

Price Movements and Dividend Policies under Alternative Tax Regimes

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We examine price movements and dividend policies before and after the tax reform of 1998. We find that cash dividend plays an appealing role for a company's dividend policy under the dividend imputation system. There are abnormal returns around the ex-days in Taiwan market. Different characteristics are found before and after implementing the imputation tax system in 1998. We find that taxable and nontaxable stock dividend sizes are positively related to ex-day abnormal returns in the pre-imputation period. The insignificant relationship between the dividend yield and ex-day abnormal return before the tax reform might result from the short-term trading. The tax credit ratios vary widely depending on effective corporate tax rates, because the unique dividend credit system in Taiwan and the tax incentive for high-tech industry, We find that tax credit ratios are positively related to the last cum-day abnormal returns and negatively related to ex-day abnormal returns, indicating that there is credit-motivated trading around the ex-days.

JEL Codes: G12, G14 and H20

1. Introduction

The main issue in this study is questioning whether the change in tax system would affect the dividend policies of companies and determines which factors would affect the price movements under different dividend-distributions compositions.

Our study focuses on the listed firms in Taiwan Stock Exchange from 1991 to 2008. Since 1998 Taiwan has implemented the dividend imputation tax system. The purpose of our paper is to examine price movements for different dividend-distribution compositions and dividend policies before and after the tax reform of 1998. Like many other studies, we investigate the price movements on the ex-day. In addition, to illustrate short-term trading around the ex-days, we also examine the price behavior on the last cum day (i.e., the day before the ex-day).

We contribute to the existing literature by showing that the change in tax system not only affect the price movements in the stock market but also affect the dividend policies of companies. We find that cash dividend distribution plays an appealing role for a company's dividend policy under the dividend imputation tax system.

We first use the market model to test the null hypothesis of zero abnormal returns around the ex-days. To analyze the factors affecting the abnormal returns on the last

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cum days and on the ex-days, we use the Ordinary Least Squares regression model to investigate the ceteris paribus effects of the factors on the last cum-day abnormal returns and the ex-day abnormal returns.

We find that ex-day abnormal returns decrease after the tax reform, suggesting that tax credits have a market value. Our result shows that there is no significant relationship between ex-day abnormal returns and cash dividend yields before the tax reform, suggesting that ex-day returns are not totally related to tax effect. This is not consistent with the findings in Elton and Gruber (1970). This finding is similar to the result found by Lasfer (2008). He argues that activities of short-term dividend capturers might reduce the tax impact. Interestingly, we find those dividend yield and tax credit ratios are both significantly positively related to the last cum-day abnormal returns after the tax reform. On the other hand, both of them are significantly negatively related to ex-day abnormal returns.

We observe that taxable stock dividend size is positively related to ex-day abnormal returns in the pre- and post-imputation periods. As shown in our result, there is a positive relationship between the ex-day abnormal return and the nontaxable stock dividend size. Frank and Jagannathan (1998) and Kadapakkam (2000) also find that there are positive ex-day abnormal returns in Hong Kong Stock Exchange where neither dividends nor capital gains are taxed. Kadapakkam (2000) points out that an additional positive ex-day abnormal return is the risk premium as compensation for the cum-dividend buyer who can not sell the stocks until 21 days after the shares go ex-dividend. Similar to Hong Kong, Taiwan shareholders can not get the odd-lot shares until about forty days after the stock goes ex-right.

The rest of this paper is organized as follows. Section 2 reviews the literature. Section 3 discusses the tax systems. Section 4 contains the data details and methodology. Section 5 reports and discusses the empirical results. Section 6 presents the conclusions.

2. Literature Review

Prior studies show that tax reform would affect ex-day stock price movements. For instance, after the tax reform of the United Kingdom in 1988, the statutory capital gains are taxed the same as the ordinary income. Lasfer (1995) shows that ex-day returns decrease from 0.46% to 0.30%. Lasfer (1995) also finds that negative ex-day abnormal return reflects tax credit associated with cash dividend. After another tax reform of the United Kingdom in 1997, the pension funds can no longer get the tax credits of full cash refund. Bell and Jenkinson (2002) demonstrate that the drop-off ratios decline (i.e., abnormal returns increase) significantly for the high-yielding stocks. They conclude that the pension funds are the 'marginal' investors for the high-yielding stocks. Prior to the tax reform of Canada in 1985, the stock dividends were nontaxable. Athanassakos and Smith (1996) find that when the stock dividends start to be taxed as the cash dividends after the tax reform of 1985, the ex-right day abnormal returns turn out to be significant in Toronto Stock Exchange. Anderson *et al.* (2004) show that the significantly positive abnormal returns no longer exist after New Zealand Stock Exchange installing the computerized trading system to eliminate the high odd-lot selling cost in 1991. Lasfer (2008) investigates the price behaviors of ex-day in the United Kingdom and in Germany. He notes that there is a short-term

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restriction in the United Kingdom and the differential taxation between dividends and capital gains is higher in the United Kingdom than in Germany. Consequently, ex-day abnormal returns in the United Kingdom are higher than in Germany. In Germany, the evidence that bid-ask spread increases along with the highest-yielding groups suggests that the short-term trading weakens the tax effect on the ex-day return (Lasfer, 2008).

In an efficient capital market, the stock price of ex-day should fall by exactly the amount of the dividend. However, Elton and Gruber (1970) show that ex-day price fell by an amount less than the dividend paid. However, Eades *et al.* (1984) investigate the high-yielding preferred stocks and show that there are significantly negative ex-day abnormal returns. Anderson *et al.* (2004) find that there are negative ex-day returns for taxable stock dividends attached with tax credits. Other than the tax argument, some nontax factors may also affect ex-day abnormal returns. For example, Kalay (1982; 1984) and Lasfer (2008) argue that short-term profit eliminators can improve the efficiency of the ex-day price movement on the stock market. Woolridge (1983) and Anderson *et al.* (2004) contend that odd-lot transaction costs result in ex-day abnormal returns for the companies distributing the stock dividends. Woolridge (1983) argues that if the investors buy the stock on the last cum day for some reasons, they would reverse the transaction on the following day.

In contrast to most of the other countries, Taiwan has no capital gains tax. However, cash dividends and most of the stock dividends are subject to individual income tax. The distribution of the stock dividend paid from the retained earnings is taxable, and the distribution of the stock dividend paid from capital surplus is nontaxable (Hu and Tseng, 2006). Therefore, Taiwan's stock market is a perfect environment to test aforementioned arguments. In addition, unlike previous ex-day studies, we take the last cum-day price behavior into account. Thus, we set the following hypotheses:

Hypothesis 1: The cash dividend payout increased for different dividend-distribution compositions after the tax reform of 1998.

Hypothesis 2: The last cum-day abnormal returns increase due to the tax credits motivated trading after the tax reform of 1998.

Hypothesis 3: The ex-day abnormal returns decrease due to the value of the tax credits after the tax reform of 1998.

3. Tax Systems in Taiwan

In our sample period, the corporate income tax rate is 25%. Yet there is a regulation called 'Statute for Upgrading Industry.' Therefore, for a company fulfilling the requirement of the statute, its effective corporate tax rate will be less than 25%. Under Taiwan's imputation system, there is an additional 10% corporate income tax on 'Undistributed Retained Earnings.' Consequently, the effective corporate tax rate varies widely depending on the company's dividend policy and on whether a company fulfills the 'Statute for Upgrading Industry.'

In Taiwan, the tax credit is fully refundable. This means that the domestic individual investor can not only reduce their tax liability to zero, but also get refund for any

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excess. For domestic corporate shareholders, prior to the imputation period, there was a deduction for the 80% receiving dividends. The other 20% receiving dividends were subject to corporate tax. After the initiation of the imputation system, according to Article 42 of the Income Tax Act, the receiving dividends are not taxable. The tax credits associated with the dividends can not be credited against their payable tax either. As for the foreign investors, the tax rate ranges from 5% to 30% for the dividends they received (Hu and Tseng, 2006). They have no dividend deduction or tax credit before and after the tax reform.

4. Data and Methodology

Our study focuses on the ex-day events of the listed firms in Taiwan Stock Exchange (TWSE) over 18-year period from January 1, 1991 to December 31, 2008. The source of the date and closing price of the ex-day is from the Taiwan Economic Journal (TEJ) data bank. The 18 years of data provide a total sample of 6,236 ex-events after our screen processes. The original observations are 6,857. We eliminate the observations which do not have a minimum of 100 non-missing daily returns and trading volume over a 145-day controlled period (from day -150 to day -6). This yields tally 6,590 observations. Then we further remove the SPO (Seasoned Public Offerings) cases. This reduced the samples from 6,590 to 6,236.

We used the market model of the event study methodology to measure the stock price movement around the ex-days and to test the null hypothesis of zero abnormal close-to-close returns around the ex-day events for the period from January 1, 1991 to December 31, 2008. The 11-day event window is employed, comprising 5 pre-event days, the event day, and 5 post-event days. For each ex-date, the 145 trading day period prior to the event window is used as the estimation window. Defining day 0 as the event date, day -5 to day +5 represents the event window, and day -150 to day -6 constitutes the estimation window. The corresponding market portfolio is TWSE value-weighted index.

We hypothesize that the event, ex-dividend/ex-rights, has no impact on the behavior of the stock return. In order to apply a test of significance, we use the standardized-residual cross-sectional method (SRCSM) as proposed by Boehmer *et al.* (1991). Boehmer *et al.* (1991) can control for the effect of beta reliability on abnormal returns. Since the t_{SRCSM} -Statistic is formed by dividing the average event-period standardized abnormal returns by its event-day standard deviation, rather than the standard deviation estimated in the estimation period, Boehmer *et al.* (1991) can resolve the possibility of the increasing variance of returns around the event period.

By employing the market model, we assume that there is a linear relationship between the stock return of firm i and the market portfolio. For any stock i , the market model is

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t}, \quad t = -150, -149, \dots, -6 \quad (1)$$

where $R_{i,t}$ and $R_{m,t}$ are the period- t returns on the stock i and the market portfolio, TWSE value-weighted index, respectively, and $\varepsilon_{i,t}$ is the zero mean disturbance

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term. Coefficients α_i and β_i are the parameters of the market model. The expected return is computed as:

$$E(\hat{R}_{i,e}) = \hat{\alpha}_i + \hat{\beta}_i R_{m,e}, \quad e = -5, -4, \dots, +5 \quad (2)$$

where $E(\hat{R}_{i,e})$ is the expected return, and $R_{m,e}$ is the market portfolio return. Given Eq. (2), we can calculate the abnormal return for the stock i on an event day e :

$$AR_{i,e} = R_{i,e} - E(\hat{R}_{i,e}) \quad (3)$$

Where $AR_{i,e}$ and $R_{i,e}$ are the abnormal return and realized return in the event period for stock i , respectively. The average portfolio abnormal return on each event day is computed as:

$$AR_e = \frac{1}{N} \sum_{i=1}^N AR_{i,e} \quad \text{where } e = -5, -4, \dots, +5 \quad (4)$$

where N is the number of the stocks in the portfolio.

To conduct a significance test, we use the standardized-residual cross-sectional method (SRCSM), as proposed by Boehmer *et al.* (1991). The test statistic is illustrated as

$$t_{SRCSM}^{AR} = \frac{\frac{1}{N} \sum_{i=1}^N SAR_{iE}}{\sqrt{\frac{1}{N(N-1)} \sum_{i=1}^N \left(SAR_{iE} - \sum_{i=1}^N \frac{SAR_{iE}}{N} \right)^2}} \quad (3)$$

where SAR_{iE} is the standardized abnormal return for any stock i during the event period.

5. Empirical Results

5.1. Abnormal Returns around the Ex-day

In Table 1, we divide the whole observations of 6,236 events into two sub-periods. *CD* denotes the events of firms which only pay cash dividends, *SD* denotes the events of firms which only pay taxable stock dividends, *NSD* denotes the events of firms which only pay nontaxable stock dividends, *SD&CD* denotes the events of firms which pay taxable stock dividends coinciding with cash dividends, *SD&NSD* denotes the events of firms which pay taxable stock dividends coinciding with nontaxable stock dividends, *NSD&CD* denotes the events of firms which pay nontaxable stock

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dividends coinciding with cash dividends, and *SD&NSD&CD* denotes the events of firms which pay taxable stock dividends coinciding both with nontaxable stock dividends and cash dividends, respectively.

Table 1: Abnormal Returns around the Ex-day (%)

Year	Distribution Type	No.	Day	Day	Day	Day	Day	Day 0	Day	Day	Day	Day	Day
			-5	-4	-3	-2	-1	(Ex-day)	1	2	3	4	5
1991~1998	CD	448	0.029 (0.88)	0.017 (0.73)	-0.768 (-10.32) ***	-0.183 (-2.76) ***	0.020 (0.92)	0.839 (10.58) ***	0.107 (1.34)	-0.097 (-1.65) *	0.167 (2.29) **	0.017 (-0.44)	0.023 (0.08)
1999~2008	CD	1,269	0.050 (1.13)	0.149 (3.28) ***	-0.585 (-8.22) ***	-0.045 (-0.03)	0.447 (8.25) ***	0.346 (3.14) ***	-0.088 (-1.73) *	-0.086 (-1.05)	-0.049 (-1.04)	0.091 (1.28)	-0.046 (-0.87)
1991~1998	SD	393	-0.048 (-0.28)	0.039 (0.51)	-0.878 (-9.17) ***	0.009 (0.21)	0.523 (4.87) ***	1.180 (8.83) ***	0.017 (0.23)	0.016 (0.76)	-0.044 (-0.45)	0.050 (0.76)	0.063 (0.35)
1999~2008	SD	358	0.054 (0.64)	-0.100 (-0.49)	-0.650 (-4.78) ***	-0.160 (-1.12)	0.581 (4.34) ***	1.123 (7.77) ***	0.170 (1.80) *	0.109 (0.92)	0.166 (1.46)	-0.018 (-0.09)	-0.049 (-0.14)
1991~1998	NSD	239	0.100 (0.50)	0.076 (0.91)	-0.687 (-5.14) ***	0.071 (0.67)	0.627 (4.30) ***	0.741 (4.06) ***	0.094 (0.45)	0.166 (1.43)	0.375 (3.04) ***	0.011 (0.57)	0.150 (1.41)
1999~2008	NSD	176	-0.178 (-1.55)	-0.100 (-0.51)	-0.837 (-4.16) ***	0.067 (0.22)	0.675 (3.27) ***	0.680 (3.09) ***	0.152 (0.56)	0.156 (0.97)	0.394 (1.85) *	0.309 (1.02)	-0.230 (-1.06)
1991~1998	SD&CD	56	0.026 (0.66)	-0.253 (0.04)	-0.942 (-3.70) ***	-0.403 (-1.64)	0.103 (1.04)	1.850 (5.83) ***	1.178 (3.23) ***	0.767 (1.83) *	0.448 (1.30)	0.324 (1.49)	0.454 (1.30)
1999~2008	SD&CD	1485	-0.030 (0.40)	0.113 (2.43) **	-0.722 (-8.53) ***	0.218 (3.34) ***	0.523 (6.36) ***	0.960 (12.94) ***	0.336 (4.54) ***	0.275 (3.82) ***	0.221 (3.93) ***	0.106 (1.91) *	0.103 (2.02) **
1991~1998	SD&NSD	787	0.056 (1.43)	-0.009 (0.92)	-0.996 (-14.58) ***	-0.034 (-0.67)	0.407 (4.87) ***	1.786 (16.65) ***	0.057 (-0.31)	-0.053 (-0.27)	0.026 (-0.26)	0.156 (2.46) **	-0.023 (-0.31)
1999~2008	SD&NSD	358	-0.096 (-0.39)	-0.055 (-0.39)	-0.991 (-6.57) ***	-0.129 (-0.88)	0.691 (4.87) ***	1.247 (7.80) ***	0.272 (1.46)	0.121 (1.43)	0.032 (0.20)	-0.093 (-0.87)	0.077 (0.72)
1991~1998	NSD&CD	29	-0.284 (-0.10)	0.266 (0.77)	-0.914 (-2.76) **	-0.037 (-0.55)	0.823 (1.24)	0.905 (1.54)	0.028 (0.57)	0.875 (1.77) *	-0.230 (-0.70)	-0.116 (-0.22)	0.205 (0.46)
1999~2008	NSD&CD	121	-0.036 (-0.20)	0.115 (0.80)	-0.191 (-0.66)	-0.054 (-0.38)	0.734 (2.96) ***	0.888 (3.21) ***	-0.015 (0.15)	0.001 (-0.19)	0.067 (0.14)	0.226 (1.38)	0.160 (1.19)
1991~1998	SD&NSD&CD	60	0.699 (2.34) **	0.172 (0.47)	-0.580 (-2.88) ***	0.568 (2.25) **	0.570 (1.47)	1.730 (6.17) ***	-0.497 (-1.62)	0.019 (-0.13)	0.272 (1.71) *	0.726 (2.48) **	0.715 (2.13) **
1999~2008	SD&NSD&CD	457	-0.113 (-1.11)	0.097 (1.22)	-0.787 (-6.10) ***	0.178 (1.90) *	0.395 (3.49) ***	1.098 (8.46) ***	0.499 (3.68) ***	0.339 (2.84) ***	0.283 (2.32) **	0.103 (0.99)	0.044 (-0.01)

The t_{SRCSM} -statistic in parentheses is computed by using standardized residual cross-sectional method. ***, **, * indicate the significances at the 1%, 5%, and 10% levels, respectively.

We find that abnormal returns of all portfolios on day -1 are higher in the post-imputation period compare to in the pre-imputation period. On the other hand, abnormal returns of all portfolios on day 0 are lower in the post-imputation period compared to in the pre-imputation period. The results suggest that the value of the tax credit might attract the speculators to buy the cum-dividend stocks, which result in the stock prices raise on the last cum day after the tax reform. As shown in Table 1, for the *CD* portfolios, abnormal returns on day -1 increase from 0.020% to 0.447% after the tax reform. On the other hand, abnormal returns on day 0 decrease from 0.839% to 0.346% after the tax reform. Similar results can be found in the other

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dividend-distribution composition.

5.2. Dividend Policy

In Table 2, *AveDY* is average cash dividend yield, *AveSDsize* is average taxable stock dividend's percentage size, *AveNSDsize* is average non-taxable stock dividend's percentage size and *AveTCR* is average imputation tax credit ratio, respectively. '*Diff.*' measures the differences in the average *DY*, average *SDsiz* and average *NSDsiz* between the two periods.

Table 2: Different Types of the Dividend Distribution

Year	Distribution		<i>AveDY</i>	<i>Diff.</i>	<i>AveSDsize</i>	<i>Diff.</i>	<i>AveNSDsize</i>	<i>Diff.</i>	<i>AveTCR</i>
	Type	No. Proportion							
1991~1998	<i>CD</i>	448 22.27%	0.020	0.030 (23.69) ***					
1999~2008	<i>CD</i>	1,269 30.04%	0.050						0.196
1991~1998	<i>SD</i>	393 19.53%			0.159	-0.057 (-5.99) ***			
1999~2008	<i>SD</i>	358 8.48%			0.102				0.160
1991~1998	<i>NSD</i>	239 11.88%					0.112	-0.042 (-5.82) ***	
1999~2008	<i>NSD</i>	176 4.17%					0.070		
1991~1998	<i>SD&CD</i>	56 2.78%	0.017	0.019 (6.10) ***	0.133	-0.048 (-4.77) ***			
1999~2008	<i>SD&CD</i>	1485 35.15%	0.036		0.085				0.152
1991~1998	<i>SD&NSD</i>	787 39.12%			0.117	-0.024 (-4.19) ***	0.085	-0.024 (-6.98) ***	
1999~2008	<i>SD&NSD</i>	358 8.48%			0.093		0.061		0.153
1991~1998	<i>NSD&CD</i>	29 1.44%	0.019	0.020 (4.15) ***			0.082	-0.034 (-5.75) ***	
1999~2008	<i>NSD&CD</i>	121 2.86%	0.039				0.048		0.205
1991~1998	<i>SD&NSD&CD</i>	60 2.98%	0.014	0.016 (6.14) ***	0.092	-0.024 (-2.57) **	0.065	-0.021 (-4.69) ***	
1999~2008	<i>SD&NSD&CD</i>	457 10.82%	0.029		0.068		0.044		0.151

***, **, * indicate the significances at the 1%, 5%, and 10% levels, respectively.

For the firms which only pay cash dividends (*CD*), we observe that average dividend yield increases from 0.020 to 0.050 after the tax reform (i.e., between 1999 and 2008). The number of firms only distributing cash dividend increases from 448 to 1,269. The proportion of cash dividend distribution increases from 22.27% to 30.04%. These results imply that the distribution of cash dividend plays an appealing role for a company's dividend policy after the tax reform.

For the firms which only pay the taxable stock dividends (*SD*), the average taxable stock dividend size decreases from 0.159 to 0.102 after the tax reform. The proportion of taxable stock dividend distribution decreases from 19.53% to 8.48%. For the firms which only pay the nontaxable stock dividends (*NSD*), the average nontaxable stock dividend size decreases from 0.112 to 0.070 after the tax reform. The proportion of nontaxable stock dividend distribution decreases from 11.88% to 4.17%. For any dividend-distribution composition, all average dividend yields increases after the tax reform. This supports Hypothesis 1 and suggests that the cash

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dividend payout increased after the tax reform of 1998. On the other hand, average taxable stock dividend size and nontaxable stock dividend size both decrease after the tax reform.

5.3. Factors Affecting the Abnormal Returns

Table 3 presents the regression analysis of the factors affecting the abnormal returns on the last cum day and the ex-day. Panel A shows the regression analyses on the last cum days. Panel B shows the regression analyses on the ex-days. Pre-TR and Post-TR denote the pre-tax reform period and the post-tax reform period, respectively. Our set of control variables are motivated by the previous studies about the ex-day abnormal returns. The variables might affect the ex-day price movements are the taxable and nontaxable stock dividend sizes (Woolridge, 1983; Anderson *et al.*, 2004), cash dividend yield (Lasfer, 1995; Kadapakkam, 2000) and the tax credit ratio. For example, suppose that a shareholder can get the 1 share stock by holding the 10 shares stock, the stock dividend size is equivalent to 1 divided by 10 or a 10% (Anderson *et al.*, 2004).

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Table 3: Regression Analyses of the Factors Affecting Abnormal Returns on Day -1 and Day 0

Panel A: Regression analyses on the last cum days

Independent Variable	Dependent Variable : the last cum-day abnormal returns													
	<i>CD</i>		<i>SD</i>		<i>NSD</i>		<i>SD&CD</i>		<i>SD&NSD</i>		<i>NSD&CD</i>		<i>SD&NSD&CD</i>	
	Pre-TR	Post-TR	Pre-TR	Post-TR	Pre-TR	Post-TR	Pre-TR	Post-TR	Pre-TR	Post-TR	Pre-TR	Post-TR	Pre-TR	Post-TR
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)	(5a)	(5b)	(6a)	(6b)	(7a)	(7b)
<i>Intercept</i>	-0.004	-0.002	0.005	0.003	0.008	0.003	-0.007	-0.001	0.005	0.005	0.022	-0.012	0.020	-0.006
	(-2.79) ***	(-0.88)	(3.28) ***	(0.82)	(3.06) ***	(0.85)	(-0.82)	(-0.40)	(2.49) **	(1.27)	(1.12)	(-1.53)	(1.70) *	(-1.40)
<i>SDsize</i>			-0.001	0.020			0.038	0.025	-0.027	0.010			0.030	0.024
			(-0.18)	(1.34)			(1.00)	(2.61) ***	(-2.71) ***	(0.45)			(0.70)	(1.07)
<i>NSDsize</i>					-0.012	0.052			0.029	-0.049	0.070	0.083	-0.106	0.076
					(-0.73)	(1.21)			(1.75) *	(-1.39)	(0.49)	(0.95)	(-1.05)	(1.80) *
<i>DY</i>	0.196	0.064					0.200	0.037			-1.028	0.120	-0.701	0.082
	(3.45) ***	(2.67) ***					(0.62)	(1.19)			(-1.83) *	(1.27)	(-1.62)	(1.14)
<i>TCR</i>		0.014		0.008				0.017		0.029		0.051		0.017
		(2.87) ***		(0.62)				(2.86) ***		(2.23) **		(2.69) ***		(1.34)
F-statistic	11.906	6.978	0.033	0.963	0.540	1.462	0.557	4.749	4.475	2.406	2.674	2.900	1.646	1.734
Prob.(F-statistic)	0.0006	0.0010	0.8567	0.3829	0.4632	0.2282	0.5764	0.0027	0.0117	0.0671	0.0879	0.0380	0.1891	0.1413

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Panel B: Regression analyses on the ex-days

		Dependent Variable : the ex-day abnormal returns													
Independent Variable	<i>CD</i>		<i>SD</i>		<i>NSD</i>		<i>SD&CD</i>		<i>SD&NSD</i>		<i>NSD&CD</i>		<i>SD&NSD&CD</i>		
	Pre-TR	Post-TR	Pre-TR	Post-TR	Pre-TR	Post-TR	Pre-TR	Post-TR	Pre-TR	Post-TR	Pre-TR	Post-TR	Pre-TR	Post-TR	
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)	(5a)	(5b)	(6a)	(6b)	(7a)	(7b)	
<i>Intercept</i>	0.010	0.023	0.007	0.010	-0.003	0.004	0.024	0.019	0.009	0.014	-0.004	0.014	0.022	0.022	
	(6.47) ***	(12.06) ***	(3.51) ***	(3.22) ***	(-1.17)	(1.20)	(2.54) **	(10.14) ***	(4.65) ***	(3.81) ***	(-0.22)	(1.74) *	(2.43) **	(5.57) ***	
<i>SDsize</i>			0.032	0.040			0.008	0.018	0.045	0.047			0.007	0.012	
			(3.67) ***	(2.79) ***			(0.21)	(1.91) *	(4.23) ***	(2.05) **			(0.20)	(0.60)	
<i>NSDsize</i>					0.095	0.036			0.037	-0.027	-0.034	0.153	-0.116	0.022	
					(5.14) ***	(0.86)			(2.07) **	(-0.73)	(-0.23)	(1.74) *	(-1.43)	(0.57)	
<i>DY</i>	-0.084	-0.218					-0.378	-0.114			0.857	-0.244	0.143	-0.146	
	(-1.25)	(-8.26) ***					(-1.13)	(-3.76) ***			(1.46)	(-2.55) **	(0.42)	(-2.21) **	
<i>TCR</i>		-0.045		-0.017				-0.048		-0.030		-0.013		-0.055	
		(-8.05) ***		(-1.36)				(-8.13) ***		(-2.18) **		(-0.69)		(-4.84) ***	
<i>F-statistic</i>	1.563	60.418	13.474	5.870	26.382	0.744	0.792	32.961	13.222	3.203	1.524	3.660	0.797	7.922	
<i>Prob.(F-statistic)</i>	0.2118	<0.0001	0.0003	0.0031	<0.0001	0.3895	0.4580	<0.0001	<0.0001	0.0234	0.2367	0.0145	0.5008	<0.0001	
<i>No.</i>	448	1269	393	358	239	176	56	1485	787	358	29	121	60	457	

***, **, * indicate the significances at the 1%, 5%, and 10% levels, respectively.

5.3.1. Regression Analysis on the Last Cum Day

In Panel A of Table 3, we are more interested in the effect of TCR on the last cum-day abnormal returns. Our hypothesis is that if everything else is equal, the stock along with the higher tax credit ratio has the higher abnormal return on the last cum day. For the regressions (1b), (4b), (5b) and (6b), the TCR has the significantly positive effect on the last cum-day abnormal returns. This implies that higher tax credit ratios lead to higher abnormal returns on the last cum day. For the short-term dividend-capture traders, the day prior to the ex-day is the last chance to buy the stock. The buying pressure would lead to an appreciation in the stock price. Therefore, stocks with higher tax credit ratios may experience higher returns on the last cum day.

For the firms which only distribute the cash dividend (CD), as shown in the regression (1b) of Panel A and the regression (1b) of Panel B, we find that the dividend yield and the tax credit ratio are both positively related to abnormal returns on the last cum days after the tax reform, and yet both of them are negatively related to ex-day abnormal returns, suggesting that dividend/credit capturer buy the stocks cum-dividend and sell them ex-dividend. In addition, the value of tax credits also lower the tax burden on shareholders, and, consequently, the ex-day abnormal returns decrease. Above results support the Hypotheses 2 and 3.

5.3.2. Regression Analysis on the Ex-day

As shown in Panel B of Table 3, the intercepts for most of the regressions are significantly positive at least to the 10% level except for the regressions (3a), (3b) and (6a). The significantly positive predicted abnormal return on the ex-day might be important for the speculators to trade during the ex-period (Bell and Jenkinson, 2002). As shown in Panel B of Table 5, the regressions (1a) and (1b) show the regression analysis of factors DY and TCR affecting ex-day abnormal returns for the firms which only pay cash dividend. The coefficient on DY is -0.084 in the pre-imputation period. The corresponding t -statistic, -1.25 , is statistically insignificant. This finding is similar to the result found by Lasfer (2008). He argues that activities of short-term dividend capturers might reduce the tax impact. It is interesting to see that the coefficient on DY in regression (1b) turns to more negative and is statistically significant at the 1% level after the tax reform. This result is similar to the Kadapakkam's (2000) finding that short-term arbitrageurs actively trade to profit the abnormal returns of the stocks with the high-yielding dividend and consequently decrease the ex-day abnormal returns of those stocks.

For the ex-day abnormal return, we are interested in the effect of TCR on $AR(0)$. As shown in the regression (1b) of Panel B, for the firms which only pay cash dividends (CD), the coefficient on TCR is -0.045 . Our empirical results validate the value argument proposed by Anderson *et al.* (2004). They argue that when a firm distributes the dividend attached with the imputation credit, the stock price would experience a negative impact. As shown in the regressions (4b), (6b) and (7b), for any dividend-distribution composition, the factor of dividend yield becomes significantly negatively related to the ex-day abnormal return in the post-imputation period. For the most of the various dividend distributions, as shown in the regressions (1b), (4b), (5b) and (7b) of Panel B, the tax credit ratios are significantly negatively related to the ex-day abnormal returns.

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As shown in the regressions (2a) and (2b) of Panel B, the *SDsize* has the significantly positive effect on ex-day abnormal returns for the firms only pay the taxable stock dividends for the pre- and post-imputation periods.

6. Conclusions

This study investigates the stock price movements during the ex-day period in Taiwan market from 1991 to 2008. The imputation tax system was introduced in 1998. We find significant abnormal returns not only on the ex-days but also around the ex-days. Ex-day abnormal returns decrease after the tax reform, which suggesting that tax credits have a market value and reduces ex-day abnormal returns.

Our result shows that short-term arbitrage trading might mitigate tax effect and lead to insignificant ex-day abnormal return for the firms which only pay cash dividend. The taxable stock dividend size is positively related to ex-day abnormal return. This can be explained by disadvantages of tax and odd-lot cost. Our results also show that the nontaxable stock dividend size is positively related to ex-day abnormal returns. This is the risk premium for the shareholders who can not get odd-lot shares until about forty days after the stock goes ex-right. We document that tax credit ratio and dividend yield are both significantly positively related to the last cum-day abnormal returns after the tax reform. In contrast, both of the tax credit ratio and dividend yield are significantly negatively related to ex-day abnormal returns.

In conclusion, the tax reform of 1998 not only changed the dividend policies of companies but also induced the dividend/credit-motivated trading around the ex-days. If there is a short-term trading around the ex-days, we should observe positive abnormal trading volume around the ex-days. Further research should be focus on the examination of trading volume around the ex-days.

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