes of these two days were abnormal, and that abnormal trading volumes for the remaining trading days were not significant as shown in Table 9.

Table 9 : Analysis of Abnormal Trading Volumes before and after the Ex-dividend Date

Session <sub>t</sub>	AV mean (%)	t-Statistic	CMAV (%)
-10	4.87	0.387	4.87
-9	4.19	0.381	9.06
-8	0.91	0.093	9.97
-7	6.73	0.694	16.70
-6	9.25	0.883	25.95
-5	4.40	0.426	30.35
-4	7.94	0.856	38.29
-3	-2.37	-0.260	35.92
-2	14.18	1.439	50.10
-1	78.40	4.724 ***	128.50
0	58.28	3.501 ***	186.78
+1	9.93	0.907	196.71
+2	5.86	0.537	202.57
+3	5.65	0.501	208.22
+4	5.02	0.472	213.24
+5	6.16	0.627	219.40
+6	9.36	0.898	228.76
+7	6.82	0.767	235.58
+8	6.74	0.735	242.32
+9	6.05	0.631	248.37
+10	7.56	0.685	255.93

This table shows cumulative abnormal trading volume (CMAV) for each day of the event session. We find that on the day before the ex-dividend date and the ex-dividend day, abnormal trading volumes were under the significance level of 1%. There was sufficient evidence to show that trading volumes on these two days were abnormal, and that abnormal trading volumes for the remaining trading days were not significant. \*\*\*, \*\* and \* indicate significance at the 1, 5 and 10 percent levels respectively.

## CONCLUSIONS

There have been many studies on dividend policies, including the influence of tax reformation on dividend policies, influence of dividend payouts on stock prices, and the correlation between dividend payouts and the future development of firms. 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 stock trading before and after the ex-dividend date. In addition, we discuss dividend policy from three dimensions of the dividend payout ratio, the stock trading turnover rate, and firm size. We examine these variables together with relationships between cash dividends, stock prices and trading volumes. We explored whether there were relationships between these variables and cumulative abnormal return ratios.

We used t-tests to determine whether cumulative abnormal returns and cumulative abnormal trading volume exist. Next, we took the cash-dividend payout ratio, stock trading turnover rate, and firm size as variables for classification. We used these variables to classify firms who paid only cash dividends into two groups.

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 2.13% abnormal return, regardless of the transaction cost.

Finally, we examine the cash-dividend payout ratio, stock trading turnover rate, and firm size as variables for classification. We examine if cumulative abnormal returns during the event session [- 10, +10] were different by these classifications. The results showed an average abnormal return ratio for firms with DPOR < 50% was 1.74%. The average cumulative abnormal return ratio for firms with DPOR  $\geq$  50% was 2.24%. Both groups reject the null hypothesis that the cumulative abnormal return ratio was no larger than zero. There was sufficient evidence to show that firms with a DPOR  $\geq$  50% and firms with a DPOR < 50% had cumulative abnormal returns. However, there was insufficient evidence to show cumulative abnormal return ratios of the groups had differences. We were not able to confirm that cumulative abnormal return ratios of the group with DPOR  $\geq$  50% were larger than that of the group with DPOR < 50%.

The results showed the average abnormal return ratio of the firm group with turnover rate  $\leq$  Q1 was 2.77%, and the average abnormal return ratio of the firm group with the turnover rate  $\geq$  Q3 was 1.35%. Additionally, the group with stock trading turnover rate  $\leq$  Q1 rejected the null hypothesis, indicating the cumulative abnormal return ratio was equal to or smaller than zero. However, the group with stock trading turnover rate  $\geq$  Q3 was did not reject the null hypothesis that the cumulative abnormal return ratio was equal to or smaller than zero. There was insufficient evidence to show the cumulative abnormal return ratios of the two groups had differences.

The results showed that cumulative abnormal return ratios were significantly different for the size based groups. Both groups rejected the null hypothesis that the cumulative abnormal return ratio was equal to or smaller than zero. This finding indicates both groups had cumulative abnormal returns during the sample period. However, there was insufficient evidence to prove that cumulative abnormal return ratios of the two groups had differences. We could not confirm that cumulative abnormal return ratios of the group with size  $\geq$  Q3 were larger than those of the group with size  $\leq$  Q1.

Finally, we examined abnormal trading volumes during the event session [- 10, +10]. We discovered that during the event session, cumulative abnormal trading volume reached 255.93%. Abnormal trading volume did exist. However, further analysis of the abnormal trading volumes for each trading day, showed that on the day before the ex-dividend date and the ex-dividend day, abnormal trading volumes were under the significance level of 1%. The hypothesis that the abnormal trading volume was zero was rejected. There was sufficient evidence to show that trading volumes for these two days were abnormal, and the abnormal trading volumes for the remaining trading days were not significant. In other words, stock market investors in Taiwan prefer to make deals on the day before the ex-dividend date and the exact ex-dividend day, and have expectations on ex-dividend payment.

We use the Market Index Adjustment Model to analysis the abnormal return rates. This assumes stock prices have a linear relationship with the Taiwan stock exchange capitalization weighted stock index. If not, then the abnormal return rates 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 to 7%. Thus, the stock price would be restricted. We discuss dividend policy from three dimensions the dividend payout ratio, the stock trading turnover rate, and the firm size. However we did not analyze the effect between different nations and different industries. This research is relegated to a future paper.

Finally, we note that 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 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. Future research will determine the impact of this tax.

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## **ACKNOWLEDGEMENT**

The authors are grateful to Mercedes Jalbert and two anonymous referees for helpful comments on an earlier version of this paper. We appreciate excellent comments made by the editor and two anonymous reviewers, resulting in a significant improvement in the quality of this paper. Any errors are our own.

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