



Article

# The Different Dividend Signaling Effect under Tax Deduction around Ex-Right Day: Evidence from Taiwan Stock Exchange

Hsing-Hua Hsiung <sup>\*</sup>, Juo-Lien Wang <sup>\*</sup> and Hong-Wei Huang

Department of Accounting, Chaoyang University of Technology, Taichung 413310, Taiwan

<sup>\*</sup> Correspondence: sandyhsi@cyut.edu.tw (H.-H.H.); lotuswang@cyut.edu.tw (J.-L.W.)

**Abstract:** Dividend tax policy is one of the important tools of government taxation. Observing the dividend tax policy and the behavior of stock prices around ex-rights will not only shed light on investment strategies, but also give us a clearer understanding of the microstructure of the capital market. Taiwan went through dividend tax policy and National Health Insurance (NHI) supplementary premium changes from 2014 to 2016. Therefore, this paper adopts the event study method to conduct empirical research on this major event period. The research conclusion points out: (1) During the research period, the company studied had a positive cumulative abnormal return before and on the ex-right day, and there was a negative cumulative abnormal return after the ex-right day. (2) When the tax reduction effect is more favorable to investors, there will be only a positive relationship with positive abnormal returns. (3) There is no statistical significance between the dividend tax reform policy and the negative abnormal return after ex-rights. The empirical results of this paper can help to better understand the pricing process of stocks by market microstructure systems such as dividend tax policies and help build a more stable stock market transaction structure. On the other hand, investors and companies can also gain their own investment or dividend policy inspiration from this research.

**Keywords:** tax reform; 2-generation NHI in Taiwan; ex-right day; abnormal return; dividend signaling



**Citation:** Hsiung, Hsing-Hua, Juo-Lien Wang, and Hong-Wei Huang. 2022. The Different Dividend Signaling Effect under Tax Deduction around Ex-Right Day: Evidence from Taiwan Stock Exchange. *Journal of Risk and Financial Management* 15: 509. <https://doi.org/10.3390/jrfm15110509>

Academic Editor: Ștefan Cristian Gherghina

Received: 11 September 2022

Accepted: 31 October 2022

Published: 4 November 2022

**Publisher's Note:** MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



**Copyright:** © 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

## 1. Introduction

### 1.1. Motivation

The rapid evolution of globalized economic policies has led to the continuous reform of tax systems by governments in various countries in response to changes in the environment. The tax policy of dividend income not only affects tax efficiency, social equity and national fiscal revenue, but it is also a research topic that the microstructure theory of the finance field attaches great importance to. Since dividend income tax is an important change in investment transaction rules, understanding how this system change affects the ex-rights process and outcome of securities assets will help clarify the behavior patterns of stock market participants.

Dividend income tax is one of the important factors influencing stock investment decisions. Campbell and Beranek (1955) studied stock price behavior on ex rights day, and they both found that when dividends went ex-dividend, stock prices fell less than the amount that dividends did. After that, some scholars conducted intense research on stock price changes on ex-rights day. Elton and Gruber (1970) proposed the tax effect to explain this phenomenon.

Dividend income tax in Taiwan has avoided double taxation of profit-seeking corporate income tax and corporate shareholder dividend income tax since 1998. Therefore, the policy makers started to implement the combined deduction of the two taxes. Since 2015, the deductible comprehensive income tax has been halved, reducing the tax benefit for shareholders to receive dividends. Lin et al. (2001) revealed that after the adoption of the

new tax system, there was an increase in the average excess return of stock purchases on the day prior to ex-dividend and selling on the next day.

In addition, the national health insurance system launched in Taiwan in 1995 is a welfare policy of compulsory insurance. The premium was originally calculated on the basis of recurring salary, but under the pressure of severe financial deficit, supplementary premiums were levied toward the “Individual Gross Income System” on 1 January 2013. Among them, a supplementary insurance premium of 2% was imposed on dividend income, and the supplementary insurance premium rate was adjusted to 1.91% in 2016.

Under the reform of the above two tax policies, if the shareholders participate in the dividend distribution of the 2015 surplus in 2016, they will also face two new policies of “halving the deductible tax amount” and “reducing the second-generation health insurance supplementary premium to 1.91%”. Motivation of the research and in-depth study of the impact of dividend-related tax rate policy changes on investment behavior are involved.

Regarding the abnormal returns on the ex-rights day of the Taiwan stock market, Lee (1991, 1994) put forward a very important hypothesis of bargain hunting to explain this phenomenon. This hypothesis is used to describe the irrational behavior of investors. This phenomenon claims that when investors find that the stock price is higher than expected, there will be selling pressure; on the contrary, if the expected stock price is lower than the actual price, there will be an influx of buying. Therefore, when a company conducts ex-rights, the market price after ex-rights day is relatively low, whether compared with before ex-rights day or with other stock prices in the same industry. Therefore, under the psychology of investors picking cheap, it will cause abnormal stock returns after stock ex-rights day.

Based on the above theoretical and practical background, this study intends to use the ex-right day of listed companies in 2014, 2015 and 2016 in Taiwan’s exchange market as the event day and uses the event study method to explore whether the market anomaly of average excess returns will still occur in listed companies around the ex-rights day after two tax policy reforms in Taiwan.

Therefore, the dividend deductible personal comprehensive income tax rate was the most favorable at 100% in 2014 compared to 50% in 2015 and 2016. Dividends were subject to a 2-generation NHI premium ratio of 2% in 2014 and 2015 and 1.91% in 2016. Based on the balance of the sample size consideration, this three-year period has fully captured the two events that the purpose of this study demonstrates: tax reform and additional NHI premiums. If the period is too long, the sample size of each event will be unbalanced, which may lead to biased conclusions.

The main purpose of this paper is to provide empirical evidence on the impact of changes in income tax policy reform on abnormal returns of companies’ stock prices.

In addition to the empirical research for the efficient market hypothesis, the abnormal return of stock around the event day is explained by the level of the deductible income tax amount of dividends and the psychological hypothesis of price comparison. The empirical results of this paper help to understand the possible economic consequences of dividend income taxation policies on the stock market and firm value. It can be used as a reference for decision makers to plan and respond when considering dividend policy and dividend income tax policy.

## 1.2. Dividend Policy and Taxation in Taiwan

Like other countries in the world, Taiwan’s tax system is constantly changing with the times. The two-tax integration system has been implemented since 1998. Before the implementation of this system, the earnings earned by a company were taxed once before being distributed to shareholders as dividends. Distributions to shareholders would again be included in their personal income and then taxed again, resulting in double taxation of shareholders. However, since 1 January 1998, the two-tax integration system has been implemented, with the purpose of encouraging the public to make direct equity

investment to promote economic growth. Therefore, its essence is to give tax incentives to investment income.

More than 10 years after the implementation of the two-tax integration system in Taiwan, it was found that this system had no obvious help in promoting investment, and the tax revenue of the treasury had been reduced by nearly TWD one trillion, which had seriously affected the tax revenue of the fiscal treasury. Therefore, with reference to the international tax reform trend and expert advice, Taiwan amended the income tax law and adjusted the deductible tax amount of the net dividends received by shareholders to be half of the original deductible tax amount.

Starting from 1 January 2015, when a company distributes surplus to shareholders, the part that can be fully deducted from personal income tax has been reduced to half. Such changes may have little effect on individuals with a lower comprehensive personal income tax rate, but for those with a higher personal comprehensive income tax rate, investors may need to pay more tax than in previous years. Therefore, it is possible to change the motivation of whether or not to participate in the stock ex-dividend.

### *1.3. National Health Insurance (NHI) in Taiwan*

The national health insurance (NHI) system is an important compulsory insurance welfare policy in Taiwan which was implemented on 1 March 1995. It has the characteristics of a wide range of insurance coverage and a large range of benefits. Significant achievements have been made in improving the fairness, accessibility and health of residents. The initial premium of the NHI is based on the national regular salary rather than the total income as the basis for the calculation of the premium, and only the general insurance premium is collected. Other personal income such as dividend income, rental income and other items are not included in the premium calculation basis. However, with the development of Taiwan's economy, the proportion of Taiwan residents' salary to income has been decreasing year by year. The original premium collection method has increased the burden on the salaried class whose main income is salary. This has resulted in the phenomenon that the same income earners have different insurance premiums, and capital owners with more total income have less universal health insurance premiums.

Since the implementation of Taiwan's NHI system, the financing mechanism and payment mechanism have been adjusted after the changes of the times and changes in the social structure. Thus, the so-called 2-generation NHI in Taiwan was formed. The 2-generation health insurance was implemented on 1 January 2013, and supplementary insurance premiums were levied. In addition to maintaining the current salary-based premiums for 2-generation NHI, the biggest difference is the expansion of the payment base. The purpose is to implement fairness that is affordable.

For the specific six items of income, a supplementary insurance premium of 2% will be charged with source deduction to improve the fairness of the NHI system. The six incomes are: (1) bonuses that exceed four times the insured amount of the current month, (2) part-time salary, (3) business income, (4) dividends, (5) interest, (6) rent, etc.

The 2-generation NHI premiums are reviewed annually. The National Health Insurance Association composed of expert representatives will report to the competent authority for approval after completing the review of the insurance rate for the next year according to the results of the agreement on the expected medical expenses of the next year. From 2013 to 2015, the supplementary insurance rates were all 2%. After deliberation on January 1, 2016, a new formula was calculated, and the rate was reduced from the original 2% to 1.91%.

## **2. Literature Review**

### *2.1. Wealth Effects of Dividend Announcements and the Signaling Hypothesis*

Companies usually share the results of operations with shareholders through the distribution of cash and stock dividends. Dividend signaling theory, also known as the signaling hypothesis or information content of dividend hypothesis, starts from relaxing

the MM theorem assumption that investors and management have the same information. It is believed that in the imperfect market, there is information asymmetry between the management authority and external investors of the enterprise, and the main focus of dividend policy theory is to explore whether the dividend policy will affect the value of the company.

Many studies, such as earlier ones by [Fama et al. \(1969\)](#), [Woolridge and Chambers \(1983\)](#), [Grinblatt et al. \(1984\)](#), have documented that stock dividends lead to excess returns around ex-right day. Furthermore, a recent study by [Kadioglu and Kirbas \(2021\)](#) used a sample of 1220 stock dividends of 305 companies listed on the Istanbul Stock Exchange from 1997 to 2018 and empirically found that a positive abnormal return on stock prices can be observed around the day before stock dividends, while the cumulative average excess return began to rise significantly in the first ten days, reached the highest level the day before, and then fell back in the following days. Most studies support the phenomenon of positive and significant abnormal returns in stock prices before and after ex-rights.

[Jiang and Huang \(2010\)](#) examined the ex-date price behavior of stock dividends for all stocks listed on the Taiwan Stock Exchange. The sample involves 2056 ex-dates of stock dividends from 473 firms. The results indicate a significantly positive abnormal return of 1.99% on the ex-date of stock dividends. The ex-date abnormal return is positively related to the stock dividend. The average ex-date abnormal return increases from 1.21% for the smallest stock dividend quintile to 3.65% for the largest stock dividend quintile.

[Shyu et al. \(2001\)](#) examined the information content of cash dividend announcements of Taiwan's listed companies and developed the theoretical impact of unexpected cash dividends on returns. Empirical research on cash dividend announcements of Taiwan Stock Exchange trading companies from January 1987 to December 1997 shows that there is evidence to support the information content hypothesis. However, when the interaction between cash dividends and earnings announcements is considered, the empirical results suggest a correlation between cash dividends and earnings announcements.

Based on the above literature, this study proposes the following research hypotheses:

**H<sub>1a</sub>:** *Stocks have a positive abnormal return on the ex-rights date.*

**H<sub>1b</sub>:** *Stocks have a positive cumulative abnormal return before the ex-rights date.*

**H<sub>1c</sub>:** *Stocks have a negative cumulative abnormal return after the ex-rights date.*

## 2.2. The Explanation of Ex-Day Abnormal Returns of Stock

Regarding the reasons for the abnormal return of the stock price on the ex-rights day, it can be mainly divided into three categories in the early stage of observation: the first category is the main reason proposed by scholars such as [Fama et al. \(1969\)](#): the market's perception of the future dividend level of the stock. The second category is represented by [Eisemann and Moses \(1978\)](#), who believe that the reason why company managers issue stock dividends is because of information asymmetry between company managers and investors. They use stock dividends as information to convey changes in the company's future cash flow and earnings performance. The third category is based on the reasons summarized by [Eisemann and Moses \(1978\)](#) and [Baker and Gallagher \(1980\)](#), which is that the company's managers can keep the company's stock price at a lower trading price through stock splits or stock dividends and thereby increase marketability. [Kadioglu and Kirbas \(2021\)](#) take the companies listed on the Istanbul Stock Exchange as an example to study the effect of ex-dividend dates on stock returns and trading volumes. Their findings show that abnormal returns around the ex-days are strongly associated with stock dividend payout ratio, asset size and company market value.

In recent years, some scholars in academia have explained the abnormal return of stock price on ex-rights day from the perspective of tax burden. Research by [Han \(1994\)](#) pointed out that the Tax Reform Act of 1986 implemented in the United States had a significant impact on the ex-dividend returns of NASDAQ stocks, but had no effect on

NYSE and AMEX stocks' relation. Furthermore, they pointed out that the main factor of the ex-dividend return rate of Nasdaq stock comes from the tax premium.

Bhardwaj and Brooks (1999) also concluded in their research paper that the tax client effect is related to the behavior of stock returns on ex-dividend days. Furthermore, this effect persisted after the 1986 Tax Reform Act. When the difference between the dividend and the price drop on the ex-dividend date exceeds the transaction cost of the stock, there is a phenomenon of short-term investors participating in the ex-dividend.

Haesner and Schanz (2011) examine the impact of Germany's 2001 tax reform, which consisted of a transition from a full imputation system to a classic system. The paper notes that the results have resulted in a significant drop in net dividend valuations for high-dividend-yielding stocks.

The phenomenon of abnormal returns of ex-rights stocks in Taiwan's stock market was explained earlier by the research of scholar Lee (1991, 1994). This hypothesis of bargain hunting points out that abnormal stock returns are caused by the irrational behavior of securities investors. When investors find that the stock price is higher than expected, there will be selling pressure. Conversely, if the expected stock price is lower than the actual price, there will be an influx of buying, but irrational investors make these decisions without considering the true value of the stock. They believe that the stock price after ex-rights, whether compared with the price before ex-rights or with other stocks in the same industry, is relatively low, which will result in abnormal returns after stock-ex-rights due to the investor's psychology of picking up bargains.

Lin et al. (2001) took the Taiwan stock market as an example to discuss the relationship between abnormal trading volume and tax deduction ratio. The results of the study indicate that when the company's deductible ratio is low, shareholders with a high income tax rate want to sell, but shareholders with a low income tax rate will not receive much benefit if they buy, so there is no large abnormal transaction volume.

The empirical study of Lee (1994) pointed out that some investors in Taiwan's stock market gave up participation in ex-rights due to tax burden before ex-rights, which resulted in negative abnormal returns of stock prices before ex-rights. Some investors are willing to buy stocks before the ex-rights date, but because investors with high marginal tax rates hold more shares, the selling pressure exceeds the buying order. Therefore, there will be negative abnormal returns before the ex-rights date. However, after the implementation of the two-in-one tax system, investors enjoy the preferential tax deduction, so the abstention selling pressure will no longer appear.

Michaely and Vila's (1995) deduced that under equilibrium conditions, the trading volume due to ex-dividend information will be affected by the heterogeneity of tax rates among investors, the amount of declared dividends of the investment target company and the market risk of the company's ex-rights. Through his empirical results, he also found that abnormal trading volume is indeed positively related to tax heterogeneity and declared dividend amount, and negatively related to transaction cost and risk.

Lu (2003) continued Michaely and Vila's (1995) equilibrium theory of trading volume before and after the ex-rights day and modified it. The sample period was from 1992 to 2002 and examined the influence of various variables on the abnormal trading volume before and after the ex-rights and ex-dividend day. The empirical results show that the level of the company's declared dividends is positively correlated with the accumulated abnormal trading volume around the ex-rights day, and the company's market risk is negatively correlated with the accumulated abnormal trading volume around the ex-rights day, which is consistent with the theory of Michaely and Vila (1995).

Lin et al. (2015) analyzed historical data on stocks with high dividend yield and high tax credit rate. The results of the study found that the stock price had a positive and significant abnormal return five days before the ex-dividend date. On the ex-dividend date, there was a significant negative abnormal return. The implication of the study is that investors strongly prefer to buy stocks with high dividend yields and high tax credit

ratios and sell them after the ex-rights date to obtain high taxes for the purpose of offsetting personal income tax expenses.

Through the above related research on taxation and abnormal returns, this study believes that when the tax deduction effect of the dividend deduction policy is more favorable to investors, there will be obvious abnormal returns, so the research hypothesis  $H_2$  is proposed. It means that the higher the tax-refundable ratio of allotment dividends, the more the incentives for investors to participate in ex-rights to receive dividends, so there is a positive relationship with the positive cumulative abnormal returns before and on the ex-rights day.

**$H_2$ :** *When the tax deduction effect is more favorable to investors, there will be obvious positive abnormal returns.*

On the other hand, paying an additional 2-generation NHI premium in dividend income means a decrease in dividend income for investors, so there is a negative relationship between health insurance supplementary premiums and the positive cumulative abnormal return on the ex-dividend date. Based on the above, this study proposes the research hypothesis  $H_3$ .

**$H_3$ :** *The 2-generation NHI premium has a negative correlation with the positive abnormal return on the ex-rights date.*

### 3. Data and Method

#### 3.1. Data

The research sample of this paper is the ex-rights data of Taiwan's listed companies in 2014, 2015 and 2016, with 592, 634 and 676 samples, respectively, and the total number of samples in three years is 1902. The reason for only taking the three-year study period is the balance of the sample size of the two events. If the data from previous or subsequent years are included, the number of samples of a single event will be too large, resulting in an unbalanced sample size, which will affect the results of statistical inferences. This study uses the event research method to analyze the abnormal returns of stock prices around the ex-right day of each year, and the data are taken from the public information observatory provided by the Taiwan Stock Exchange and analyzed by the event research system of the Taiwan Economic Journal Database (TEJ).

#### 3.2. Estimation Abnormal Return of Stock

The event research method is a commonly used empirical method in the financial field. [Fama et al. \(1969\)](#) studied the effect of stock dividends and observed whether the company will generate abnormal returns when paying dividends. The event study method is mainly used to test the existence of the semistrong efficient market hypothesis. That is, the information reflected in the price of a security includes all publicly available information in addition to historical information.

Usually, the event window will be longer than the date of the event, including a period of time before and after the event. Because the information content in the period before and after the event is relatively sufficient, investors can better capture the signs before the event and the impact after the event. In particular, Taiwan's capital market is not a strong form efficiency market, and the stock market usually cannot fully respond to specific events in a very short period of time.

The design of the event window of this study refers to the research method of [Boehmer et al. \(1991\)](#), and after prechecking the data, the abnormal return of the stock price of the observed sample starts about 10 days before the ex-rights date and ends 10 days after the ex-rights date. Therefore, the designed event window is in the range of  $(-10, 10)$ .

The company's ex-right day is the 0th day of the event day, and the event period is 10 days before and after the event day, that is, the 10 days before and after the ex-rights day is the event period, with a total of 21 days. The estimated period is 310 days before

the event to 11 days before the event, a total of 300 days. The event study method can be used to understand the impact on investors' willingness to participate in ex-rights dividends when the two events of "halving the deductible tax amount" and "2-generation NHI supplementary premiums" occur in Taiwan. Furthermore, by examining the results of abnormal returns of stocks, the investors' reactions before and after the implementation of the policy can be explained.

The abnormal return in the event study method is defined as the actual rate of return minus the expected rate of return during the event analysis period. There are several methods used to measure the expected return of stocks in the research. Some use the stock's own historical data as the normal rate of return; others are normal returns adjusted by the market's single-factor return (Mackinlay 1997), such as: constant-mean return, mean-adjusted returns, market-adjusted returns, etc.; there are also models that consider multiple factors, such as the APT proposed by Born (1984) and the three-factor mode proposed by Fama and French (1993).

Biased expected returns can lead to erroneous results in event studies. However, Brown and Warner (1980), Brown and Weinstein (1985), Chandra et al. (1990), Binder (1998) all found that event studies using multifactor models are no more powerful than those using market models. The reason is that it is difficult to correctly find the factors of a multifactor model, and the estimation procedure is also prone to errors. Therefore, this study adopts the market model to calculate the expected rate of return of the stock.

The market model establishes the risk-adjusted return of individual companies' stocks based on market returns. This relationship is a linear relationship. This paper uses this model to understand whether the event of a company issuing stock dividends will cause abnormal returns on stocks. Looking at stock prices in the days preceding and following the event date can serve as a test for the market's reaction to an event. Market models are widely used to explore the effect of specific events on stock prices because they can partially exclude market factors that affect stock price movements and show the effects of company-specific information in the residuals.

The 'market model' equation assumes a linear relationship between the returns of a particular security ( $R_{i,t}$ ) and the Taiwan Weighted Stock Price Index returns ( $R_{m,t}$ ) over a period of time.

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t} \quad (1)$$

where  $R_{i,t}$  represents the return rate of sample  $i$  on the  $t$  day,  $R_{m,t}$  is the market return rate on the  $t$  day,  $\varepsilon_{i,t}$  represents the error term on the  $t$  day and  $\alpha_i$  is the regression intercept term.  $\beta_i$  represents the regression coefficient, that is, the systematic risk of the  $i$  sample. The parameters of the market pattern are estimated by the method of least squares (OLS).

The values of individual stock returns,  $R_{i,t}$ , are calculated for a period of 300 trading days before the announcement window ( $T - 310$ ,  $T - 10$ ) and are regressed against the corresponding market returns  $R_{m,t}$  as in the market model Equation (1). Substituting  $\varepsilon_{it} = AR_{it}$  and rearranging Equation (1) gives the final equation for the calculation of the unsystematic/abnormal returns during the event period ( $T - 10$ ,  $T + 10$ ):

$$AR_{i,t} = R_{i,t} - (\alpha_i + \beta_i R_{m,t}) \quad (2)$$

Using the above models (1) and (2), we calculate the return residuals for the period  $T - 10$  to  $T + 10$  for all 1902 observations in our sample. We calculate the cumulative abnormal returns ( $CAR_{i,t,T}$ ):

$$CAR_{i,t,T} = \sum_t^T AR_{it} \quad (3)$$

Furthermore, we calculate the average abnormal returns ( $AAR_t$ ) and average cumulative abnormal returns ( $ACAR_{i,t,T}$ ):

$$AAR_t = 1/1902 \sum_{i=1}^{1902} AR_{i,t} \quad (4)$$

$$ACAR_{t,T} = 1/1902 \sum_{i=1}^{1902} CAR_{i,t,T} \quad (5)$$

### 3.3. The Regression Model of Abnormal Returns

In this paper, the multiple regression model is used to test the abnormal return on the stock ex-right day by deducting income tax from dividends. The independent variables of the three models are the cumulative abnormal return before the ex-right day, the abnormal return on the ex-right day and the cumulative abnormal return after the ex-right day. The regression model is described as follows:

Model I: The model's dependent variable is the cumulative abnormal return before the ex-right day.

$$CAR_i(-10, -1) = \beta_0 + \beta_1 REDUCT + \beta_2 HEALTH + \beta_3 PR + \beta_4 DYR + \beta_5 EPS + \beta_6 CAT + \beta_7 ROE + \beta_8 SIZE + \beta_9 TAX + \varepsilon$$

Model II: The model's dependent variable is the abnormal return on the ex-right day.

$$AR_i(0) = \beta_0 + \beta_1 REDUCT + \beta_2 HEALTH + \beta_3 PR + \beta_4 DYR + \beta_5 EPS + \beta_6 CAT + \beta_7 ROE + \beta_8 SIZE + \beta_9 TAX + \varepsilon$$

Model III: The model's dependent variable is the cumulative abnormal return after the ex-right date.

$$CAR_i(1, 10) = \beta_0 + \beta_1 REDUCT + \beta_2 HEALTH + \beta_3 PR + \beta_4 DYR + \beta_5 EPS + \beta_6 CAT + \beta_7 ROE + \beta_8 SIZE + \beta_9 TAX + \varepsilon$$

The dependent variables, independent variables and control variables of the above regression model are defined as follows:

1.  $CAR_i(-10, -1)$ : The cumulative abnormal return of the company stock from the 10 days before the ex-right day to the ex-rights day.
2.  $AR_i(0)$ : The company's abnormal rate of return on the ex-right date.
3.  $CAR_i(1, 10)$ : The company's cumulative abnormal return 10 days after ex-right.
4. REDUCT: Investor's dividend income can be deducted as a category variable of the preferential personal comprehensive income tax rate. In 2014, the best discount is a 100% deduction, so it is rounded to category variable 1. In 2015 and 2016, both 50% deductions are made, so the category variable is set to 0.5.
5. HEALTH: Investors' dividend income is subject to the category variable of the NHI supplementary premium ratio, which was 2 in 2014, 2 in 2015 and 1.91 in 2016.

There are seven control variables. The variable symbols and definitions are as follows:

1. PR: The hypothesis of bargain hunting variable. Proposed by Lee (1991, 1994), this variable is calculated from the ratio (PR) of the difference before and after ex-right. The higher the value, the larger the comparative psychological spread. It is calculated as follows:  

$$PR = 1 - (P_a / P_b), \text{ where:}$$

$$P_a \text{ represents the ex-right reference price;}$$

$$P_b \text{ represents the closing price on the day before ex-right day.}$$
2. Dividend Yield Rate (DYR): Ex-right dividend per share.
3. EPS: Earnings per share of the company in the year prior to the ex-dividend date.
4. CAT: represents the industry category variable. Additionally, 3 represents the financial industry, 2 represents the electronics industry, and 1 the rest of the others in the industry.
5. ROE: Return on equity, calculated as net profit after tax/equity.
6. SIZE: Company size variable. The calculation method is the natural logarithm of the company's total assets at the end of the previous year.

7. TAX: Effective tax rate, which is the actual income tax rate paid by the enterprise. The calculation formula is income tax expense/pretax accounting income of continuing operations.

#### 4. Results

##### 4.1. Abnormal Return around Ex-Right Day

In Table 1, we present the frequencies of different types of dividends and earnings combinations for the 1902 announcements in the sample in the period 2014–2016. There were 592 cases in 2014, 634 cases in 2015 and 676 cases in 2016.

**Table 1.** Average abnormal returns and average cumulative abnormal returns.

Panel A: Average Abnormal Returns AAR					
Event Day	All Event	t			
T <sub>0</sub>	0.57	14.6 ***			
Panel B: Average Cumulative Abnormal Returns ACAR					
Before ex-rights			After ex-rights		
Event Window	All Events	t	Event Window	All Events	t
T <sub>-1</sub> , T <sub>-10</sub>	0.12	3.16 ***	T <sub>1</sub> , T <sub>10</sub>	-0.85	-4.36 ***
T <sub>-1</sub> , T <sub>-9</sub>	0.21	3.78 ***	T <sub>1</sub> , T <sub>9</sub>	-0.88	-4.57 ***
T <sub>-1</sub> , T <sub>-8</sub>	0.22	3.21 ***	T <sub>1</sub> , T <sub>8</sub>	-0.81	-4.31 ***
T <sub>-1</sub> , T <sub>-7</sub>	0.17	2.22 **	T <sub>1</sub> , T <sub>7</sub>	-0.76	-4.12 ***
T <sub>-1</sub> , T <sub>-6</sub>	0.15	1.77 *	T <sub>1</sub> , T <sub>6</sub>	-0.68	-3.92 ***
T <sub>-1</sub> , T <sub>-5</sub>	0.07	0.78	T <sub>1</sub> , T <sub>5</sub>	-0.55	-3.26 ***
T <sub>-1</sub> , T <sub>-4</sub>	0.15	1.51	T <sub>1</sub> , T <sub>4</sub>	-0.51	-3.08 ***
T <sub>-1</sub> , T <sub>-3</sub>	-0.21	-1.89 *	T <sub>1</sub> , T <sub>3</sub>	-0.53	-3.29 ***
T <sub>-1</sub> , T <sub>-2</sub>	-0.28	-2.38 **	T <sub>1</sub> , T <sub>2</sub>	-0.49	-3.16 ***
T <sub>-1</sub> , T <sub>-1</sub>	-0.19	-1.59	T <sub>1</sub> , T <sub>1</sub>	-0.41	-2.80 ***

\*\*\* Significant at 99%. \*\* Significant at 95%. \* Significant at 90%.

Panel A in Table 1 is the statistical *t*-test value of whether the  $t_{AR}$  on ex-right day is significantly different from zero. The research results show that the stock has a positive abnormal return rate on the ex-rights (dividend) day, and the average abnormal return test results show that there is an average positive abnormal return of 0.57% on the ex-rights day. Therefore, the hypothesis of H<sub>1a</sub> in this study is statistically supported.

The left side of Panel B in Table 1 (before ex-right) is the *t*-test result of whether the average accumulated abnormal return from 10 days (−10) before the event window to the event day is significantly different from zero. As can be seen from the table, except for that the average cumulative abnormal return for the three days before the ex-right date is negative, the test results of positive cumulative abnormal return are consistently presented from the first 4 days to the first 10 days.

The right side of Panel B in Table 1 (after ex-right) is the *t*-test result of whether the average cumulative abnormal return from 10 days after the event window to the event day (ex-right date) is significantly different from 0. It can be seen that from the 1st day after the ex-rights date to the 10th day after the ex-rights date, the cumulative abnormal return for 10 periods consistently showed negative results. The values for the after event date are consistently higher than before the event date. It shows that investors tend to sell their shares after receiving dividends ex-rights. This phenomenon is consistent with Kadioglu and Kirbas (2021) and Grinblatt et al. (1984). We also verified the research hypotheses H<sub>1b</sub> and H<sub>1c</sub>.

##### 4.2. The Determinants of Abnormal Returns

In Table 2, we report the results from the five multiple OLS regression models, which were estimated to examine the signaling hypothesis around ex-right day for the entire sample.

**Table 2.** The results of the regression.

		Dependent Variables		
		(Model I)	(Model II)	(Model III)
		CAR (−10, −1)	AR (0)	CAR (1, 10)
intercept		−10.319	5.051	9.164
Independent Variables	$\beta_1$	2.125 ***	−0.11	0.155
	(REDUCT)	(3.113)	(−0.411)	−0.156
	$\beta_2$	3.346	−2.725 *	−4.529
	(HEALTH)	−0.858	(−1.786)	(−0.798)
Control Variables	$\beta_3$	8.072	5.797 ***	−8.629
	(PR)	−1.522	(2.794)	(−1.117)
	$\beta_4$	−0.012	−0.131 ***	−0.011
	(DYR)	(−0.184)	(−5.08)	−0.096
	$\beta_5$	−0.023	−0.007	0.019
	(EPS)	(−0.924)	(−0.706)	−0.533
	$\beta_6$	0.074	−0.094	−0.34
	(CAT)	−0.254	(−0.831)	(−0.807)
	$\beta_7$	0.052 ***	0.018 **	0.049 *
	(EOE)	(2.849)	(2.536)	(−1.851)
	$\beta_8$	0.16	0.17 **	−0.012
	(SIZE)	−0.734	(1.988)	−0.038)
	$\beta_9$	0.004	−0.001	0.016
	(TAX)	−0.315 ***	(−0.097) ***	−0.83
	F	4.376	4.087	1.149
	R <sup>2</sup>	0.021	0.019	0.006
	Adj-R <sup>2</sup>	0.016	0.015	0.001

Note: \*\*\* 1% significance level; \*\* 5% significance level; \* 10% significance level.

Since the company has paid the corporate income tax in the business year, the dividend is the distribution of the company's after-tax profit. In order to avoid the double taxation loss of the stock investor after the corporate tax and income tax, the investor can enjoy the personal credit in the next year after receiving the dividend. Therefore, the higher the variable of REDUCT, the greater the degree of preference for investors.

The 2-generation NHI premium variable (HEALTH) means to investors the additional expenses that must be paid in addition to dividend income, so the higher the value, the more unfavorable it is for investors.

The dependent variable of Model I is the abnormal return 10 days before ex-right day, the estimated value of  $\beta_1$ (REDUCT) in Model I is 2.125, the statistical test value of the *t*-value is 3.113 and the *p*-value reaches the test level of 1%. That is to say, the deductible ratio of the allotment tax rate is positively correlated with the positive abnormal return before the ex-right day. Furthermore, the higher the deduction ratio of stock income tax, the higher the excess abnormal return of stock that shareholders can obtain by participating in the stock exchange before ex-dividend. Therefore, it can be considered that the dividends received by investors for participating in ex-rights will be tax refunded when the individual is paid. This result supports the hypothesis H<sub>2</sub> proposed in this paper. When the tax deduction effect is more favorable to investors, there will be obvious abnormal returns.

The dependent variable of Model II is the abnormal rate of return on the ex-right day. The estimated value of  $\beta_2$  (HEALTH) in mode 2 is −2.725, the statistical test value of the

$t$ -value is  $-1.789$  and the  $p$ -value reaches the 10% test level. This result also supports the hypothesis  $H_3$  proposed in this paper.

The degree of preferential taxation for dividends is inversely related to the positive abnormal return on the ex-right day, that is, the lower the supplementary health insurance rate, the higher the abnormal return on the ex-rights day.

As for the phenomenon that the R-squared of the three-model is lower, it is often found in the studies on abnormal returns by the event study method (Katagiri et al. (2022), Kreidl (2020), Lin et al. (2001)). The possible reason is that the value of the abnormal return has a small change, while the independent variable has a large change, thus causing the X-axis of the regression to be nearly parallel. In addition, adding independent variables is also a way to improve the R-squared. However, the F values of the three regressions in this study were all statistically significant, so the three regression models were well-suited.

## 5. Conclusions and Discussion

Taiwan's tax laws are constantly changing with the needs of the times. Major changes in recent years include two new policies, "Half the tax deductible for shareholders" and "2-generation NHI supplementary premiums changed". The policy of "halving the tax deductible for shareholders" reduces the amount of tax that investors originally received to be deducted by half. Compared with the full tax deduction after the two taxes in one policy, the preferential participation in ex-right data is relatively reduced. The 2-generation NHI supplementary premium has been reduced from 2% to 1.91%, which makes the tax that investors need to pay for participating in ex-rights lower than before. Whether these reduced tax costs affect the abnormal returns of ex-right events and then understanding the behavior of investors are the focuses of this paper. Therefore, the research opportunity of this paper is formed to understand the relationship between dividend-related tax reduction and abnormal stock returns through empirical evidence, which is very helpful for understanding investors' mentality and the formulation of dividend tax policies.

In general, the first research implication is that the abnormal return direction of the stock price before ex-rights, the day of ex-rights or after ex-rights is not affected by the dividend tax policy. The conclusion of this study points out that the stocks of listed companies on the Taiwan Stock Exchange have a positive cumulative abnormal return before the ex-right day; there is a positive abnormal return on the ex-rights day; there is an average negative cumulative abnormal return after the ex-rights day. The results of this study are consistent with most empirical findings. In addition, Taiwan's stock market does not conform to the semistrong efficient market hypothesis, that is, securities prices do not reflect all publicly available information, and stock prices still have abnormal returns before and after ex-rights.

The second important implication of this study is that different tax reform changes will have varying degrees of impact at different stages of the stock ex-right day. REDUCT is related to the abnormal return before the ex-right day and has nothing to do with the abnormal return on the ex-dividend date and after the ex-right day; PR is related to the abnormal return rate on the ex-dividend day; HEALTH is only related to the abnormal return rate on the ex-dividend day. Tax reform and abnormal returns after the stock ex-rights date were not statistically significant. The results of this study are also in line with the complexity of investment behavior. Different tax reform strategies make it difficult to generalize investors' investment behavior.

The last important implication that can be derived from the comparison of the three regression models is that the PR and HEALTH independent variables of Model II are statistically correlated with the abnormal return on the ex-date. Model II and Model III do not have this phenomenon. Therefore, it can also be explained that the stock price behavior on the ex-rights day is more susceptible to the impact of the dividend tax policy than before and after the ex-right day. Relatively, the tax rate policy factors have a lower impact before and after the ex-right day. When the tax deduction effect of the dividend deduction policy

is more favorable to investors, it is more conducive to increase the abnormal return on the ex-right day of the stock.

This article is a work of research conducted with Taiwanese enterprises as empirical samples. Due to time and funding constraints, this research cannot conduct larger-scale and in-depth investigations and research. In addition, the three regression models in this study have the phenomenon that R-squared is very low, which can be improved by adjusting the research model. Therefore, follow-up research can use different countries as samples to determine whether the empirical evidence is valid. If the same conclusion as this paper is obtained, the research results of this paper will be more representative and inspiring. In addition, the factors that affect the abnormal return rate are not only from the enterprise itself, but also related to the investor's personal characteristics. Therefore, subsequent researchers must also consider such factors to obtain higher knowledge power.

**Author Contributions:** Conceptualization, H.-H.H.; Data curation, H.-W.H.; Formal analysis, H.-H.H.; Project administration, H.-H.H.; Resources, J.-L.W. and H.-W.H.; Validation, J.-L.W.; Writing—original draft, J.-L.W.; Writing—review & editing, H.-H.H. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research received no external funding.

**Institutional Review Board Statement:** Not applicable.

**Informed Consent Statement:** Not applicable.

**Conflicts of Interest:** The authors declare no conflict of interest.

## References

- Baker, H. Kent, and Patricia L. Gallagher. 1980. Management's View of Stock Splits. *Financial Management* 9: 73–77. [\[CrossRef\]](#)
- Bhardwaj, Ravinder K., and LeRoy D. Brooks. 1999. Further Evidence on Dividend Yields and the Ex-Dividend Day Stock Price Effect. *The Journal of Financial Research* 22: 503–514. [\[CrossRef\]](#)
- Binder, John. 1998. The Event Study Methodology Since 1969. *Review of Quantitative Finance and Accounting* 11: 111–37. [\[CrossRef\]](#)
- Boehmer, Ekkehart, Jim Masumeci, and Annette B. Poulsen. 1991. Event-study methodology under conditions of event-induced variance. *Journal of Financial Economics* 30: 253–72. [\[CrossRef\]](#)
- Born, Jeffery A. 1984. *The Arbitrage Pricing Theory, the Market Portfolio and Ambiguity When Performance is Measured by the Security Market Line*. Working Paper No. FIN-2-84. Lexington: University of Kentucky.
- Brown, Stephen J., and Jerold B. Warner. 1980. Measuring Security Price Performance. *Journal of Financial Economics* 8: 205–58. [\[CrossRef\]](#)
- Brown, Stephen J., and Mark I. Weinstein. 1985. Derived Factors in Event Studies. *Journal of Financial Economics* 14: 491–95. [\[CrossRef\]](#)
- Campbell, James A., and William Beranek. 1955. Stock Price Behaviour on Ex-dividend dates. *Journal of Finance* 10: 425–29. [\[CrossRef\]](#)
- Chandra, Ramesh, Shane Moriarity, and G. Lee Willinger. 1990. A Re-Examination of the Power Alternative Return-Generating Models and the Effect of Accounting for Cross-Sectional Dependencies in Event Studies. *Journal of Accounting Research* 28: 398–408. [\[CrossRef\]](#)
- Eisemann, Peter C., and Edward A. Moses. 1978. Stock Dividends: Management's View. *Financial Analysts Journal* 34: 77–80. [\[CrossRef\]](#)
- Elton, Edwin J., and Martin J. Gruber. 1970. Marginal Stockholder Tax Rates and the Clientele Effect. *Review of Economics and Statistics* 52: 68–74. [\[CrossRef\]](#)
- Fama, Eugene F., and Kenneth R. French. 1993. Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics* 33: 3–56. [\[CrossRef\]](#)
- Fama, Eugene F., Lawrence Fisher, Michael C. Jensen, and Richard Roll. 1969. The Adjustment of Stock Prices to New Information. *International Economic Review* 10: 1–21. [\[CrossRef\]](#)
- Grinblatt, Mark S., Ronald W. Masulis, and Sheridan Titman. 1984. The Valuation Effects of Stock Splits and Stock Dividends. *Journal of Financial Economics* 13: 461–90. [\[CrossRef\]](#)
- Haesner, Christian, and Deborah Schanz. 2001. Ex-dividend Day Stock Prices and Trading Behavior in Germany: The Case of the 2001 Tax Reform. *Payout Policy Tax Clienteles* 40: 527–63. [\[CrossRef\]](#)
- Han, Ki C. 1994. The Effect of the 1986 Tax Reform Act on Ex-Dividend Day Return Behavior. *The Journal of Financial Research* 17: 175–86. [\[CrossRef\]](#)
- Jiang, Ching-Hai, and Yen-Sheng Huang. 2010. Investor overreaction and the ex-date price behavior of stock dividends: Evidence from the Taiwan Stock Exchange. *Journal of Statistics and Management Systems* 13: 1–26. [\[CrossRef\]](#)
- Kadioglu, Eyup, and Ayhan Kirbas. 2021. Stock Dividend Ex-Day Abnormal Return: Evidence from Turkish Stock Market. *Ekonomski Pregled* 72: 670–96. [\[CrossRef\]](#)

- Katagiri, Mitsuru, Junnosuke Shino, and Koji Takahashi. 2022. The announcement effects of a change in the Bank of Japan's ETF purchase program: An event study. *Finance Research Letters* 50: 1–7. [[CrossRef](#)]
- Kreidl, Felix. 2020. Stock-Market Behavior on Ex-Dates: New Insights from German Stocks with Tax-Free Dividend. *International Journal of Financial Studies* 8: 58. [[CrossRef](#)]
- Lee, Tsun-siou. 1991. Stock dividends, equity right issues and the stock price behavior around the ex-right date: Theory and evidence. *NTU Management Review* 2: 1–40.
- Lee, Tsun-siou. 1994. After-Tax excess Return on the Ex-Right Day of Stock Dividends and the Hypothesis of Bargain Hunting. *NTU Management Review* 5: 41–60.
- Lin, Suming, Ming-Chin Chen, and Tsun-Siou Lee. 2001. Ex-dividend Day Price Behavior of the Taiwan Stock Exchange before and after the Imputation Tax System. *Journal of Management and Business Research* 18: 477–501.
- Lin, Tony Kuan-Yuh, Chen Ming-Chang, and Ching-Hwa Lee. 2015. A Brief Discussion on Big Data Analyses and Applications: Evidence from Taiwan Market. *Journal of Data Analysis* 10: 1–15.
- Lu, Hsin-Ying. 2003. *The Effect of the Tax Imputation Credit System on Cumulative Abnormal Trading Volume around the Ex-Dividend Day*. New Taipei: Graduate Institute of Accounting, National Taiwan University.
- Mackinlay, A. Craig. 1997. Event Studies in Economics and Finance. *Journal of Economic Literature* 35: 13–39.
- Michaely, Roni, and Jean-Luc Vila. 1995. Investors' heterogeneity, prices, and volume around the ex-dividend day. *Journal of Financial and Quantitative Analysis* 30: 171–98. [[CrossRef](#)]
- Shyu, David, Min-Shann Tsai, and Zen-Eou Chen. 2001. The Information Content of Dividend Announcements: The Case of Taiwan. *Pan-Pacific Management Review* 4: 223–43.
- Woolridge, J. Randall, and Donald R. Chambers. 1983. Reverse Splits and Shareholder Wealth. *Financial Management* 12: 5–15. [[CrossRef](#)]