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What drives the dating game of executive options exercise? Evidence from Taiwan

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Abstract

Examining Taiwanese firms from 2002 to 2008, this paper investigates the motivations behind backdating the exercising of executive stock options. The probability of suspect exercises (backdating) is positively related to the firm's stock return, the value of the option, tax savings, institutional ownership and the extent of CEO equity ownership and negatively related to firm-specific risk and the use of Big Four accounting firms. Tax incentives motivate executives to backdate the exercise date, implying that the greater the potential for larger tax savings, the greater the likelihood of backdating. Backdating usually occurs in firms that have heavy ownership by the CEO, have more claims to executive stock options and are not family-run, confirming the presence of the agency cost problem.

Key words: Backdating; Exercise date; Stock options

JEL classification: C12, C35, G32

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1. Introduction

This paper examines factors that determine the likelihood of backdating in the exercise of executive stock options, which is the practice of selecting a retroactive date on which the stock price was particularly low for executives to exercise their

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stock options. Narayanan and Seyhun (2008) indicate that backdating is more likely in smaller firms and where large volumes of options can be exercised, while Dhaliwal *et al.* (2009) show that the rate of personal income tax influences the behaviour of executives in exercising their stock options. The topic of backdating executive stock options is important because it sheds light on different issues related to the agency cost issue concerning executives, corporate governance and transparency of the firm.[1]

There are two stock option exercise strategies characterized by executives' stock disposition on the exercise date: exercise-and-hold and exercise-and-sell. The exercise-and-hold strategy refers to the situation in which executives hold all their acquired stock after exercising the option, while the exercise-and-sell strategy refers to the situation in which executives sell all or part of the acquired stock immediately after exercising the option.

The backdating of stock options exercise refers to the practice of retroactively selecting a date on which the stock price was particularly low to be the exercise date. When executives backdate their stock options exercise, we refer to this strategy as the exercise-and-hold strategy because they cannot sell the shares on the past date when the market price was low.

The tax treatment of stock options in the United States can be grouped into two categories:[2] The difference between the stock price and the strike price is subject to ordinary income tax (now as high as 35 per cent). When executives dispose of their shares, they are subject to the capital gains tax. Executives who hold their shares for at least 1 year with capital appreciation can be taxed at a much lower capital gains tax rate. Currently, the ordinary income tax rate can be 233 per cent of the capital gains tax rate (which is at 15 per cent). If executives employ the exercise-and-hold strategy, they have a tax incentive to pay the lower capital gains tax instead of the ordinary income tax.

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[1] Under the optimal contract theory, the intent of issuing stock options to executives is to reduce the conflict between executives and shareholders, which should enhance shareholder value. However, current literature views backdating as an agency problem in which executives manipulate the timing of exercising stock options for their own profit.

[2] There are two principal kinds of stock option programmes with unique rules and tax consequences for each: non-qualified stock options (NQSO) and incentive stock options (ISO). When an executive exercises an NQSO, the spread between the market price on the exercise date and the strike price is the executive's profit, which would generally be taxed at the ordinary income rate for that year. The corporation generally receives a tax deduction on the 'spread'. If the stock options qualify for the Internal Revenue Code Section 422 tax treatment, they are called ISO. Gains from these options are generally taxed at the capital gains tax instead of the higher ordinary income tax. The corporation does not receive a tax deduction for this type of stock option in the ISO programme. An ISO cannot be granted for in-the-money options, and the stock value covered by the ISO cannot exceed $100,000 per executive per year.

Executives who exercise stock options in Taiwan face one of two tax treatments.[3] When executives exercise their stock options, the spread between the current market price and the strike price is taxed at the ordinary income tax rate. However, when they sell shares after exercising their stock options in Taiwan, they do not pay any capital gains tax because of a higher market share price. In other words, when executives select a date with a low closing price to backdate their exercise date, they do not need to worry about capital gains tax.[4]

The difference between the tax treatment of stock options exercise in the United States and Taiwan arises because in Taiwan, there is no capital gains tax applied, whereas in the United States, capital gains tax is levied. Thus, Taiwanese executives can ignore capital gains tax in their decision making. As a result, the tax system in Taiwan provides executives a stronger incentive to backdate the exercise date than those executives in the United States.

US executives have to consider the trade-off between the ordinary income tax and the capital gains tax payment when backdating so that their tax bills (combining the ordinary income tax and capital gains tax) will be minimized while they still have the incentive to backdate the exercise date in order to reduce ordinary income tax.

The existing literature supports the notion that the exercise-and-hold strategy is optimal for executives with stock options. For example, McDonald (2003) indicates that if executives expect an increase in their rate of ordinary income tax, then they will find the exercise-and-hold strategy optimal. In addition, Cicero (2009) demonstrates that an exercise-and-hold strategy may be optimal if the exercise date can be chosen ex post to minimize the total tax burden and that this strategy is favoured over any alternative if the executives can backdate the exercise date. Under the current tax regimes in the United States and Taiwan, the

[3] All stock options here are based on non-qualified stock options (NQSO) because the NQSO's tax treatment is similar to the tax treatment of stock options in Taiwan. Related research is based on NQSO, like Dhaliwal *et al*. (2009).

[4] For example, an executive in Taiwan holds stock options on 100,000 shares with a strike price of $15. If the stock price today (December 30) is $40, he/she can backdate the exercise date to 1 month ago (November 30). The stock price then was $20. The current stock price ($40) has doubled the closing price on November 30 ($20). Apparently, the executive (with an assumed income tax rate of 30 per cent) can sell these shares today on December 30, realizing a total income of $2.5 million [=($40−$15)*100,000]. The executive must pay an income tax of $150,000 [i.e. ($20−$15)*100,000*30 per cent] but does not have to pay any capital gains tax, resulting in a net gain of $2.35 million ($2.5 million−$150,000). The executive has an incentive to backdate the stock option exercise date to the lowest closing price in Taiwan. This transaction is referred to as the exercise-and-hold strategy. However, in the United States, the executive in this example has to pay an additional capital gains tax of $300,000 [=($40−$20)*100,000*15 per cent], resulting in a net gain of $2.05 million ($2.5 million−$150,000−$300,000). The income tax rate is higher than the capital gains tax in the United States, providing an incentive for backdating to lower the income tax burden.

exercise-and-hold strategy seems to be the best strategy for executives. This paper examines the effect of tax savings on backdating in Taiwan.

Dhaliwal *et al.* (2009) examine US CEO stock option exercise data and find that if executives exercise their options and hold shares for at least 1 year, they have an incentive to backdate the stock price on the exercise date to lower their ordinary income tax immediately. Doing so might increase their future income if share prices rise, which will make them liable for paying capital gains tax. When executives in Taiwan exercise their stock options, the spread between the current market price and the strike price is part of the consolidated income of an individual for the exercise year.[5] Because Taiwan has no capital gains tax, executives have a stronger incentive to manipulate the exercise date with a low stock price. The tax incentive variable should be an important factor in option backdating in Taiwan.[6] Thus, the stock option data for Taiwan offer a unique opportunity to assess the personal tax motivations behind the exercise of stock options.

When executives engage in backdating, they are generally more concerned with total capital gains from the stock price movements. In fact, many studies, such as Carow *et al.* (2009), Huddart and Lang (2003) and Narayanan and Seyhun (2008), present the same argument, using raw stock returns as the basis for their empirical backdating analysis. Thus, following the literature, we use raw stock returns in our analysis.

Our sample includes both family-run and non-family-run firms, enabling us to analyse the effect of agency costs on the exercise of executive stock options. That is, the results help us better understand how executives behave in the two types of firms. This analysis has important implications, particularly for Asian countries, which have a large number of listed firms that are family-run.

Finally, we provide a comprehensive analysis of the factors behind backdating, including stock return momentum, the value of the options exercise and institutional ownership. In addition, we investigate the effect of the public firm-specific news hypothesis proposed by Roll (1988) on the likelihood of exercising stock options. That is, how is the likelihood of option exercises affected by more firm-specific information that has been capitalized or incorporated into the stock prices? This study adds to the literature on backdating the exercise of executive stock options and has implications for both public policy and corporate governance.

The results indicate that about 17.87 per cent of executive stock options are exercised on the day of the month with the lowest closing price, a rate

[5] The consolidated income tax is declared and paid in the subsequent year in Taiwan.

[6] Our study examines factors underlying the probability of backdating. They are related to the executives' interest and their decision to realize gains from exercising the options as well as underlying forces (such as the use of Big Four accounting firms) that reduce the likelihood of making the decision. The stock options granting decision is a different research issue that may concern the tax status of corporations and is not the focus of the present study.

significantly higher than the 4.8 per cent exercised on any other day of the month.[7] Additional analysis shows that for the 381 suspect exercises in our samples, executives saved over NT$130,795 in tax per stock option exercise. That is, by exercising their stock options on the day of the lower closing price, executives realized a total tax savings of more than NT$49.83 million.[8] The result implies that tax motivations are an important factor in backdating the exercise of stock options. In addition, the probability of suspect exercises (backdating) is positively related to the firm's stock return, the value of the option, institutional ownership and the extent of CEO equity ownership and is negatively related to firm-specific risk and the use of Big Four accounting firms. The backdating of the exercise of stock options occurs most often in non-family-run firms, confirming the agency cost problem.

The rest of the article is organized as follows. In Section 2, we briefly discuss the methodology, data and related hypotheses. In Section 3, we present the results and implications. The final section offers our conclusions.

2. Methodology and data

2.1. Method and hypotheses

We use a logistic regression to examine the different hypotheses, as shown in the following model:

$$\begin{aligned} Backdating = f(&Nopshare, Momentum, Value, Concurrent, Big4,\\ &Taxsavings, Board, Size, Institution, Non-family,\\ &CEOown, Firm-specific\ risk), \end{aligned} \tag{1}$$

where *Backdating* is a (1,0) dummy variable that is equal to one if the executives exercise stock options at the lowest, second-lowest and third-lowest closing stock price during the month, and zero otherwise. We compute this variable by following the approach of Dhaliwal *et al.* (2009), who infer the backdating exercise date using a procedure that classifies exercises at the lowest monthly price as a 'suspect exercise'.

Nopshare is the number of stock options exercised in logarithmic form. Balachandran *et al.* (2008) point out that the incentive for managers to manipulate investors' perceptions and personally benefit from positive price effects is stronger

[7] In Taiwan, on average, there are 250 trading days a year and an average of 20.83 trading days a month. Hence, the expected frequency of stock option exercise at random for any given day in a month is 4.8 per cent.

[8] Estimate obtained by multiplying the mean tax savings of NT$130,795 (about $4087) by the 381 suspect exercise observations (US$1 equals about NT$32).

when managers have equity ownerships. Therefore, we expect this variable to have a positive effect on the dependent variable because the larger the variable, the greater the gain to the option holders.

Momentum is the firm's stock returns over the exercise date t through $t + 30$. Past studies argue that backdated stock options are more likely to occur during a month with a high volatility of stock returns, when there are greater opportunities for gains through backdating (Heron and Lie, 2007). An increase in returns from stocks seems to be a critical factor affecting the behaviour of managers, as suggested by Carpenter and Remmers (2001). We hypothesize that the larger this momentum, the higher the probability of backdating.

Value is the stock options exercise volume times the value of the stock options. Brockman *et al.* (2010) show that the greater the value of the CEO option, the CEO has an incentive to manipulate the timing and content of voluntary disclosures. So, the *value* variable is expected to have a *positive* effect on the probability of backdating. We estimate the stock options' value based on the Black and Scholes (1973) model. However, Rubinstein (1995) argues that the Black–Scholes (BS) model tends to cause overvaluation theoretically, and Marquardt (2002) indicates that the BS method can overvalue the economic cost to shareholders of issuing stock options to executives.[9] Executive stock options are generally not standard options (like different vesting periods, non-tradable feature and risk-aversion of executives are) so it is not easy to estimate their parameters. As a result, many studies, such as Bebchuk *et al.* (2010), Bergman and Jenter (2007), Core and Guay (2002), McAnally *et al.* (2008) and Mehran (1995), continue to use the BS model to estimate the value of executive stock options. The slight overvaluation result is not expected to affect the sign or direction of the relation, so we follow prior studies and use the BS model here.

Concurrent is a dummy variable that equals one if multiple executives who work at the same firm exercise stock options on the same day and zero otherwise. Hall and Liebman (1998) show that when executives hold large stock options and multiple executives at the same firm exercise their stock options on the same date, they do so at a favourable stock price. Cicero (2009) argues that if multiple executives at the same firm exercise options around the release of information or backdate exercises with favourable prices, it is more likely that they will occur on the same day. Thus, we include the *concurrent* variable in the regression model, which indicates option exercises with multiple executives on the same day in order to examine whether suspect exercises are associated with favourable stock prices for executives. As a result, this variable is expected to have a *positive* effect on the probability of backdating.

Big4 is a dummy variable that equals one if the auditor is from one of the Big Four accounting firms (Deloitte, KPMG, PwC, or Ernst & Young) and zero otherwise. According to Taiwan's regulations, the auditing firm is responsible for

[9] We thank the reviewer for suggesting this point.

ensuring that stock option information has been adequately disclosed in the financial statements and for ascertaining whether proper accounting procedures have been followed.[10] Firms audited by the major accounting companies are less likely to backdate if they are experienced in detecting such behaviour and face a greater risk to their own reputation if it occurs on their watch so they might not encourage their clients to backdate the exercising of their stock options. Collins *et al.* (2009) find that firms that engage in backdating are more likely to be audited by non-Big Four accounting firms than those that are audited by the Big Four.

Tax savings represents the potential tax savings, i.e., $N \times tax \times (P^* - P_{exercise})$, where N is the number of stock options exercised; *tax* is the personal income tax rate; P^* is the average closing price during the exercise month; $P_{exercise}$ is the closing price of the exercise date; and $P^* - P_{exercise}$ is the potential reduction in taxable income per share achieved by exercising the options at $P_{exercise}$.

Dhaliwal *et al.* (2009) show that executives consider the effect of personal income tax liability on their decision to exercise their stock options. The Taiwan Income Tax Act states that the spread between the closing price on the exercise date of stock options and the strike price of stock options should be added to gross income. As mentioned earlier, Taiwan did not levy capital gains tax on the securities' transactions during our sample study, unlike the United States, which does assess these transactions for capital gains. Because they are not subject to capital gain taxes, executives in Taiwan have a stronger incentive to identify a date with a low closing price. Thus, we expect this variable to have a *positive* effect on the probability of backdating.

Board is a (1,0) dummy variable that equals one if the executives who exercise stock options are members of the board of directors and zero otherwise. Regarding the role of the board of directors, Ryan and Wiggins (2002) indicate that when the CEO also chairs the board of directors, the decision making and the monitoring of those decisions cause a potential conflict of interest, implying a less-effective board. We expect this variable to be positive because of the agency cost problem.

Size is the natural logarithm of a firm's market capitalization. It serves as a control variable. Bhushan (1989) and Lang and Lundholm (1993) indicate that smaller firms' managers are more likely to engage in self-interested behaviour because their firms are subject to less scrutiny and transparency than larger firms, while Narayanan and Seyhun (2008) demonstrate a small-firm effect on backdating. Dhaliwal *et al.* (2009) use firm size as a proxy for the strength of internal supervision, finding that backdated exercises are more likely when the firm has relatively weak internal oversight. If such logic prevails, the size variable would be expected to be negative.

[10] According to section 19, article 20, of Regulations Governing Auditing and Certification of Financial Statements by Certified Public Accountants, Taiwan, Republic of China.

Institution is the sum of ownership by the government, domestic financial institutions and foreign financial institutions compared with total ownership. Pound (1988) relates the effects of institutional ownership to firm performance through three hypotheses: (i) the efficient-monitoring hypothesis, (ii) the conflict of interest hypothesis and (iii) the strategic-alignment hypothesis. The efficient-monitoring hypothesis predicts a positive effect of institutional ownership on the value of the firm because of proper monitoring on improper managerial behaviour, thus implying a *negative* effect of institutional ownership on the likelihood of backdating. By contrast, the conflict of interest hypothesis and the strategic-alignment hypothesis both predict a negative relation between institutional ownership and the value of the firm arising from collusion by managers against the best interest of atomistic shareholders, implying a *positive* effect on the likelihood of backdating. In short, the effect of institutional ownership, *Institution,* on the likelihood of backdating can be positive or negative.

Non-family is a (1,0) dummy variable that equals one if the executives exercise stock options in a non-family-run firm and zero otherwise. We identify a firm as family-run or not as measured by ownership: (i) the shares are directly owned by family members; (ii) the cross-shareholdings of listed companies are in the same conglomerate; and (iii) the shareholdings of the nominal agent are controlled by the family. If the family's holding of the firm's outstanding shares exceeds 20 per cent, then it is a family-run firm.

Publicly traded family-run firms are quite common around the world (Burkart *et al*., 2003). Compared to non-family-run firms, family-run firms appear to face less-severe agency problems, which typically result from the separation of ownership and management (Type I agency problem).[11] Ryan and Wiggins (2002) indicate that CEOs who are members of the founding family can closely monitor the firm's decisions. McConnell and Servaes (1990) and Morck *et al*. (1988) observe that managers' and shareholders' interests become more closely aligned as managerial ownership increases, resulting in improved firm performance. However, as managers' equity stakes increase, their interests begin to diverge from those of the shareholders, leading to greater agency problems and declining firm performance.

We examine the agency cost problem using data for family-run and non-family-run firms in backdating the exercise of stock options. Such backdating is more likely to occur in non-family-run firms than in family-run firms. We predict that this variable will be *positive* and significant.

CEOown is the percentage of the executive's equity ownership during the month of the stock options exercise. If executives have a higher stock ownership in the firm, it can imply managerial entrenchment, resulting in a positive association between *CEOown* and the probability of suspect option exercises. Collins

[11] Villalonga and Amit (2006) refer to the classic agency conflict between owners and managers as a Type I agency problem.

et al. (2009) find that higher CEO ownership in a firm increases the CEO's ability to influence his/her own pay through backdating stock options. Because of the self-interest argument pertaining to executives, we expect this variable to be positively related to backdating as executives may have more claims to executive stock options with a higher *CEOown*.

Firm-specific risk is measured by idiosyncratic risk (Roll, 1988). We follow Bali *et al.* (2005) in computing the idiosyncratic risk for each stock, which is estimated within 30 days of the exercise date using daily return data. Firm-specific risk (variation) and disclosure are an integral part of corporate governance. Morck *et al.* (2000) document that higher firm-specific risk (variation) is associated with stronger public investor property rights because these firms are better known to the public. In addition, Li *et al.* (2004) find that higher firm-specific risk implies greater capital market openness in emerging markets, including Taiwan. It appears that greater firm-specific return variation indeed provides more informed stock pricing for firms (Durnev *et al.*, 2003). Ferreira and Laux (2007) indicate that (i) firms with high levels of transparency display high levels of idiosyncratic risk and (ii) poor firm-level corporate governance is associated with low levels of idiosyncratic volatility. Thus, high idiosyncratic volatility reflects higher corporate transparency and good corporate governance.

Thus, it seems reasonable to assume that firms with higher firm-specific variation have greater transparency and supply more public information about the firm. Higher transparency and better disclosure reduce the information asymmetry between a firm's management and the financial stakeholders (equity and bond holders), mitigating the agency problem in corporate governance (Patel *et al.*, 2002). In the light of the above literature, we hypothesize that the firm-specific risk variable will have a *negative* effect on the likelihood of suspect exercise.

2.2. Data

We examine a sample of 1321 executive exercise stock options from 2002 to 2008 for firms from the Taiwan Stock Exchange Corporation (TSEC) and the Gre Tai Securities Market (an over-the-counter market). We collect data on the exercising of stock options from the Market Observation Post System (MOPS) and the Taiwan Economic Journal Database (TEJDB).

We exclude the exercising of stock options for which we have insufficient stock price data. Our final sample consists of 1214 individual exercises, with option exercises across 209 companies.

The data on option exercises are selected for this study because executives have the power to make decisions that use a company's inside information. Thus, the data set enables us to analyse the different motivations behind the decision to exercise stock options. The executive positions in this study include chief

Table 1
Data and descriptive statistics

Variable	Mean	Std. Dev.	Median	Minimum	Maximum
Nopshare	11.1085	1.1314	11.0509	5.2983	14.9141
Momentum	0.3392	1.8530	0.2113	−10.0021	11.0947
Value	32.6213	57.8871	13.8300	0.0447	749.5786
Concurrent	0.3995	0.4900	0	0	1
Big4	0.9522	0.2134	1	0	1
Tax savings	0.5649	1.5893	0.0263	0.0000	21.2008
Board	0.4283	0.4950	0	0	1
Size	8.8300	1.2079	8.6648	6.0890	14.2744
Institution	0.3452	0.2020	0.3040	0.0004	0.8523
Non-family	0.6647	0.4723	1	0	1
CEOown	0.1755	0.3243	0.0043	0	0.3735
Firm-specific risk	5.7173	3.9080	4.7509	0.3010	33.7061

Number of observations is 1214. *Nopshare* is the number of stock options exercised in log. *Momentum* is the firm's compounded return at exercise date t through $t + 30$. *Value* is the stock option exercise volume times the stock option price, as calculated by the Black–Scholes model in NT$100,000. *Concurrent* = 1 if multiple executives who work at the same firm exercise stock options on the same day; otherwise = 0. *Big4 = 1* if firm's auditor is Deloitte, KPMG, PwC, or Ernst & Young; otherwise = *0*. The tax savings variable, *Tax savings,* is constructed as the potential tax savings = $N \times tax \times (P^* - P_{exercise})$ in NT$100,000. N is the number of stock options exercised. *tax* is the personal income tax rate. P^* is the average closing price during the exercise month. $P_{exercise}$ is the closing price of the exercise date. *Board* = 1 if the executives who exercise stock options are members of the board of directors, otherwise = *0*. *Size* is a firm's market capitalization in log. *Institution* is the sum of ownership by the government, domestic financial institutions and foreign financial institutions relative to total ownership. *Non-family* = 1 if executives are from non-family-run firms; otherwise = *0*. *CEOown* is the percentage of the manager's equity ownership during the stock option exercise month. *Firm-specific risk* is measured by idiosyncratic volatility computed from the capital asset pricing model (CAPM).

executive officer, president, vice-president, chief financial officer, chief operating officer, general manager and deputy general manager.

Table 1 provides a descriptive summary of the key variables. One interesting point is the *tax savings* variable. The average tax savings is NT$56,489, while the maximum value of *tax savings* is NT$2,120,075. These tax savings are substantial, indicating that tax incentives do motivate executives to manipulate the exercise date of their stock options.

3. Empirical results

3.1. The incidence of suspect stock options exercise

We classify suspect stock options as those that were exercised if the stock price on the exercise date is one of the three lowest closing prices during the month of the exercise date. Figure 1 shows that 17.87 per cent of executives exercise stock

Figure 1 Percentage of executive stock options exercised on the day of the month and its closing price. This figure plots the percentage of executive stock options exercised on each day of the month and its closing price. The lowest closing price has a rank of 1, the second-lowest price 2 and so on.

Table 2
Raw stock returns and effect of number of stock options exercised on raw returns around exercise date

	All samples $N = 1214$	< 100,000 shares $N = 841$	> 100,000 shares $N = 373$	
Window	Cumulative raw returns	Cumulative raw returns (a)	Cumulative raw returns (b)	Difference (a−b)
(−20,0)	0.0803 (0.142)	−0.2495 (−0.312)	0.6718 (0.886)	−0.9213 (−1.032)
(−10,0)	0.3288 (0.809)	0.3666 (0.791)	0.2605 (0.517)	0.1061 (0.169)
(−5,0)	−0.1360 (−0.457)	−0.1149 (−0.318)	−0.1731 (−0.430)	0.0582 (0.122)
(−3,0)	0.0634 (0.453)	0.2081 (1.088)	−0.2023 (−0.993)	0.4104 (1.307)
(1,3)	0.5774*** (3.645)	0.4435*** (3.809)	0.8392** (2.022)	−0.3957 (1.215)
(1,5)	0.4531 (1.311)	0.3967 (1.592)	0.5832 (0.927)	−0.1865 (−0.444)
(1,10)	0.9153** (2.541)	0.7299** (2.530)	1.2659* (1.868)	−0.5360 (−0.891)
(1,20)	2.1499*** (3.772)	1.8459*** (3.467)	2.7132*** (3.063)	−0.8673 (−1.000)

t-Values are in parentheses. ***Significant at the 1 per cent level; **significant at the 5 per cent level; and *significant at the 10 per cent level.

options on the day with the lowest closing price of the month, even though the expected percentage would be 4.8 per cent (see footnote 7). The frequency of exercising stock options on the second-lowest closing price of the month is 6.59 per cent and on the third-lowest closing price of the month is 6.92 per cent. Clearly, the results indicate that when Taiwanese executives exercise their stock options, they tend to backdate their exercise date.

Table 2 provides a statistical analysis of the raw stock returns surrounding when executives exercise their stock options. The table indicates positive increases after the stock options exercise date. The subsequent stock returns are

significantly higher than zero. These results are consistent with our hypothesis that executives backdate the exercising of their stock options.

It is expected that such backdating by executives is more pronounced as the number of stock options exercised rises because it increases the executives' potential tax savings. As a result, we divide the whole sample into two subsamples according to the number of stock options exercised: $< 100{,}000$ and $> 100{,}000$ shares per exercise. The result is consistent with our expectations. The large volume of stock options exercised is positively correlated with cumulative raw stock returns. Table 2 shows that raw stock returns increase with the exercise volume after the stock options are exercised. However, there is no statistical significance in returns for an exercise volume of $< 100{,}000$ and $> 100{,}000$ shares, implying that there is no size effect.

Figure 2 shows greater cumulative raw stock returns for the non-family-run firms than for family-run firms. The 20-day post-exercise cumulative raw stock returns are 0.9234 per cent for a family-run firm and 2.7685 per cent for a non-family-run firm; these differences are statistically significant (see also Table 3). In our all option exercise samples, there are 209 companies (i.e. 72 family-run firms and 137 non-family-run firms). In our family-run and non-family-run firm samples, executives include the chief executive officer, president, vice-president, chief financial officer, chief operating officer, general manager and deputy general manager. The difference in market capitalization between family-run firms and non-family-run firms is not statistically significant.[12] Family-run firms' executives increase their own wealth by increasing the value of the firm because their wealth is tied up with the firm. Backdating can damage the firm's reputation if it is detected.

Table 4 presents summary statistics on suspect exercising and non-suspect exercising of stock options. The mean for tax-suspect exercises is NT$130,795, which is significantly higher than that for non-suspect exercises. This result also supports the notion that executives backdate the exercise of their stock options for tax reasons.

Table 5 reports summary statistics on executives' exercise of stock options in family-run firms and non-family-run firms. The descriptive statistics differ greatly between family-run and non-family-run firms.[13] The mean of family-held equity is 0.3066 in family-run firms and 0.1154 in non-family-run firms. The mean of backdating (suspect exercise) is 0.2752 in family-run firms and 0.3333 in non-family-run firms. The results indicate that the likelihood of suspect exercises is higher in non-family-run firms than in family-run firms.

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[12] We tested the difference between the market capitalization between family-run firms and non-family-run firms and find that there is no statistical difference between them (t-value = 1.406).

[13] As a robustness check, we tested the difference between family-run firms and non-family-run firms in terms of grant volume and find that their difference is not statistically significant (t-value = 0.479). The result indicates that family-run firms and non-family-run firms grant a similar number of stock options to executives.

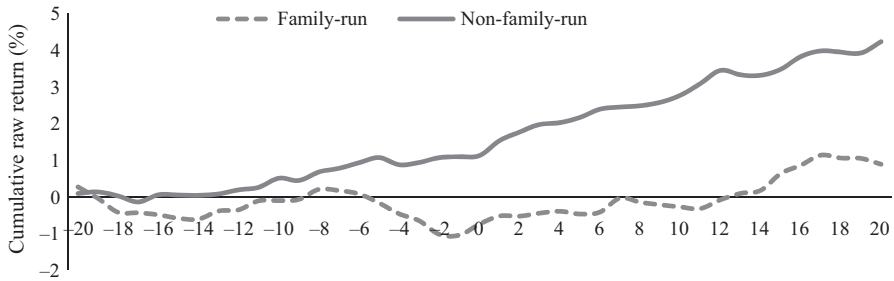

Figure 2 Stock return behaviours around the exercise date for family-run and non-family-run firms. Samples are classified into two subsamples: family-run firms (N = 407) or non-family-run firms (N = 807).

Table 3
Stock return behaviours around the exercise date for family-run and non-family-run firms

	All samples N = 1214	Non-family N = 807	Family N = 407	
Window	Cumulative raw returns	Cumulative raw returns (a)	Cumulative raw returns (b)	Difference (a−b)
(−20,0)	0.0803 (0.142)	0.6618 (1.258)	−1.0729 (−1.089)	1.7347** (2.010)
(−10,0)	0.3288 (0.809)	0.8288*** (4.233)	−0.6627 (−0.941)	1.4915** (2.353)
(−5,0)	−0.1360 (−0.457)	0.3193*** (9.017)	−1.0388** (−2.229)	1.3581*** (2.823)
(−3,0)	0.0634 (0.453)	0.3260*** (7.320)	−0.4573 (−1.070)	0.7833* (1.957)
(1,3)	0.5774*** (3.645)	0.8225*** (10.724)	0.0912 (0.731)	0.7313** (2.222)
(1,5)	0.4531 (1.311)	0.7392*** (18.656)	−0.1142 (−0.519)	0.8534** (2.011)
(1,10)	0.9153** (2.541)	1.1307*** (18.545)	0.1312 (0.304)	0.9995* (1.941)
(1,20)	2.1499*** (3.772)	2.7685*** (12.615)	0.9234 (1.182)	1.8451** (2.106)

t-Values are in parentheses. ***Significant at the 1 per cent level; **significant at the 5 per cent level; and *significant at the 10 per cent level.

The stock return momentum is much higher in non-family-run firms (0.4004) than in family-run firms (0.2176). That is, the non-family-run firms' stock return momentum is about twice as high as in family-run firms. These results also support the conclusion that suspect exercises are more likely in non-family-run firms. Executives who work at non-family-run firms appear to display more self-interest because of the agency cost problem.

3.2. Logistic regression results

We use a logistic regression model to examine the relation between various factors behind backdating and the likelihood of suspect exercises. Table 6 reports the results of the logistic regression. Two versions are presented. In Model 1, the

Table 4
Statistics on suspect exercising and non-suspect exercising of stock options

	Suspect exercises	Non-suspect exercises	*P*-value (difference)
Number of observations	381	833	—
Potential tax savings (mean)	NT$130,795	NT$22,503	< 0.001
Potential tax savings (median)	NT$59,796	NT$0	< 0.001

Potential tax savings is $N \times tax \times (P^* - P_{exercise})$. N is the number of stock options exercised. *tax* is the personal income tax rate. P^* is the average closing price during the exercise month. $P_{exercise}$ is the closing price of the exercise date. If the closing price on the exercise date is higher than the average closing price during the exercise month, the potential tax savings equals zero.

likelihood of suspect exercises is positively and significantly related to (i) *Nopshare,* which is the number of stock options exercised (coeff. = 0.429, $P < 5$ per cent), (ii) the stock return *Momentum* (coeff. = 0.597, $P < 1$ per cent) and (iii) *Value*, which is the value of stock options (coeff. = 0.019, $P < 1$ per cent) and negatively related to the auditor type (coeff. = −1.118, $P < 1$ per cent). The estimated marginal effect of *Nopshare* is 0.0713. This result implies that an increase in *Nopshare* of one standard deviation will increase the probability of backdating by 7.13 per cent. The estimated marginal effect of *Momentum* is 0.1631, implying that an increase of one standard deviation in *Momentum* will increase the probability of backdating by 16.31 per cent. Similarly, the results indicate that an increase of one standard deviation in *Value* will increase the probability of backdating by 17.37 per cent. The firms audited by the Big Four accounting firms (*Big4*) appear to have a negative and significant coefficient, which implies a lower likelihood of suspect exercises. That is, an increase of one standard deviation in *Big4* is associated with a 3.52 per cent reduction in the probability of backdating. Higher-quality auditors are expected to follow rules and regulations and have incentives to protect their reputation and brand, thus lowering the likelihood of suspect exercises, a result consistent with our prediction.

Tax savings (coeff. = 0.814, $P < 1$ per cent) are significantly positive in predicting the likelihood of suspect exercises. The estimated marginal effect of *Tax savings* is 0.1971, indicating that an increase in *Tax savings* of one standard deviation is associated with a 19.71 per cent increase in the probability of backdating. This finding is consistent with the hypothesis that tax incentives motivate executives to manipulate their option exercise date. The greater the potential tax savings, the greater the likelihood of suspect exercises.

The *Institution* variable is positive and has a significant effect (coeff. = 1.185, $P < 5$ per cent) on the likelihood of suspect exercises, implying that an increase in *Institution* of one standard deviation will increase the probability of backdating by 3.54 per cent. This result supports the conflict of interest hypothesis and the strategic-alignment hypothesis by Pound (1988).

Table 5
Summary statistics on executive exercising of stock options among family-run firms and non-family-run firms

Variables	Mean	Std. Dev.	Median	Minimum	Maximum
Family-held equity					
Family sample	0.3066	0.1020	0.2757	0.2007	0.6710
Non-family sample	0.1154	0.0623	0.1270	0.0000	0.1995
Backdating					
Family sample	0.2752	0.4472	0.0000	0.0000	1.0000
Non-family sample	0.3333	0.4717	0.0000	0.0000	1.0000
Nopshare					
Family sample	4.9074	0.5066	4.8968	2.8751	6.4771
Non-family sample	4.7825	0.4783	4.7690	2.3010	6.4771
Momentum					
Family sample	0.2176	1.7200	−0.0151	−4.4663	4.6485
Non-family sample	0.4004	1.9143	0.3937	−10.0021	11.9047
Value					
Family sample	34.6456	65.0319	14.8345	0.1581	749.5786
Non-family sample	31.6000	53.9404	13.5428	0.0447	535.9256
Concurrent					
Family sample	0.3342	0.4723	0.0000	0.0000	1.0000
Non-family sample	0.4325	0.4957	0.0000	0.0000	1.0000
Big4					
Family sample	0.9509	0.2164	0.0000	0.0000	1.0000
Non-family sample	0.9529	0.2120	0.0000	0.0000	1.0000
Tax savings					
Family sample	0.5558	1.5694	0.0000	0.0000	14.6250
Non-family sample	0.5694	1.6002	0.0420	0.0000	21.2008
Board					
Family sample	0.3882	0.4879	0.0000	0.0000	1.0000
Non-family sample	0.4486	0.4977	0.0000	0.0000	1.0000
Size					
Family sample	8.9709	1.0812	8.9276	6.4583	12.2378
Non-family sample	8.7590	1.2616	8.5475	6.0890	14.2744
Institution					
Family sample	0.4229	0.4374	0.2126	0.0027	0.8523
Non-family sample	0.3061	0.1845	0.2697	0.0400	0.8308
CEOown					
Family sample	0.0173	0.0433	0.0027	0.0000	0.3735
Non-family sample	0.0177	0.0253	0.0058	0.0000	0.1711
Firm-specific risk					
Family sample	5.3345	3.7588	4.1811	0.4431	21.2189
Non-family sample	5.9104	3.9708	5.0051	0.3010	33.7061

Family-held equity is the percentage of the sum of the shares directly owned by family members, the cross-shareholdings of listed companies are in the same conglomerate and the shareholdings of the nominal agent controlled by the family.

Table 6
Empirical results of logistic regression for backdating

Variable	Predicted sign	Model 1		Model 2	
		Coefficient	Marginal effect	Coefficient	Marginal effect
Constant	?	−3.544*** (0.002)		−2.217** (0.056)	
Nopshare	+	0.429** (0.031)	0.0713	0.321 (0.112)	0.0532
Momentum	+	0.597*** (0.001)	0.1631	0.707*** (0.001)	0.1890
Value	+	0.019*** (0.001)	0.1737	0.020*** (0.001)	0.1737
Concurrent	+	0.213 (0.174)	0.0152	0.176 (0.269)	0.0127
Big4	−	−1.118*** (0.001)	−0.0352	−1.287*** (0.001)	−0.0399
Tax savings	+	0.814*** (0.001)	0.1971	0.912*** (0.001)	0.2114
Board	+	−0.225 (0.174)	−0.0163	−0.188 (0.260)	−0.0134
Size	−	0.072 (0.374)	0.0133	0.473 (0.567)	0.0085
Institution	±	1.185** (0.018)	0.0354	1.280** (0.012)	0.0376
Non-family	+	0.500*** (0.005)	0.0350	0.553*** (0.002)	0.0378
CEOown	+	4.871** (0.046)	0.2332	4.326* (0.080)	0.2040
Firm-specific risk	−			−0.113*** (0.001)	−0.0625
#obs.		1214		1214	
% Suspect exercises		31.39%		31.39%	
−2 log likelihood		1101.308		1079.232	
Cox & Snell R^2		28.6%		29.9%	
Nagelkerke R^2		40.2%		42%	

The dependent variable is a dummy variable (backdating), which is 1 if executives exercise stock options with lowest, second-lowest and third-lowest closing stock price during the month, and 0 otherwise (i.e. backdating = 0). *Nopshare* is the number of stock option exercises in log. *Momentum* is the firm's compounded return at exercise date t through $t + 30$. *Value* is the stock option exercise volume times the stock option price by the Black–Scholes model in NT$100,000. *Concurrent* = 1 if multiple executives who work at the same firm exercise stock options on the same day; otherwise = 0. *Big4* = 1 if firm's auditor is Deloitte, KPMG, PwC, or Ernst & Young; otherwise = 0. *Tax savings* is constructed as potential tax savings = $N \times tax \times (P^* - P_{exercise})$ in NT$100,000. N is the number of stock options exercised. *tax* is the personal income tax rate. P^* is the average closing price during the exercise month. $P_{exercise}$ is the closing price of the exercise date. *Board* = 1 if the executives exercising stock options are members of the board of directors; otherwise = 0. *Size* is a firm's market capitalization in log. *Institution* is the sum of ownership by the government, domestic financial institutions, and foreign financial institutions relative to total ownership. *Non-family* = 1 if executives are from non-family-run firms; otherwise = 0. *CEOown* is the percentage of the manager's equity ownership during the stock option exercise month. *Firm-specific risk* is measured by idiosyncratic volatility computed from the capital asset pricing model (CAPM). Marginal effect for one standard deviation of the variable *(i)* is beta (*i*) × [exp (*backdating*)/(exp (*backdating*) + 1)^2] × standard deviation (*i*). Tests of the multicollinearity among independent variables via variance inflation factor (VIF) show no evidence for multicollinearity between the model variables (tolerance range between 0.58 and 0.95, mean VIF 1.317). *P*-values are in parentheses. ***, ** and * denote significance at 0.01, 0.05 and 0.1 levels, respectively.

It is interesting to note that such backdating practices usually occurred in non-family-run firms. The fact of being a non-family-run firm has a significant and positive effect (coeff. = 0.500, $P < 1$ per cent) on the likelihood of

suspect exercises. An increase in *Non-family* of one standard deviation will trigger a 3.5 per cent increase in the probability of backdating. Executive stock options are part of the compensation package for executives, as part of an effort to reduce Type I agency problems. So, backdating violates the original purpose of granting executive stock options and creates a different serious agency problem.

The *CEOown* variable is positive and has a significant effect (coeff. = 4.871, $P < 5$ per cent) on the likelihood of suspect exercises. We find that an increase in *CEOown* of one standard deviation increases the probability of backdating by 23.32 per cent. It is important to note that good corporate governance principles need to be applied to deter self-interest behaviour by CEOs.

Model 2 shows results similar to those in Model 1, but it further demonstrates the importance of the public firm-specific risk (variation) that affects the suspect exercises. The *Firm-specific risk* variable is negative and significant (coeff. = −0.113, $P < 1$ per cent). The result indicates that an increase of one standard deviation in *Firm-specific risk* reduces the probability of backdating by 6.25 per cent, a finding that supports the argument that greater firm-specific risk (variation), a proxy for transparency, reduces the motivation for executives to backdate the exercising of their stock options. This is an interesting and important result because the current corporate literature does not seem to document corporate governance's strong role in the backdating of exercising stock options.

In the light of the marginal effect that a one standard deviation change can have on the probability of backdating, we find that the *Tax savings* variable appears to have the most noticeable effect on backdating (i.e. a marginal effect of 21 per cent in Model 2). The other three important variables according to Model 2 are *CEOown* (about 20 per cent), *Momentum* (19 per cent) and *Value* (17 per cent).

To check for robustness, we examine different ways of defining the dependent variable (suspect exercises). We use firms in a group with the lowest closing price as the dependent variable.[14] The results are shown in Table 7. Two interesting points are noted here. First, in Model 1 of Table 7, the *Concurrent variable* (coeff. = 0.376, $P < 5$ per cent) is positive and becomes significant when compared to the insignificant result in Table 6. The estimated marginal effect of the *Concurrent* variable is 0.0216, indicating that a one standard deviation increase in *concurrent* is associated with a 2.16 per cent increase in the probability of backdating. That is, when two or more executives simultaneously backdate to the same exercise day with the lowest closing price, the probability of backdating becomes stronger and significant. Second, the *CEOown* variable is no longer significant in Table 7, implying that the executive who has higher equity ownership intends to backdate the exercise date to a lower closing price, but not necessarily

[14] We thank the reviewer who suggested the inclusion of Table 7.

Table 7
Logistic regression results for backdating on the lowest closing price day

Variable	Predicted sign	Model 1		Model 2	
		Coefficient	Marginal effect	Coefficient	Marginal effect
Constant	?	−5.136*** (0.001)		−3.599*** (0.008)	
Nopshare	+	0.567** (0.014)	0.0758	0.420* (0.071)	0.0554
Momentum	+	0.423*** (0.001)	0.0927	0.559*** (0.001)	0.1204
Value	+	0.022*** (0.001)	0.1737	0.023*** (0.001)	0.1737
Concurrent	+	0.376** (0.032)	0.0216	0.355** (0.045)	0.0201
Big4	−	−0.554 (0.152)	−0.0139	−0.746* (0.058)	−0.0186
Tax savings	+	0.458*** (0.001)	0.0858	0.502*** (0.001)	0.0922
Board	+	−0.193 (0.303)	−0.0114	−0.133 (0.481)	−0.0079
Size	−	0.026 (0.773)	0.0036	0.003 (0.976)	0.0036
Institution	±	1.794*** (0.001)	0.0428	1.883*** (0.001)	0.0442
Non-family	+	0.522*** (0.009)	0.0293	0.552*** (0.006)	0.0302
CEOown	+	1.889 (0.464)	0.0723	1.402 (0.593)	0.0529
Firm-specific risk	−			−0.116*** (0.001)	−0.0547
#obs.		1214		1214	
% Suspect exercises		31.39%		31.39%	
−2 log likelihood		927.691		908.674	
Cox & Snell R^2		16.0%		17.3%	
Nagelkerke R^2		26.3%		28.5%	

The dependent variable is a dummy variable, which is equal to 1 if executives exercise stock options at the lowest closing stock price during the month (i.e. *backdating* = 1), and otherwise = 0. *Nopshare* is the number of stock option exercises in log. *Momentum* is the firm's compounded return at exercise date t through $t + 30$. *Value* is the stock option exercise volume times the stock options price, as calculated by the Black–Scholes model in NT$100,000. *Concurrent* = 1 if multiple executives who work at the same firm exercise stock options on the same day; otherwise = 0. *Big4* = 1 if the firm's auditor is Deloitte, KPMG, PwC, or Ernst & Young; otherwise = *0*. *Tax savings* is constructed as the potential tax savings = $N \times tax \times (P^* - P_{exercise})$ in NT$100,000. N is the number of stock options exercised. *tax* is the personal income tax rate. P^* is the average closing price during the exercise month. $P_{exercise}$ is the closing price of the exercise date. *Board* = 1 if the executives who exercise stock options are members of the board of directors; otherwise = 0. *Size* is a firm's market capitalization in log. *Institution* is the sum of ownership by the government, domestic financial institutions and foreign financial institutions relative to total ownership. *Non-family* = 1 if executives are from non-family-run firms; otherwise = 0. *CEOown* is the percentage of the manager's equity ownership during the stock option exercise month. *Firm-specific risk* is measured by idiosyncratic volatility computed from the capital asset pricing model (CAPM). The marginal effect of one standard deviation of the variable (i) is beta (i) × [exp (*backdating*)/(exp (*backdating*) + 1)^2] × standard deviation (i). Tests of the multicollinearity among independent variables via variance inflation factor (VIF) show no evidence for multicollinearity between the model variables (tolerance range between 0.58 and 0.95, mean VIF 1.317). *P*-values are in parentheses. ***, ** and * denote significance at 0.01, 0.05 and 0.1 levels, respectively.

the lowest. The results in Table 7 in general are largely similar to those in Table 6. Thus, our conclusion about the driving forces behind the backdating decision is robust.

4. Conclusions

This paper conducts a comprehensive analysis of the motivations behind the exercising of executive stock options. We include in our analysis Taiwanese firms covering the 7-year span from 2002 to 2008. The data set contains observations of 1214 individual exercises. We focus on how tax incentives drive executives to manipulate the date of exercising their stock options. Executives reduced their tax liability by more than NT$49.83 million in 381 suspect exercises in all exercise samples, more than NT$130,795 per stock option. In addition, we find that 17.87 per cent of executives exercise their stock options on the day with the lowest closing price of the month. The frequency of exercises on the second-lowest closing price of the month is 6.59 per cent and the third lowest is 6.92 per cent.

In this study, we explore several motivations that may affect the exercising of stock options. Our results contribute to the existing literature in several ways. First, we document the presence of an upward-momentum factor, which is important in explaining the decision by executives to backdate the exercising of their stock options. The upward movement of firms' stock prices provides executives with the best timing to manipulate the exercise date; hence, they benefit financially from backdating.

Second, we explore backdating practices in non-family-run firms. Issuing stock options may motivate executives to work hard, but this study shows that backdating the exercising of stock options confirms the agency cost problem. That is, family-run firms exert tight control over the firms, thus reducing the likelihood of backdating. The results imply that a better governance structure within the firm or through a regulatory body needs to be implemented effectively in order to reduce the agency problem among non-family-run firms listed on the stock exchange.

Finally, our results indicate that a greater firm-specific risk variable has a negative and significant effect on the likelihood of suspect exercises. Executives who work in firms with lower firm-specific risk (variation) are more likely to manipulate the date of exercising their stock options. This study demonstrates clearly the presence of self-interested motivations among executives in backdating the exercising of their stock options.

Our study contributes to the literature by providing a comprehensive framework for examining the exercising of executive stock options. Specifically, our results shed light on corporate governance, the agency cost problem among executives and the role of public firm-specific information relating to firm behaviour.

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