

On Rescissions in Executive Stock Options

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ABSTRACT

This paper examines executive stock options that permit the option holding to rescind an exercise decision and return the stock to the firm in exchange for a refund of the exercise price. Rescissions have occurred at a number of US firms in recent years and have been widely condemned as giveaways to employees that weaken incentives. To the contrary, we find that allowing for rescissions delivers the same incentive payoffs as a standard option, but at a lower cost under many conditions. The cost savings from rescindable options arise as a consequence of the tax treatment of the exercise and rescission decisions under US tax law. The savings are associated positively with stock volatility and the spread between personal and corporate tax rates, and negatively with interest rates.

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I. Introduction

In the last decade, stock options have become an increasingly important component of employee compensation in the United States, accounting, by some measures, for over 50% of total executive pay (Murphy, 1999). A common argument advanced in favor of these instruments is that they align shareholder interests and employee incentives by tying compensation to share price performance. Nonetheless, empirical and anecdotal evidence suggests that companies protect option-holding employees from the effects of declining share prices. Previous work has investigated the prevalence and optimality of one such tactic, that of repricing, in which the strike prices of previously-issued options are lowered to bring the options closer to the money.¹ This paper examines a more recent practice known as rescission that is actuated by similar considerations and has received harsh criticism in the financial press.²

Unlike repricing, which takes place *prior* to the option's exercise and aims to restore value to deep out-of-the-money options, rescission takes place *after* the exercise of stock options by employees. In a rescission, shares received by the employee from exercise of the options are returned to the company in exchange for a refund of the strike price. (This presumes the shares received from exercise were not sold in the interim; rescission is not possible if the shares were sold.) Rescission therefore negates exercise decisions that proved poor *ex-post*, that is, those in which exercise was followed by a steep decline in the stock price. In some cases, rescission also permits employees to have their original options restored with terms unchanged.

A principal motivation driving rescissions is the tax treatment of option exercise decisions. Under U.S. law, the depth in-the-money (or "spread") of the option at exercise is taxed as ordinary income in the year of exercise, regardless of whether the shares obtained by the exercise were subsequently sold during that year.³ Thus, for example, an employee exercising options with a strike of \$10 when the stock price is \$80 must pay income taxes

on the amount $\$(80 - 10) = \70 ; at a marginal tax rate of (say) 40%, this amounts to a tax of \$28 per share. However, if the option exercise decision is rescinded before the end of the tax year in which exercise occurred, then, for tax purposes, it is as if the exercise never happened, and no taxes are owed by the employee. Where the exercise decision is followed by a steep drop in the price of the stock, rescission thus offers a substantial benefit to the employee. Indeed, in the cases reported in the financial press, the shares held by employees were, at the time of rescission, typically worth less even than the taxes due on account of the exercise. (This would have been the case in our example if share prices fell below \$28.) The company too was indirectly benefitted in the many instances where employees had borrowed money from the company to pay the strike price on their options.

Rescissions have come under considerable fire as a symptom of poor corporate governance. An option whose exercise may be rescinded is akin to a standard call option plus a contingent *put* option that vests when the call is exercised and gives the employee the right to sell the stock back to the company at the original strike price. As such, rescissions appear to reward employees when share prices fall, weakening or even inverting the alignment of incentives between employees and shareholders.⁴

This paper examines whether rescissions are really the corporate giveaway they appear to be. We compare the cost and incentive features of options whose exercise decisions may be rescinded (“rescindable options”) to standard non-rescindable options. Our main result is simply stated: Contrary to the the widespread condemnation that rescission has received, we find that rescindable options dominate standard options under general conditions, delivering equal value and incentives to the employee at a lower cost to the company. The paragraphs below elaborate.

In the first step of our analysis, we characterize the optimal exercise policies for standard and rescindable options. These policies differ substantially. In particular, and in contrast to standard options, there is considerable incentive to exercise a rescindable option early when the option is at- or out-of-the-money: such an action minimizes the tax liability from

exercise and the decision can be rescinded if it proves poor ex-post. We show that the optimal early exercise policies may be precisely identified and characterized. Our analysis of rescindable options makes use of a construction that combines the option award with some other compensation, notably an interest-free loan that subsidizes the interest costs of the early exercise decision.⁵

We then show that under the optimal exercise and rescission policies, the net (after-tax) payoff to the holder of the rescindable option package is just a multiple of the net payoff from a standard option. In particular, by choosing the number of units of the rescindable option package appropriately, the after-tax payoff distributions from the two alternatives can be made identical, and so made to deliver identical value and incentives to the employee. Identification of the preferred alternative now comes down to a comparison of their net after-tax costs to the company.

We find that under a wide range of conditions, rescindable options lead to a net cost savings for the company after taking into account the income taxation of the firm and the employee. So long as the executive's marginal tax rate exceeds that of the firm, we show that there exists always some cutoff value of interest rates below which rescindable options dominate standard options. The cost savings are larger the greater the difference in these marginal tax rates. Further, the cost savings are an increasing function of the underlying stock's volatility. One clear implication of these results is that financially distressed firms—which generally pay no taxes because they are not profitable, and also tend to have volatile stock prices—will find rescindable options more attractive than most firms.

Although rescindable options have not, to our knowledge, become widespread, one can observe their inherent structure in compensation arrangements around the world. For example, many firms provide executives with long-term loans to buy the company's stock at current market prices (this practice was ended in the U.S. in 2002). Some firms further provide that when these loans mature, after five to ten years, the executive has the option of repaying them in full or returning the stock to the company if it has lost value.⁶ This

sequence of transactions has final payoffs similar to those generated by a rescindable option since the latter also effectively provides the holder with a put upon the call's exercise.

The remainder of this paper is organized as follows. Section II reviews the related literature on exotic features of stock option compensation schemes. Section III introduces our basic analytical framework. Section IV presents a first comparison of standard and rescindable options in a simplified framework that equates the tax/rescission period and the option's life; this framework makes our arguments most transparent. Section V extends the "single-year" analysis of Section IV to a multi-year setting and shows that the results remain essentially unchanged. Section VI discusses the impact of replacing risk-neutral valuation with utility-based analysis and relaxing our assumption that issuing firms pay zero dividends. Section VII briefly discusses the income tax treatment of rescindable options, and compares the tax treatment of executive stock options in different countries. Section VIII concludes.

II. Literature Review

The academic literature on executive compensation is vast.⁷ A recent focus of this literature has been on the use by corporations of exotic or non-standard options in compensation schemes. Work in this area includes Hemmer, Matsunaga, and Shevlin (1996b, 1997) who analyze "reload" options (options in which exercise automatically triggers the awarding of additional at-the-money options); Johnson and Tian (2000), who examine six compensation schemes with non-standard aspects; and the work on "repricing" (see references below). The present paper also falls into this category and is most closely related to the work on repricing.

Repricing, like rescission, is a practice corporations have used to shield employees from the effects of steep share price declines. However, rescission is a *post-exercise* action that is aimed at nullifying exercise decisions that proved poor in hindsight. Repricing offers

pre-exercise protection: it restores value to unexercised options that have gone underwater on account of stock price declines, by lowering their strike prices to move them closer to-the-money.

Empirical studies of the incidence and characteristics of repricing are presented in Brenner, Sundaram, and Yermack (2000), Chance, Kumar, and Todd (2000), and Chidambaram and Prabhala (2001).⁸ The first two papers also describe a procedure for valuing options that are repriced following a specified decline in stock prices; the procedure involves viewing a “repriceable” option as a combination of two barrier options. In theoretical work, Acharya, John, and Sundaram (2000) employ an agency model to examine the potential merits of repricing. Analogous to the results we present in this paper, and contrary to the general criticism of the practice, they show that allowing for repricing can be a dominant strategy for the corporation in a variety of circumstances.

III. The Basic Framework

This section introduces the basic framework and notation that we use to analyze the valuation and incentive features of allowing for rescissions. We consider a model with horizon T . Time is denoted t , with time 0 denoting the initial point and time T the terminal date. An employee stock option award is made at time 0; the option has a strike of K and expires at time T . The time- t stock price of the firm is denoted S_t . The option is American in style so that it can be exercised at any point over the horizon. As is common in practice, the option is taken to be issued at-the-money, so we have $K = S_0$. The constant risk-free rate of interest (continuously-compounded) is denoted r . To keep matters simple, we assume that the stock pays no dividends during the option’s life.⁹

Exercise of the option triggers a potential income tax liability for the option holder. If exercise occurs at time t at a stock price of S_t , the employee owes taxes in the amount of $\tau(S_t - K)^+$ where $\tau \in [0, 1)$ is the employee’s marginal income tax rate and $x^+ =$

$\max\{0, x\}$. The tax payment is made at exercise time (for example, through withholding by the company), but the payment might be refunded at T if the option exercise decision is rescinded, as we now explain.

We consider two cases. One involves a standard option, where no reversal of the exercise decision is possible. In the other, the employee may elect to rescind the exercise decision on date T . (We term this case a “rescindable option.”) Specifically, suppose that the option had been exercised on date $t \leq T$ when the stock price was S_t . If, on date T , the employee chooses to rescind this exercise decision, the employee returns one unit of the stock to the company and receives the strike price K in exchange; in addition, rescission also eliminates the employee’s tax liability that was triggered by exercise, so a tax refund of $\tau \cdot (S_t - K)^+$ is also received. If the exercise decision is not rescinded at T , the tax liability remains and there is no further possibility of rescission or a refund.

Our aim in this paper is to compare standard and rescindable options from the standpoints of cost and incentive features. We employ risk-neutral techniques for the purpose of valuation, so suppose that a risk-neutral measure exists (with respect to the risk-free rate as numeraire). All references to probabilities and expectations in the sequel are with respect to this measure. Time- t expectations under the risk-neutral measure are denoted $E_t^*[\cdot]$.

Two comments on this structure are in order at this point. The first concerns the empirical structure of employee stock option awards and rescissions. In practice, such awards typically have a multi-year horizon (usually 10 years) and a vesting period during which they may not be exercised. Moreover, rescissions of exercise decisions can only be made in the same tax year in which exercise occurs. Our model simplifies reality on these dimensions: it does not provide for a vesting period and equates the tax/rescission period and the option’s life. These assumptions make the analysis in Section IV transparent and enable a sharp characterization of the relative merits of rescindable options vis-a-vis

standard options. We generalize this framework to a multi-period setting in Section V and show that the results remain qualitatively unchanged.

The second comment concerns the valuation methodology. Risk-neutral pricing has been used extensively in recent years to identify the value of employee compensation schemes (e.g., restricted stock grants in Longstaff (1995); “high watermark” contracts in Goetzman, Ingersoll, and Ross (1998); and non-standard compensation contracts in Brenner, Sundaram and Yermack (2000), Chance, Kumar and Todd (2000), and Johnson and Tian (2000)). The key underlying assumption here—hedgeability of the option using the stock—may be presumed to hold for shareholders, so risk-neutral valuations can be viewed as a good estimate of the economic cost to shareholders of providing the given compensation scheme. From the employee’s standpoint too, risk-neutral values offer a useful benchmark estimate of the compensation received. While employees cannot hedge option risk by short selling the company’s stock, this restriction is not critical for employees who already own stock in the company (as most senior executives do). Moreover, index options or other derivative-based strategies such as zero-cost collars can also be, and in practice frequently are, used for hedging purposes. For completeness, however, we discuss the impact of replacing risk-neutral valuation with utility-based maximization in Section A.

IV. Rescindable vs. Standard Options: A First Comparison

Two hurdles arise in comparing standard and rescindable options. The first pertains to the options’ optimal exercise policies. For standard options, the exercise question is well-understood and analytical solutions are known (see Theorem IV.1), but for rescindable options, matters are more complicated. On the one hand, tax considerations encourage early exercise of rescindable options: by exercising when the option is at- or out-of-the-money, the holder can ensure a zero tax bill from exercise even while retaining the right

to reverse the exercise decision at time T . On the other hand, there is a cost to early exercise in the form of interest foregone on the strike price. The presence of this trade-off suggests that analytical solutions to the early exercise problem will not be possible in general. The second obstacle has to do with comparability of the options' payoffs: even if the exercise policies were identified explicitly, standard and rescindable options may fail to be comparable from an incentive standpoint since the timing and distribution of the payoffs they generate may be (possibly very) different.

We show that both problems can be resolved if we compare the standard option to a compensation package that combines the rescindable option with an interest-free loan. Specifically, we show (Theorem IV.2) that the package can be so constructed that two properties obtain. First, the early exercise policy of the rescindable option can be characterized analytically, enabling closed-form representations of the net value of the compensation received by the employee and the net cost of the package to the company.¹⁰ Second, the terminal payoffs received by the employee from the package arise at the same time as, and are a specific multiple of, the payoffs received under the standard option.¹¹

These properties facilitate an unambiguous comparison of the alternatives. We can choose the number of units of the rescindable option package so that the employee receives an identical payoff to that provided by one unit of the standard option, and then use the closed-form representations to identify the costs to the company. Carrying out this comparison, we find (Proposition IV.3) that the rescindable option package unambiguously dominates the standard option at low interest rates, delivering equal value and incentives to the employee at a lower cost to the company. At high interest rates, either alternative could cost less depends on the values of the remaining parameters, notably the stock's volatility; for representative values, we find that the rescindable option package still typically dominates (see Figure 1).¹²

Formally, the rescindable option package we consider has the following components:

1. A rescindable option with strike K and maturity T .

2. An interest-free loan of K made on the date t of the option's exercise and repayable at T .
3. A compensation on date T of

$$w = \frac{\tau}{1 - \tau} [e^{r(T-t)} - 1] K,$$

where t is the date of option exercise and τ is the employee's marginal tax rate.

The interest-free loan in this package is designed to eliminate the opportunity cost of early exercise and thereby to facilitate analytical characterization of the exercise policy (see Theorem IV.2 below for details); without this component, the early exercise policy cannot be identified in closed-form. However, the interest subsidy creates a further tax liability for the employee; the compensation of w at T is chosen to cancel out this liability and leave the employee with a net payoff of zero from the latter two components of the package.

Some additional notation is required. Let V^r and V^{nr} denote respectively the time-0 values of the rescindable option package and the standard option to the employee. Let C^r and C^{nr} denote the net costs of these alternatives to the company. When we wish to emphasize the dependence on the initial stock price, we shall write $C^r(S_0)$, etc. Note that all of these quantities depend on the exercise policies followed by the employee; for example, to identify C^r , we calculate the payoffs generated under the employee's optimal exercise policy and then compute the cost to the company of providing these payoffs. Let τ_c denote the marginal tax rate of the company (or the discounted present value of the tax shield in case the company lacks sufficient earnings). Finally, let $\xi(S_0)$ denote the value of a European call with a strike of K maturing at date T :

$$\xi(S_0) = E_0^*[e^{-rT}(S_T - K)^+]. \tag{1}$$

Our first result identifies the value and cost of the standard option:

Theorem IV.1 *It is optimal to hold the standard option to maturity. As a consequence:*

1. *The ex-ante value to the employee is $V^{nr} = (1 - \tau)\xi(S_0)$.*
2. *The ex-ante cost to the company is $C^{nr} = (1 - \tau_c)\xi(S_0)$.*

Proof It is well known that it is optimal to hold a call on a non-dividend-paying stock to maturity (see Merton, 1973). For completeness, we include a short proof here. Pick any $t \in [0, T]$. The value of immediate exercise at t is $(1 - \tau)(S_t - K)^+$, while viewed from t , the value of holding the option to T is $E_t^*[(1 - \tau)e^{-r(T-t)}(S_T - K)^+]$. Under the risk-neutral measure, we have $E_t^*(S_T) = e^{r(T-t)}S_t$, so by Jensen's inequality,

$$\begin{aligned}
E_t^*[(1 - \tau)e^{-r(T-t)}(S_T - K)^+] &\geq (1 - \tau)e^{-r(T-t)} \{E_t^*[S_T - K]\}^+ \\
&= (1 - \tau)e^{-r(T-t)} \{e^{r(T-t)}S_t - K\}^+ \\
&= (1 - \tau) \{S_t - e^{-r(T-t)}K\}^+ \\
&\geq (1 - \tau)(S_t - K)^+.
\end{aligned}$$

This means waiting to T is always preferable to immediate exercise and the option will be held to maturity. Thus, the ex-ante value to the employee is $(1 - \tau)\xi(S_0)$. Since the company can recognize depth-in-the-money at exercise time as an expense, the net-of-tax cost to the company at exercise time is $(1 - \tau_c)(S_T - K)^+$, whose time-0 expectation is precisely $(1 - \tau_c)\xi(S_0)$. \square

Our next result establishes the counterpart of Theorem IV.1 for the rescindable option package:

Theorem IV.2 *It is optimal to exercise the option in the rescindable option package at time 0 and to subsequently rescind it at T in the event that $S_T < K$.*

1. *The ex-ante value of the package to the employee is $V^r = \xi(S_0)$.*

2. *The ex-ante cost of the package to the company is*

$$C^r = \xi(S_0) + \left(\frac{\tau}{1 - \tau} \right) (1 - \tau_c)(1 - e^{-rT})K. \quad (2)$$

Proof We identify the optimal exercise policy and the value to the employee first. Suppose the option is exercised at time 0. Then, there are no tax consequences of exercise since $S_0 = K$, and since the strike price is paid with the interest-free loan, there are no net cash outflows for the employee at time 0. At time T , it is clearly optimal to rescind the exercise decision if and only if $S_T < K$. Also at time T , a cash outflow of K occurs because of the loan repayment. Finally, at time T , there is a cash inflow of

$$w = \frac{\tau}{1 - \tau} [e^{rT} - 1] K,$$

and a cash outflow of τw (taxes on the time T payment received) and $\tau(e^{rT} - 1)K$ (taxes due on the interest subsidy received). From the definition of w , it is trivial to check that these last set of inflows and outflows cancel, so the final time- T value of exercising at time 0 is

$$-K + \begin{cases} S_T & \text{if } S_T \geq K \\ K & \text{if } S_T < K \end{cases} \quad (3)$$

which is just $(S_T - K)^+$. The time-0 present value of this time- T payment is

$$E_0^*[e^{-rT}(S_T - K)^+] = \xi(S_0).$$

Now pick any $t \in (0, T]$ and consider exercising at t . The exercise decision results in a tax liability and hence net cash outflow of $\tau(S_t - K)^+$ at t . However, the taxes are refunded at T and the tax liability cancelled if the exercise decision is rescinded at that point. Thus, rescission results in a cash inflow at T of $K + \tau(S_t - K)^+$ so it is optimal to rescind the exercise decision at T if and only if $S_T < K + \tau(S_t - K)^+$. Once again, there is a net cash

outflow at T of K to repay the loan, and no net inflow or outflow at T on account of w . Putting all this together, the time- T value of exercising at t is

$$\begin{cases} S_T - K, & \text{if } S_T \geq K + \tau(S_t - K)^+ \\ \tau(S_t - K)^+, & \text{otherwise} \end{cases} \quad (4)$$

Moving the time- t cash outflow of $\tau(S_t - K)^+$ to time T , therefore, exercising at time t is equivalent to having zero cash outflows at t and a cash inflow at T of

$$\begin{cases} S_T - K - e^{r(T-t)}\tau(S_t - K)^+, & \text{if } S_T \geq K + \tau(S_t - K)^+ \\ (1 - e^{r(T-t)})\tau(S_t - K)^+, & \text{otherwise} \end{cases} \quad (5)$$

It is easily seen that (5) is dominated by (3) except when $S_t \leq K$ in which case the two payoffs are equal. Thus, exercising at time 0 is optimal under the rescindable option package. The net payoffs received by the employee under this package are given by (3), whose time-0 present value is precisely $\xi(S_0)$.

The net cost to the company of this package remains to be identified. At time 0, the company receives K on account of exercise and gives a loan of K and a unit of stock worth S_0 to the employee. At time T , the company pays the employee a compensation of w which has an after-tax cost of $(1 - \tau_c)w$. In addition, if the exercise decision is rescinded, the company pays the employee K and receives a share worth S_T . Now, the at-the-money exercise of the option implies that the company receives no tax-deduction from the exercise. Moreover, for tax purposes, an interest-free loan is treated as if the company receives interest from the employee and then returns it to him as compensation. Taking all this into account, it

is easily seen that the time-0 cost to the company of providing the compensation package is the present value of the following time- T cash flows:

$$\begin{cases} (S_T - K) + (1 - \tau_c) w, & \text{if } S_T \geq K \\ (1 - \tau_c) w, & \text{otherwise} \end{cases}$$

Substituting for w , this present value is precisely (2), completing the proof. \square

The closed-form solutions in Theorems IV.1 and IV.2 enable a simple and direct comparison of the two alternative compensation schemes:

Proposition IV.3 *Suppose $\tau > \tau_c$. Then, there is $r^* > 0$ such that at all interest rates $r < r^*$, the rescindable option package dominates standard options as a compensation mechanism: it delivers the same value and incentives to the employee at a lower cost to the company. The cut-off r^* increases as equity volatility increases.*

Proof From Theorems IV.1 and IV.2, one unit of a standard option provides the employee with a time- T payoff of $(1 - \tau)(S_T - K)^+$, while one unit of the rescindable option package provides a time- T payoff of $(S_T - K)^+$. Thus, one unit of a standard option is equivalent from an employee-value and incentives standpoint to $(1 - \tau)$ units of a rescindable option package. As we have seen, the net cost to the company of one standard option is $(1 - \tau_c)\xi(S_0)$, while, from (2), the net cost of $(1 - \tau)$ units of the rescindable options package is

$$(1 - \tau)\xi(S_0) + \tau(1 - \tau_c)(e^{rT} - 1)K. \quad (6)$$

Therefore, the standard option costs more as long as

$$(\tau - \tau_c)\xi(S_0) \geq \tau(1 - \tau_c)(e^{rT} - 1)K. \quad (7)$$

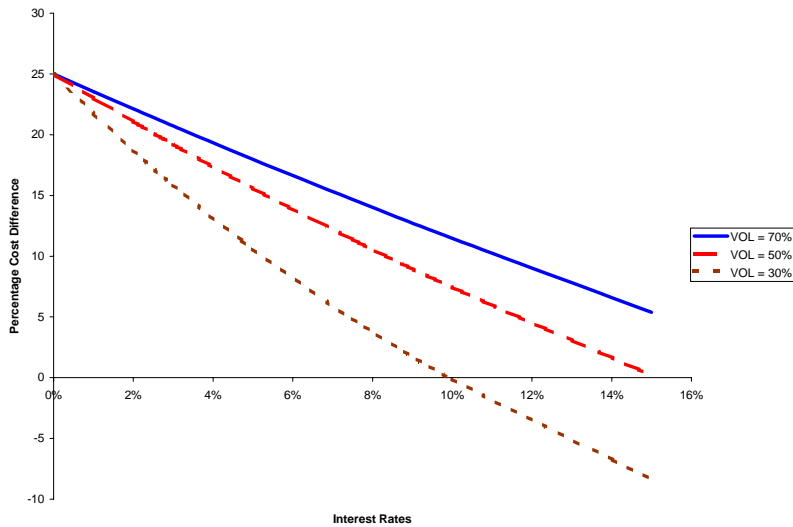
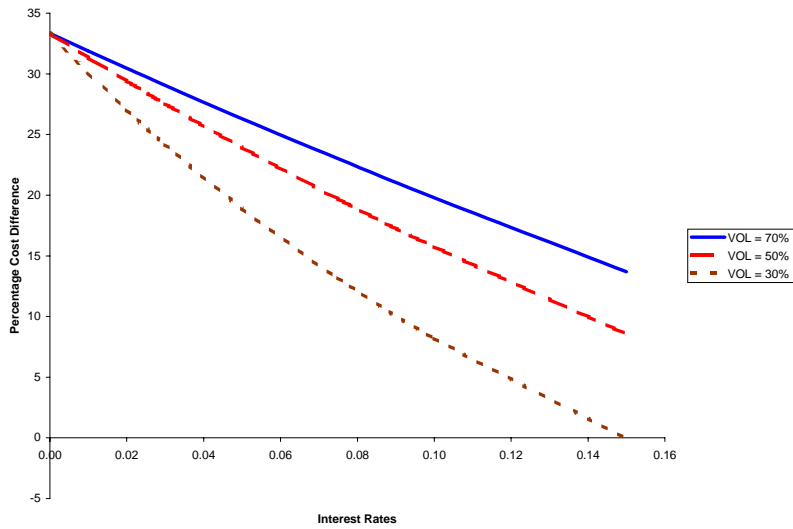
At $r = 0$, the inequality in (7) holds strictly, so rescindable options are strictly preferable for the company. By continuity in r , this means there is $r^* > 0$ such that for all $r < r^*$, the rescindable option package is cheaper. As the volatility of the stock increases, $\xi(S_0)$ increases, so the cut-off value r^* where the two sides of (7) are equal also increases. \square

Figure 1 illustrates the comparison. In the figure, the option is taken to have a life of one year. Interest rates vary between 0% and 15%, and the stock price process follows a geometric Brownian motion with three possible levels of volatility: 30%, 50%, and 70%. (Even the top volatility figure of 70% may be conservative. The three firms we are aware of from media reports that permitted rescissions (Cysive, Medscape, and Telocity) all exhibited volatilities above 100 percent.) In the upper figure the marginal tax rates of the employee and company are set at 40% and 10%, respectively, while in the lower figure these are 40% and 20%. For these parameter values, the costs of the standard option and rescindable option are computed using the expressions provided in Theorems IV.1 and IV.2, respectively. The figure describes the reduction in costs (as a percentage of the cost of the standard option) achieved by using $(1 - \tau)$ units of the rescindable option package rather than one unit of the standard option.

The reduction in costs from using the rescindable option package is maximal in both cases when interest rates are zero, i.e., when the interest subsidy is irrelevant. The percentage difference in costs in this case depends on just the two marginal tax rates and is larger the greater the difference in these tax rates (compare the upper and lower figures). As interest rates increase, the cost of providing the interest-free loan reduces the relative attractiveness of the rescindable options package. The reduction is less at high volatilities (as is implicit in (7)), meaning high-volatility firms will generally find rescindable options more attractive. Even at low volatilities, however, the rescindable options package remains more attractive until interest rates are about 14% (in the upper figure) and about 10% (in the lower figure). For the higher volatilities, the rescindable options package continues to be the cost-effective choice for the company even at high interest rates.

Figure 1. Standard v. Rescindable Options in the Basic Model

This figure describes the percentage reduction in net costs achieved in the basic model at different interest rates by using $(1 - \tau)$ units of the rescindable option package rather than one unit of the standard option. The stock price follows a geometric Brownian motion with three possible values (30%, 50%, and 70%) for annualized volatility. The option life is one year. τ and τ_c are 40% and 10%, respectively, in the upper figure and 40% and 20% in the lower figure.



From comparing the two parts of Figure 1, one observes that when the gap between personal and corporate tax rates narrows, all the curves shift down. Of course, so long as this marginal tax rate differential is nonzero, a positive cutoff interest rate exists below which rescindable options have lower cost than standard options. However, the attractiveness of rescission clearly is greatest when the firm pays little or no taxes, as would be the case for financially distressed companies or for unprofitable firms that obtain tax loss carry-forwards. These types of firms are by no means rare, motivating our use of 20 percent and 10 percent corporate tax rates in Figure 1.

Finally, the results of this section must be qualified by one observation: we have ignored possible capital gains taxes in our analysis. Formally handling the capital gains tax issue is next to impossible since we would have to model the investment decisions of the executive. However, the following informal arguments suggest that the superiority of rescindable options will still obtain, albeit in a more restricted set of circumstances. The presence of a non-zero capital-gains tax rate implies that the net value to the employee of a rescindable option will be a fraction less than unity of $\xi(S_0)$. On the other hand, since capital gains tax rates are typically much lower than income tax rates, this value will still be higher than $(1 - \tau)\xi(S_0)$, the value received by the holder of a standard option. Thus, if the executive's tax rate minus the capital gains rate exceeds the company's tax rate (or the discounted present value of the tax shield in case the company lacks sufficient earnings), the rescindable option will continue to dominate the standard option.

V. A Multi-Period Extension

In this section, we examine a multi-period extension of the basic model. For rescindable options in such a setting, the exercise decision may be rescinded only in the period in which exercise occurred, and not in subsequent periods. We show that our results remain qualitatively unchanged. At low interest rates, rescindable options provide a cost-effective

method of delivering value and incentives to the employee, while at higher interest rates, which alternative is superior depends on the specific values of the remaining parameters.

For specificity, we consider a two-period model, though the arguments are easily extended to more periods (see comments at the end of this section). The initial time point is denoted $t = 0$. At $t = 0$, the employee receives a two-period option. The first period ends at $t = T_1$ and the second period ends at $t = T_2$. For expositional convenience, we assume that the option may be exercised at any time $t \in [0, T_2]$. This too is readily modified to allow for an initial vesting period without altering our results in any way (again, see comments at the end of the section).

For the standard option, exercise at any time t at a stock price of S_t results in a tax liability of $\tau (S_t - K)^+$ for the employee. The same tax liability also arises for the holder of a rescindable option, but the exercise decision in this case can be rescinded at the end of the time period in which exercise occurred (i.e., at T_1 if exercise occurred prior to T_1 and at T_2 if exercise occurred after T_1). Rescission results in a cancellation of the tax liability and the employee returns the stock to the company in exchange for the strike price. If the exercise decision is not rescinded at the end of the period in which exercise occurred, no further rescission is possible.

In comparing standard and rescindable options in this setting, the two hurdles discussed at the beginning of the previous section get magnified. First, the problem of identifying the optimal exercise decision for a rescindable option becomes more complex because of the restrictions on when rescission can occur. Second, because of differing optimal exercise policies, the payoffs from the two options may occur in different periods, and the payoff distributions themselves may be very different. If so, the incentive effects of the options will not be directly comparable.

Motivated by these considerations, we adopt a similar route to that in the previous section and compare the standard option to a compensation package that includes the rescindable option as a component. Let t denote the date of option exercise and T denote

the end of the period in which exercise occurs (i.e., $T = T_1$ if exercise occurs prior to T_1 and $T = T_2$ if exercise occurs after T_1). As usual, τ is the employee's marginal tax rate. The specific package we consider is the following.

1. A rescindable option with strike K and maturity T_2 .
2. An interest-free loan of K made on the date t of the option's exercise and repayable at T .
3. A compensation on date T of

$$w = \frac{\tau}{1 - \tau} [e^{r(T-t)} - 1] K$$

4. A contingent payment of $z(S_t)$ at T made only if there is no rescission at T where

$$z(S_t) = \frac{\tau}{1 - \tau} (S_t - K)^+$$

The first three components of this package are identical to those in the previous section and serve the same purpose. The last component ensures that the company, not the employee, bears the tax consequences of exercise. The package ensures (Theorem V.2) that the rescindable option's exercise policy becomes analytically characterizable and that the payoffs of the compensation package are directly comparable to those from the standard option.

It must be stressed once again that this construction is quite possibly overkill. The tax subsidy, especially, could be very substantial; as a consequence, the rescindable option package could now cost significantly more than the option in isolation. This makes our finding below more noteworthy that despite the subsidies, the rescindable option package dominates the standard option at low interest rates.

Extending our earlier notation, let $\xi_2(S_0)$ denote the time-0 value of a two-period call option with strike K given the time-0 price S_0 :

$$\xi_2(S_0) = E^* [e^{-rT_2} (S_{T_2} - K)^+ \mid S_0].$$

The remaining notation (V^r , V^{nr} , C^r , and C^{nr}) remains unchanged: C^r denotes the time-0 cost to the company of the rescindable option package, V^r the value received by the employee from this package, etc. Our first result of this section characterizes the optimal exercise policy and the value/cost of the standard option, while the next result does the same for the rescindable option package.

Theorem V.1 *It is optimal to hold the standard option to maturity T_2 . As a consequence:*

1. *The value received by the employee is $V^{nr} = (1 - \tau) \xi_2(S_0)$.*
2. *The cost to the company is $C^{nr} = (1 - \tau_c) \xi_2(S_0)$.*

Proof This is a simple extension of Theorem IV.1 and is proved by backwards induction. If the option has not been exercised upto T_1 , then the same arguments as used in the proof of Theorem IV.1 show that it is optimal to hold it to T_2 . Thus, given any price S_{T_1} at time T_1 , the value of the option at T_1 to the employee is given by $(1 - \tau)\xi_1(S_{T_1})$ where ξ_1 is the value of the one-period option viewed from T_1 :

$$\xi_1(S_{T_1}) = E_{T_1}^* [e^{-r(T_2-T_1)} (S_{T_2} - K)^+].$$

Note that $\xi_1(S_{T_1}) \geq (S_{T_1} - K)^+$, since immediate exercise at T_1 is suboptimal.

Consider any $t \in [0, T_1)$. The value to the employee of immediate exercise at t is $(1 - \tau)(S_t - K)^+$. Viewed from t , the value of delaying exercise upto T_1 is $E_t^*[e^{-r(T_1-t)}\xi_1(S_{T_1})]$. Appealing to Jensen's inequality once again, we have

$$\begin{aligned}
E_t^*[(1 - \tau)e^{-r(T_1-t)}\xi_1(S_{T_1})] &\geq E_t^*[(1 - \tau)e^{-r(T_1-t)}(S_{T_1} - K)^+] \\
&\geq (1 - \tau)e^{-r(T-t)} \{E_t^*[S_{T_1} - K]\}^+ \\
&= (1 - \tau)e^{-r(T-t)} \{e^{r(T_1-t)}S_t - K\}^+ \\
&= (1 - \tau) \{S_t - e^{-r(T_1-t)}K\}^+ \\
&\geq (1 - \tau)(S_t - K)^+.
\end{aligned}$$

Thus, holding the option to T_1 is preferable to exercising it at $t \in [0, T_1)$.

Combining these observations, it is optimal to hold the option upto T_2 and exercise it then if and only if $S_{T_2} \geq K$. This leads to the values V^{nr} and C^{nr} provided in the statement of the theorem. \square

Theorem V.2 *Given the rescindable option package, it is optimal to exercise the rescindable option at the beginning of the last period and to rescind the exercise decision at T_2 in the event that $S_{T_2} < K$.*

1. *The time- T_2 payoff received by the employee is $(S_{T_2} - K)^+$, which has a time-0 present value of $V^r = \xi_2(S_0)$.*
2. *The cost to the company of providing the package is*

$$\begin{aligned}
C^r &= \xi_2(S_0) + e^{-rT_2}(1 - \tau_c)w \\
&\quad + E_0^* [e^{-rT_2} \{(1 - \tau_c)z(S_{T_1}) - \tau_c(S_{T_1} - K)^+\} \cdot Q(S_{T_2} \geq K | S_{T_1})]
\end{aligned} \tag{8}$$

where $Q(S_{T_2} \geq K | S_{T_1})$ is the risk-neutral probability that $S_{T_2} \geq K$ given S_{T_1} .

Proof We first assume that the option is held to the beginning of the last period and identify its value at the beginning of this period. Then, using this value, we show that the employee will not exercise till the last period. Finally, the cost to the company will be derived as a consequence of the exercise policy.

So suppose we are in the last period. Consider any point t . If exercise occurs at T , the employee has a cash outflow of K on account of exercise and a cash inflow of K from the interest-free loan. In addition, the employee receives a stock worth S_t . Finally, since the company has guaranteed paying the taxes stemming from exercise, we can ignore any cash outflow on this account. Thus, exercise results in a net inflow of a stock worth S_t .

At time T_2 , if the employee rescinds the exercise decision, the following flows result: (a) an outflow of K to repay the loan; (b) an outflow of $\tau(e^{r(T_2-t)} - 1)K$ representing taxes due on the interest-free loan; (c) an inflow of w , the compensation received from the company at T_2 ; (d) an outflow of τw representing the taxes due on w ; (e) an outflow of S_{T_2} representing the stock returned to the company; and (f) an inflow of K from the strike price returned by the company. Summing these up, rescission leads to a net cash outflow of S_{T_2} .

If the employee does *not* rescind the exercise decision at T_2 , the following flows result: (a)—(d) as above; (e) an inflow of $z(S_t)$, the contingent payment received in the event of no rescission which includes the payment towards taxes due on account of option exercise; (f) an outflow of $\tau z(S_t)$ representing the taxes due on $z(S_t)$; and (g) an outflow of $\tau(S_t - K)^+$ from the taxes due on account of the original exercise. Summing these up, not rescinding leads to a net cash outflow of K .

It is immediate from these net cash flows that it is optimal to rescind at T_2 if and only if $S_{T_2} < K$. Now, an inflow of S_t at time t is equivalent to an inflow of S_{T_2} at time T_2 .

Thus, moving all cash flows to time T_2 , exercising at t and rescinding the decision optimally provides the holder with the following cash flows at T_2 :

$$\begin{cases} S_{T_2} - K, & \text{if } S_{T_2} \geq K \\ 0, & \text{otherwise} \end{cases} \quad (9)$$

Since these cash flows are independent of t , exercising at any t during the last period is optimal. In particular, we may assume without loss of generality that exercise occurs at the beginning of the period, i.e., at the stock price S_{T_1} . (This could be formally ensured, for example, by making some component of the package, such as the tax subsidy, contingent on beginning-of-period exercise.) The payoffs in (9) also imply that value of the rescindable option package to the employee at the beginning of the last period is

$$\xi(S_{T_1}) = E^* [e^{-r(T_2-T_1)}(S_{T_2} - K)^+ \mid S_{T_1}].$$

Now, considering exercising at any point $t < T_1$. From repeating the arguments given above, the optimal rescission policy will result in a payoff at T_1 of $S_{T_1} - K$ if $S_{T_1} \geq K$ and zero otherwise. Now a standard argument (see, e.g., Merton, 1973) establishes that a call option is always worth more “alive” than “dead,” i.e., that $\xi(S_{T_1}) \geq (S_{T_1} - K)^+$. This means it is preferable to wait till the last period and exercise at the beginning of the last period than exercise at any earlier time. It follows that the time-0 value to the employee of the rescindable option package is the present value of a payoff of $\xi(S_{T_1})$ at time T_1 , which is, of course, just $\xi_2(S_0)$. This establishes one part of the result.

The cost to the company of the package remains to be identified. At the beginning of the last period, the company has a net outflow of one unit of stock. At time T_2 , if rescission occurs, the company has an inflow of one unit of stock worth S_{T_2} (from the rescission); and an outflow of w (from the compensation paid) which after taxes has a net cost of $(1 - \tau_c)w$. In addition, the interest-free loan is treated for tax purposes as if the employee repays the loan with interest and the company returns the interest to the employee; this

results in a net inflow of K . Summing these up, the net cash flow at T_2 if rescission occurs is $S_{T_2} - (1 - \tau_c)w$.

If rescission does not occur at T_2 , then there is a net cash inflow of K from repayment of the loan; an after-tax cost of $(1 - \tau_c)w$ on the compensation w paid; an after-tax cost of $(1 - \tau_c)z(S_{T_1})$ on the contingent compensation $z(S_{T_1})$ paid; and a tax-deduction of $\tau_c(S_{T_1} - K)^+$ based on the option's depth in the money when exercised. This amounts to a net cash flow of $K - (1 - \tau_c)w - (1 - \tau_c)z + \tau_c(S_{T_1} - K)^+$.

Moving all cash flows to T_2 , therefore, the net cash outflows incurred by the company are equivalent to the following outflows at T_2 :

$$\begin{cases} S_{T_2} - K + (1 - \tau_c)w + (1 - \tau_c)z(S_{T_1}) - \tau_c(S_{T_1} - K)^+, & \text{if } S_{T_2} \geq K \\ (1 - \tau_c)w & \text{if } S_{T_2} < K \end{cases}$$

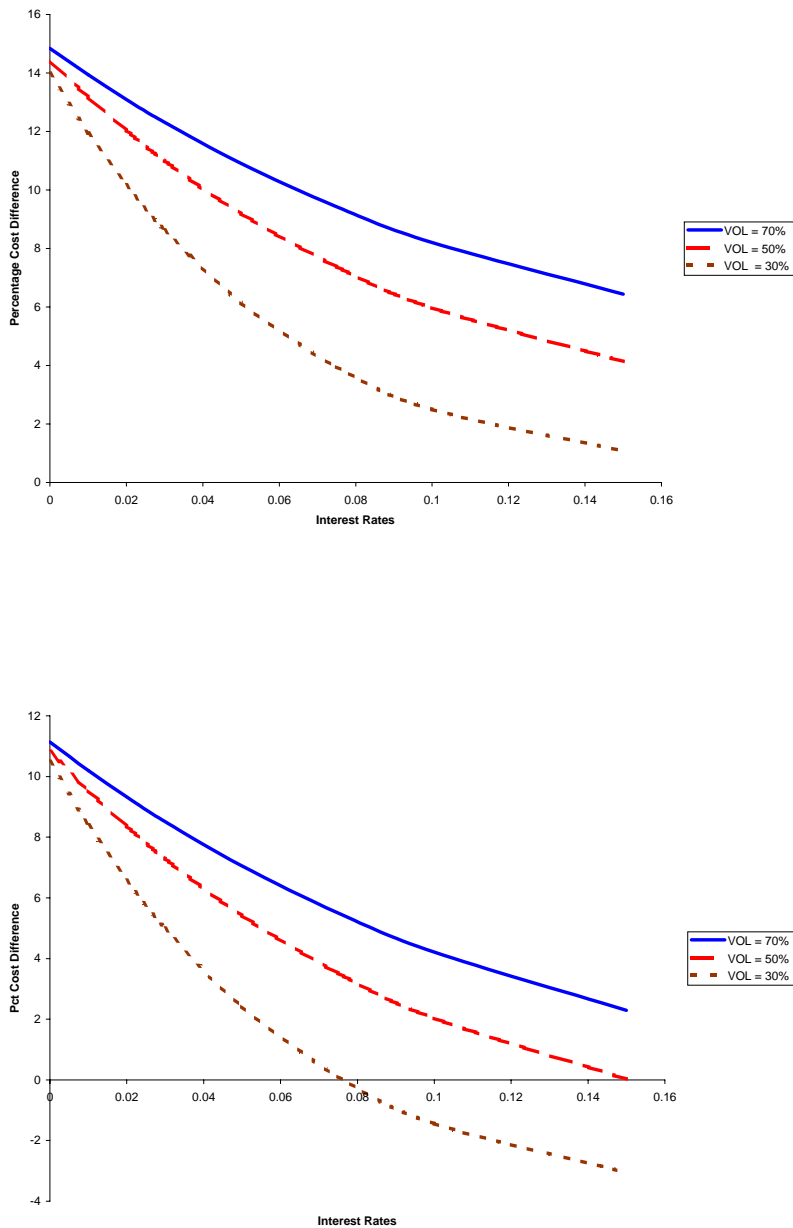
The present value of these cash flows as of time 0 is precisely (8). □

As in the previous section, these results show that $(1 - \tau)$ units of the rescindable option package is equivalent in employee value and incentives to one unit of the standard option. Thus, which alternative is more efficient can be identified from their costs. In this case, however, the costs have to be identified numerically, since the last term of (8) cannot be solved for in closed form.

Figure 2 illustrates the cost difference. The cost of the rescindable option package was computed by a Monte Carlo procedure, assuming, as earlier, that the underlying stock price process is geometric Brownian motion. Once again, three values are considered for the stock's volatility, 30%, 50%, and 70%. The marginal tax rates of the employee and the company are taken to be 40% and 10%, respectively. The figure plots the amount by which the standard option costs more as a percentage of the cost of the standard option.

Figure 2. Standard v. Rescindable Options in the Multi-Period Model

This figure describes the percentage reduction in net costs achieved at different interest rates by using $(1 - \tau)$ units of the rescindable option package rather than one unit of the standard option in the multi-period model. The stock price follows a geometric Brownian motion. Three values (30%, 50%, and 70%) are considered for annualized volatility. The option life is two years. The marginal tax rates for the employee and the company are 40% and 10% in the upper figure, and 40% and 20% in the lower figure, respectively.



Qualitatively, the results are identical to those in the previous section. At low interest rates, the rescindable option package is cheaper, but as interest rates climb, its dominance is reduced, and at high interest rates, it could vanish depending on the stock price volatility. At high volatilities, the difference comes down more slowly; for the parametrizations used in the figure and for the two higher volatility numbers, the rescindable option package remains cheaper than the standard option even at interest rates in excess of 15% per annum.

Finally, some comments to end this section. We have studied a two-period model here, but it is apparent that the optimal exercise policy will remain unchanged even if more periods are tagged on. Thus, the value differences will qualitatively remain exactly the same if one discounts back to an earlier point in time. Second, an initial vesting period will not affect our results since the optimal exercise policy only calls for exercise in the last period. Third, in practice, rescissions sometimes result in the employee getting back not only the strike price but also the original option with its terms unchanged. We have implicitly ruled this possibility out. Once again, however, incorporating it makes no difference to our results. The same arguments as employed above show that since the option is worth more alive than dead, it is optimal to rescind the exercise decision and get back the option if exercise occurred before the last period; optimal exercise still involves waiting until the last period. Thus, our results are robust to all of these extensions.

VI. Other Extensions

In this section we discuss the role of two assumptions employed in the above analysis. Section A considers the implications of using utility-based maximization instead of the hedging-based risk-neutral pricing approach while Section B discusses our assumption that firms pay zero dividends.

A. Utility-Based Analysis

As mentioned in Section III, risk-neutral valuation has been widely employed to study the value of employee compensation schemes. The key underlying assumption—that the risk in the option may be hedged with the stock—is one that may be presumed to hold for the firm’s shareholders. From the employee’s standpoint too, this method provides a useful benchmark value. Senior executives often have large shareholdings in their companies and this facilitates hedging without the need to sell shares short; hedging is also commonly achieved in practice through the use of derivatives such as zero-cost collars. For completeness, nonetheless, we examine in this section the polar opposite case where the option risk is presumed to be non-hedgeable and optimal exercise policies are identified through utility-maximization by the option holder.

Huddart (1994) presents a detailed analysis of this topic for standard options. He shows that early exercise becomes optimal for such options if risk-aversion is large enough. Intuitively, if an option is sufficiently deep in-the-money, exercising immediately and receiving a certainty payoff is preferable to a possibly larger but uncertain payoff from waiting. Extending this intuition to rescindable options, the paradoxical possibility arises that a rescindable option may provide the holder a *lower* level of ex-ante utility than a standard option. Uncertainty under the rescindable option is only resolved at time T when the decision on rescission is made, and the extra uncertainty makes the holder worse off when risk-aversion is suitably large. This intuition is robust; simple examples show that it holds in non-pathological circumstances. To eliminate such situations, we assume that at the time of exercise, the holder of a rescindable option may elect to forfeit the right to later rescission of the exercise decision.

With this in place, the the likely impact of risk-aversion is not hard to forecast. For low levels of risk-aversion, little should change in the qualitative nature of our earlier results; for example, rescindable options should remain dominant at low interest rates. As risk-aversion increases, the relative advantage of rescindable options should start eroding because of the

extra payoff uncertainty these options entail. At high levels of risk aversion, the advantage will likely vanish altogether: option holders will find it preferable to forfeit the right to rescind than to hold on to this right, so the two options should become effectively identical.

We verify these intuitive arguments in the “single-period” setting of Sections III and IV. The assumptions and structure we use are similar to Huddart (1994). The employee has zero initial wealth and has a utility function $u(\cdot)$ defined over terminal (i.e., time- T) payoffs. We consider constant relative-risk-aversion functions of the form

$$u(x) = \frac{1}{\alpha} x^\alpha, \quad \alpha \in (0, 1]. \quad (10)$$

The coefficient of relative risk aversion is $1 - \alpha$; in particular, $\alpha = 1$ corresponds to the case of risk-neutrality. The employee chooses an exercise strategy to maximize time-0 expected utility. The payoffs under this strategy less any tax deductions determine the cost to the company. The company identifies the present value of these payoffs through risk-neutral valuation.

We take the stock price process to be a binomial process with the stock price moving up by a factor of u or down by a factor of d in each time-step with probabilities p and $1 - p$, respectively. Since the purpose of this section is illustrative, we make two further simplifications. First, we confine attention to a two-step binomial model. Second, we focus on the question of how risk-aversion might affect the possible superiority of rescindable options at low interest rates; for specificity, we take the risk-free rate to be zero. For the rest, we consider three possible values for the stock’s annualized volatility: 30%, 50%, and 70%. We also take the expected return on the stock to be 10% and choose the parameters u , d and p accordingly. The risk-neutral probability q is then defined by the relationship $q = (1 - d)/(u - d)$.¹³

Our aim, once again, is to compare standard and rescindable options. To move all cash flows to time T , we make the following assumptions.¹⁴ With standard options, we assume

that if the employee exercises the standard option prior to T , the net-of-taxes proceeds are invested in the risk-free asset until time T . With rescindable options, we assume that the employee receives a loan towards the strike price and the taxes due on account of exercise if exercise occurs before T . The loans must be repaid at T ; of course, the exercise decision may also be rescinded at T and rescission leads to a tax refund.

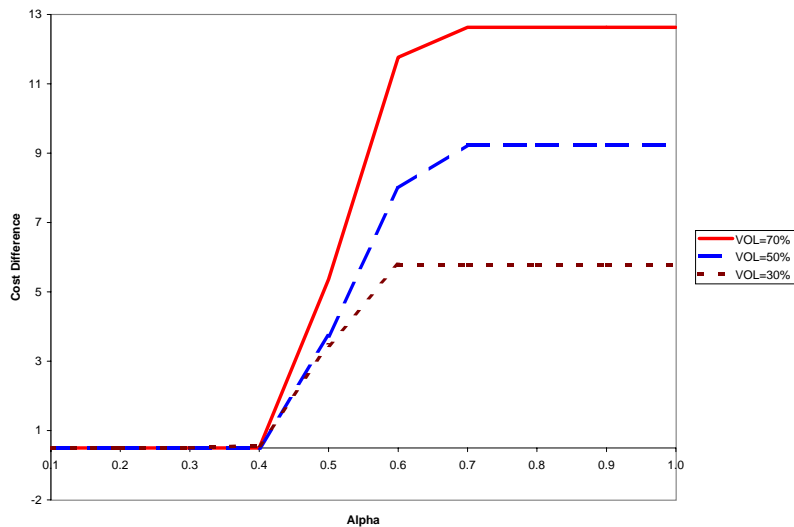
One final point is important. Since exercise may occur at different times and result in different terminal payoff distributions, we can no longer ensure that the options' incentive features are identical. We ask therefore a more modest question: how much higher is the net (after-tax) cost to the company of ensuring the same utility level for the employee under standard options as from one unit of a rescindable option?

Figure 3 plots the answer for our chosen parameter values and it is exactly what intuition suggests. At low levels of risk-aversion, rescindable options offer substantial cost savings for the company over the alternative of standard options, with the savings being higher at higher volatilities. As risk-aversion increases (α becomes smaller), the advantage of rescindable options begins to fade, and at high levels of risk aversion ($\alpha < 0.4$ in the graph), it vanishes altogether.

The plot in Figure 3 has rough edges since it is based on a binomial model with only two periods. Nonetheless, the outcome is very intuitive and similar conclusions should obtain in a model with a finer grid. We conclude that if option risk is deemed completely non-hedgeable, then the attractiveness of rescindable options depends on the extent of risk-aversion. Even at low interest rates, the advantage from using these options can be small or negligible if risk-aversion is large, but continues to be substantial when risk-aversion is small.

Figure 3. % Cost Difference Between Standard & Rescindable Options

This figure describes the percentage reduction in net costs achieved at different levels of risk-aversion by using standard options to guarantee the same level of utility to the option holder as one unit of a rescindable option. The framework is that described in Section A. The underlying model is a two-period binomial model. Three possible levels (30%, 50%, and 70%) are considered for annualized volatility of the stock. The marginal tax rates for the employee and the company are 40% and 10%, respectively.



B. Dividends

To our knowledge, rescindable options have been used only by distressed or start-up firms, concentrated in the technology sector, that are predisposed not to pay dividends. Our assumption of zero dividends probably squares closely with the prevailing practice, as well as with our theoretical result that rescindable options will have the greatest appeal to financially distressed firms.

However, it is possible that a dividend-paying firm could permit rescission of option exercises. For “small” dividend levels, our analysis would not change much, but for large dividends, considerable analytical complexity is added to the problem. One question is the treatment of dividends itself under rescission—whether the option holder who exercised, began collecting dividends, and then rescinded the exercise, would have to return the dividends to the firm; and, if so, whether an interest charge is also applied to the returned dividends. The specific assumptions would determine the nature of the impact of dividends on the exercise policy. If dividends do not have to be returned, this increases the incentives for early exercise of rescindable options.¹⁵ To a lesser degree, this is also true if the dividends have to be returned but there is no interest penalty (which appears to be the most plausible situation). On the other hand, if dividends have to be returned with penalty, the extra incentives for early exercise are substantially reduced.

The standard option’s exercise policy is also, of course, affected by the presence of dividends: for the usual reasons, early exercise would become optimal if dividends are large enough. This implies that payoffs would typically occur at different times for the two options—at exercise time for the standard option and at the time of rescission for rescindable options. Overall, these factors make it substantially harder to ensure unambiguous comparability of the options.

VII. Tax Treatment of Executive Options

Most options held by executives in U.S. firms are “nonqualified options” for tax purposes. These options trigger a tax liability for the employee and a deduction for the firm on the date of exercise, based on the spread between the exercise price and the current stock price. For the employee, this amount is taxed as ordinary income; if he continues to hold the underlying stock for at least 12 months, further appreciation (or decline) is taxed as a capital gain (or loss).

A minority of options, called “incentive stock options,” receive special tax benefits. The option holder pays no tax at the time of exercise and capital gains tax only when the underlying shares are sold, with a tax basis equal to the exercise price. The firm receives no tax deduction. Stock acquired from exercising ISOs must be held at least one year past the exercise date and two years past the option award date. However, tax benefits from ISOs can be severely limited for certain option holders, because the option spread at exercise—which would ordinarily be untaxed—enters into the calculation for alternative minimum tax, which is subject to a 28% marginal rate for those whose incomes exceed certain limits. ISO holders can also convert their options to NQOs by selling the underlying stock before the end of the required holding period; this strategy avoids the AMT if the stock is sold in the same calendar year as the exercise.

Tax Treatment of Rescission

Rescission becomes appealing if the underlying stock value declines substantially after the exercise date. Since the spread on the exercise date determines the ordinary income tax obligation for NQOs, as well as the possible AMT obligation for ISOs, falling stock prices after the exercise date could leave the former option holder with stock whose value is less than his tax obligation.

The accounting treatment of rescissions is dealt with by a 2001 SEC Staff Announcement.¹⁶ There is, however, no explicit guidance from the Internal Revenue Service on the tax treatment of rescissions. No statutes in the U.S. Internal Revenue Code address the possibility of rescission, nor has the IRS issued any non-precedential Private Letter Rulings on the topic. The closest relevant legal reference point is IRS Private Letter Ruling 9104039, issued in 1991 in a case involving a rescission of restricted stock awards. In that case, the company and its employees agreed to rescind the awards after realizing that the firm's accountants had given mistaken advice about the awards' impact on the company's income statement. The IRS held that the rescissions permitted employees to "disregard for federal income tax purposes" the original awards, so long as both events occurred in the same tax year. As articulated in the financial press, those option holders who have rescinded exercise decisions appear to have taken the position that "the exercise and the subsequent rescission within the same tax year are treated as if neither had occurred."¹⁷ This position motivates our analysis in this paper.

International Tax Treatment of Executive Stock Options

Outside the US, tax laws governing the treatment of options granted to employees are rather new and subject to frequent amendment. In many countries, the tax law is simply a copy of the US code. In the UK, France, and Germany, for example, the law is similar to that of the US: a tax liability is created the day option exercise occurs with the depth-in-the-money at exercise time being treated as ordinary income. Italian law is different in this regard with options being taxed only if they are in-the-money on the day of grant.

A few countries in which the compensation of employees using corporate securities is a recent phenomenon have drafted laws that attempt to avoid inefficiently influencing employees' behavior. In India, for example, the tax treatment of all employee stock options parallels the treatment of Incentive Stock Options in the US. There is no tax liability until the stock obtained through exercise is sold, no matter how much later than the option

exercise this occurs. Further, sale of the stock triggers a capital gains tax, not an income tax. The Japanese tax code is similar to the Indian one with a tax liability arising only when the stock acquired through exercise is sold.

In other countries the tax code tends to follow the principles of US law but with individual twists. Israel, for example, does not currently have clear legislation regarding the tax treatment of employee stock options. However, a pending proposal favors the US treatment, but with the following adjustment: if during the six months following exercise of the option, the price of the stock is below the price at exercise, rescission will be permitted with cancellation of the tax liability stemming from the original exercise.

VIII. Conclusions

Like the earlier practice of repricing, rescissions of executive stock option exercises have generated harsh criticism from shareholder groups and corporate governance experts. Superficially, rescindable options appear to remove or even reverse the incentive alignment that stock options provide between shareholders and employees.

Our analysis shows that these criticisms are not valid. We show that the holder of a rescindable option will follow a different optimal exercise strategy from the holder of a standard option; this strategy is driven by the income tax treatment of executive options in the U.S., which is based upon the depth-in-the-money of the option at exercise time. As a consequence of this exercise policy, rescindable options generate payoffs that are similar—and under suitable conditions, identical—to those under standard options. However, the net cost to the issuer of creating these payoffs is lower under rescindable options than under standard options so long as the marginal tax rate of the employee exceeds that of the firm. The attractiveness of rescindable options increases with the size of this tax differential and stock volatility, and decreases as interest rates increase.

Notes

¹See Section II for references.

²See, e.g., “New Corporate Perk: If the Stock Falls, Cancel Purchases,” *New York Times*, 1/26/2001; or “Unlike Most Investors, Some Insiders can Cancel Unprofitable Stock Purchases,” *Wall Street Journal*, 2/15/2001.

³This tax treatment applies to those employee stock options that are called “non-qualified.” Options in the other category, “incentive stock options,” do not incur a tax liability upon exercise, but only when the stock obtained through exercise is sold. See Section VII for further details.

⁴A typical reaction is this quote from a compensation consultant in a news report: “[Rescissions] are beyond a double standard. If you’re going to let people rescind transactions, you’ve literally removed all the risk.

⁵As discussed in Section IV, the interest-free loan is key to obtaining an analytical characterization of the exercise policy. The idea of using such a loan came from the referee.

⁶More precisely, the principal amount to be returned to the company is the face value borrowed minus the decline (if any) in the value of the stock over the borrowing period. Two Israeli companies (Kardan Technologies and Delek Automotiv) have, for example, implemented such a scheme in the past two years.

⁷The range of topics that have been studied include: the valuation of executive stock options (Rubinstein, 1994); the effect of reporting costs on the use of stock options (Matsunaga, 1995); the effectiveness of options as a means of compensation (Yermack, 1995); the timing of option awards (Yermack, 1997); and the price impact of early-exercise decisions (Seyhun, 1992).

⁸The incidence of repricing by corporations in financial distress is examined in Gilson and Vetsuypens (1993), while repricing after the stock market crash of 1987 is studied by Saly (1994).

⁹The no-dividends assumption is reasonable since rescission is a practice followed by troubled firms. The impact of introducing dividends is discussed in Section B below.

¹⁰The provision by the firm of the interest-free loan moves early-exercise forward in our model. There is an analogy between this impact and the finding of Hemmer, Matsunaga, and Shevlin (1996a) that the propensity to exercise options early is reduced if the firm's investment choices provide a hedge against option risk. In our model, the interest-cost of an early exercise decision that is subsequently rescinded is reduced by the interest-free loan making early exercise more likely. In their framework, the option risk is presumed unhedgeable by the manager, so risk-averse managers have an incentive to exercise early as in Huddart (1994). However, if the firm provides a hedge against option risk, the incentive to early exercise is reduced.

¹¹An earlier version of this paper compared standard options to stand-alone rescindable options. This had two disadvantages. First, the comparison was in part numerical since the early-exercise policy of the rescindable option is not always analytically characterizable. Second, except where the early exercise policies were identified analytically, a comparison of incentive features could only be done by comparing option sensitivities, which is not entirely satisfactory. The procedure adopted in this version of the paper was suggested by this paper's referee.

¹²Note that our results potentially *understate* the attractiveness of the rescindable option, since our analysis compares the standard option to a compensation package that includes, but costs strictly more than, the rescindable option.

¹³Huddart's construction of the binomial tree differs from ours. In Huddart's model, the expected return on the stock *equals* the return on the riskless asset. (This is justified by

interpreting the return on the riskless asset as the return on the market portfolio in an economy without systematic risk.) Thus, a risk-neutral investor in his model is indifferent between the risky and riskless assets. For our model, it is both natural and necessary to interpret the riskless rate as an interest rate rather than as the return on a market portfolio, so the expected return on the stock exceeds the risk-free rate. It turns out, however, that it does not make a substantial qualitative difference to our results which interpretation we make concerning the riskless asset.

¹⁴These assumptions could be replaced with a more complex structure such as a time-additive utility function under which the employee's total utility is the sum of the utilities from cash flows at different points in time discounted back to time 0. This adds unnecessary complexity, particularly for rescindable options.

¹⁵This treatment also creates a moral hazard problem: it provides considerable incentive for executives holding such options to declare large dividends.

¹⁶SEC Staff Announcement: "Accounting for the Rescission of the Exercise of Employee Stock Options," Topic No. D93, January 17–18, 2001.

¹⁷SEC Staff Announcement cited above.

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