PERSONNEL PSYCHOLOGY
2008, 61, 687–726

UNDERWATER STOCK OPTIONS AND VOLUNTARY EXECUTIVE TURNOVER: A MULTIDISCIPLINARY PERSPECTIVE INTEGRATING BEHAVIORAL AND ECONOMIC THEORIES

BENJAMIN B. DUNFORD
Purdue University

DEREK K. OLER
Indiana University

JOHN W. BOUDREAU
University of Southern California

In a study of top U.S. executives between 1996 and 2006, we examined the impact of underwater stock options on voluntary turnover. Financial and economic logic suggests that underwater options may carry a positive valuation based on Black–Scholes (BS) pricing, even when the current market price is below the exercise price. However, a variety of psychological and behavioral theories suggest that underwater option portfolios may motivate voluntary turnover to a greater extent than what can be captured by Black–Scholes valuation. Findings supported these perspectives, as underwater options were associated with voluntary executive turnover, after controlling for the BS value of the options and other factors. Moreover, we found evidence that voluntary turnover dynamics differed substantially between CEOs and non-CEOs.

Employee stock options are nontransferable rights to purchase a certain number of shares in one's company at a certain price known as the exercise price (Hall, 2000). They are considered "underwater" or "out-of-the-money" when the market price falls below the exercise price. Conversely, stock options are considered to be "in-the-money" when the market price is above the exercise price (Hall, 2000). Despite recent policy changes by the Financial Accounting Standards Board (FASB) requiring the expensing of stock options on company income statements, they remain a popular form of compensation in the United States, particularly for top executives (Hansen & Cummings, 2005). Hall and Knox (2004) reported that stock options represent the largest single component of executive pay

We thank Ann Marie Ryan, three anonymous reviewers, Shaun Hansen, Trent Williams, WonJun Kwak, and Gun Jea Yu for their assistance with this study. Correspondence and requests for reprints should be addressed to Benjamin B. Dunford, Krannert School of Management, Purdue University, 403 West State Street, West Lafayette, IN 47907-2056; bdunford@purdue.edu.

in the United States. A recent study indicated that 78.2% of top executives in S&P 500 companies received stock option grants in 2005, compared to 77.2% in 2004 (Equilar, 2006).

The value of executives' stock option portfolios has fluctuated dramatically in recent years. In 2001, more than 80% of U.S. companies had underwater stock options, with more than one-third reporting that 50% of their outstanding options were underwater (Corporate Board, 2001). More recent data suggest a brighter outlook for the future. A Hewitt (2004) survey indicated that one-third of responding companies predicted that less than 20% of their stock options would expire underwater. However, underwater stock options are still common. For example, a 2005 survey of 100 technology companies (cf. Marquez, 2005) indicated that at least 50% of respondents had underwater stock options in their portfolios. Given the volatility of the market, underwater stock options are likely to be a feature of executive portfolios in the foreseeable future.

Stock options are granted to executives for two major reasons. First, they provide a powerful financial incentive for executives to take actions to increase shareholder value (Chidambaran & Prabhala, 2003). In other words, they align the interests of executives with the interest of shareholders (Jensen & Meckling, 1976; Jensen & Murphy, 1990; Murphy, 1985). Second, stock options are granted as a retention tool (Carter & Lynch, 2004). Ittner, Lambert, and Larcker (2003) reported that retention was the most often cited objective for stock option plans among a sample of 194 firms. Indeed, empirical evidence suggests that stock options can have meaningful retention effects when they are in-the-money (Mehran & Yermack, 1999). Balsam and Miharjo (2007) found that executives with higher in-the-money stock option portfolio values were less likely to leave their firms voluntarily than executives with lower in-the-money portfolios. However, less attention has been paid to out-of-the-money options.

As we demonstrate, out-of-the money options provide a unique situation in which the portfolio value derived from financial/economic theory may diverge from psychological perceptions. The most widely accepted option of pricing algorithm (the Black–Scholes [BS] approach) correlates very closely with fluctuations in option intrinsic value[1] when the options are in-the-money. However, this pricing algorithm is far less correlated with fluctuations in option intrinsic value when options are underwater. This divergence provides a unique opportunity to decompose the effects of intrinsic value fluctuations as distinct from the BS option pricing model. We examine whether predictions regarding executive reactions to underwater options are improved by a multidisciplinary approach that augments

[1]Intrinsic value is defined as the difference between the current market price and the exercise price of in-the-money options (Hull, 2002).

BS pricing, using propositions from psychological theories regarding signaling, perceptions, and separation behavior.

A significant body of research shows a positive relationship between poor firm performance and involuntary executive turnover (e.g., Parrino, 1997; Warner, Watts, & Wruck, 1988). Executives are likely to be replaced when their firm performs poorly (Fee & Hadlock, 2004), and research shows that this is often a good thing for the firm in terms of future firm performance (Denis & Denis, 1995). Thus, when underwater options result from poor managerial performance that leads to lower stock prices, boards of directors can justify dismissing incompetent executives. However, decreasing option values are not always the result of executive performance problems, as recent economic fluctuations have shown, and this raises interesting questions about how executives react to depreciation in the value of their stock option portfolios, particularly if executive performance is not necessarily the cause of the depreciation (Balachandran, Carter, & Lynch, 2004).

Some research has examined whether underwater stock option portfolios may erode the alignment between executive performance and shareholder interests (Balsam & Miharjo, 2007; Brenner, Sundaram, & Yermack, 2000). However, here we focus on a second widely publicized concern with underwater options—the threat of losing key talent (Carter & Lynch, 2004; Chidambaran & Prabhala, 2003). To retain key talent, firms employ various approaches to modify the compensation packages of executives with underwater stock options. Balachandran et al. (2004) found that 81% of firms with underwater options responded with at least one of the following tactics: greater-than-expected increases in base pay, bonuses, or restricted stock grants;[2] repriced[3] stock options; and "6 and 1" option exchange programs.[4] Figure 1 summarizes the frequency of such tactics identified in the Balachandran et al. (2004) study, which shows that repricing and 6 and 1 option exchange practices are very rarely used relative to base pay, bonus, and restricted stock increases. Each of these tactics has one thing in common: Virtually all are controversial with shareholders because they may reward executives for poor managerial performance (Carter & Lynch, 2004). Augmenting the compensation of executives to offset their underwater stock options may "undermine the role of options

[2]Restricted stocks are outright grants of shares of stock given to executives that cannot be sold until after a long-term vesting period is completed (Balachandran et al., 2004).

[3]Stock option repricing is the practice of replacing existing underwater stock options for new stock options with a lower exercise price, often 30–40% lower than the original exercise price (Chidambaran & Prabhala, 2003).

[4]In 6 and 1 option exchange programs, firms cancel underwater options and promise to replace them with at-the-money options 6 months later. The 6-month delay enables firms to avoid expensing the new shares (Balachandran et al., 2004).

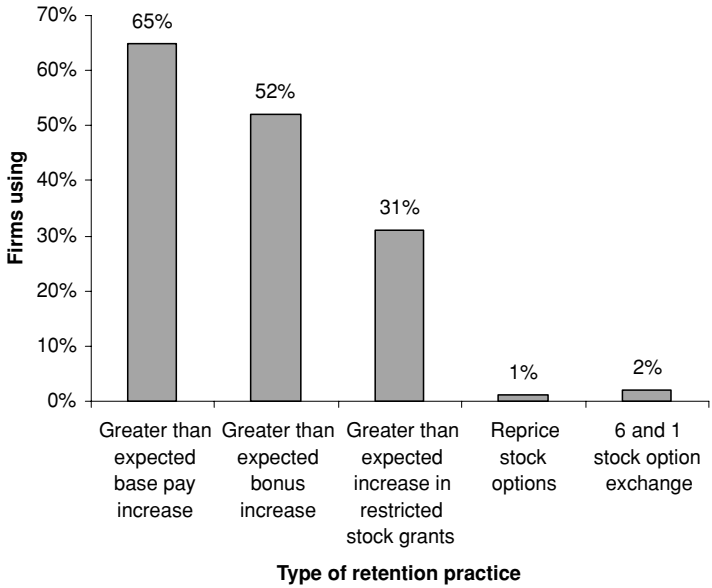

Figure 1: **Frequency of Practices Used to Retain Valued Executives With Underwater Stock Options (Adapted from Balachandran, Carter, & Lynch, 2004).**

as a link between management and shareholder wealth" (Chidambaran & Prabhala, 2003).

Compensation adjustments such as those noted in Figure 1 reflect a legitimate concern among boards of directors about the retention of key executives whose options fall underwater. However, these costly and highly controversial practices do not appear to be based on sound empirical evidence that underwater stock options actually cause executives to voluntarily jump ship (Balachandran et al., 2004). Instead, such practices appear to be based on anecdotal evidence, advice of compensation consultants, benchmark studies (Watson Wyatt Worldwide, 2003), and popular press reports about how highly valued executives leave when their options are underwater (Osterland, 2001).

Very little scholarly research has examined the effects of underwater stock options on voluntary executive turnover. To date, most research concerning underwater stock options comes from the finance literature on repricing, which has investigated two major research questions: (a) whether or not repricing reduces turnover and (b) what factors cause firms to reprice stock option grants. Findings on the retention efficacy of repricing are mixed. Chen (2004) found that firms who had more restrictive

policies about repricing (i.e., less likely to reprice) demonstrated higher levels of executive turnover following stock price declines. Carter and Lynch (2004) found that repricing reduced overall employee turnover but not executive turnover. In contrast, Chidambaran and Prabhala (2003) found that repricing firms had abnormally *high* CEO turnover rates following repricing. Conclusions regarding the antecedents of repricing are much clearer and consistent. Evidence shows that repricing often occurs in smaller, younger, more rapidly growing firms (Chidambaran & Prabhala, 2003) after a period of poor firm performance (Chen, 2004). There is also evidence that repricing is influenced by politics and power dynamics, occurring more frequently in firms where the CEO is also the chairman of the board, has more internally appointed board members, and has higher ownership levels (Pollock, Fischer, & Wade, 2002).

Although research regarding the association between executive turnover and repricing is informative, it may not provide sufficient evidence to conclude that valued executives leave when their options are underwater. First, studies that examine linkages between repricing and turnover have not distinguished between voluntary and involuntary turnover (e.g., Chidambaran & Prabhala, 2003), so it is possible that executives with underwater options are being involuntarily terminated for poor performance. Second, firms often accompany repricing practices with restrictions on when repriced options can be exercised and restart vesting schedules. It is possible that these factors, which lengthen the necessary employment period before options can be monetized, and not the presence or degree of underwater options by itself, explain why repricing firms can have lower turnover rates (Subramanian, Chakraborty, & Sheikh, 2007). Thus, repricing literature cannot provide an adequate empirical basis for the conclusion that underwater stock options lead valued executives to voluntarily leave the firm.

Two studies have directly investigated the impact of underwater stock on turnover. Dunford, Boudreau, and Boswell (2005) examined the impact of underwater stock options on executive job search behavior. They found that the greater the percentage of underwater options in executives' portfolios, the more likely the executives were to search. Dunford et al. (2005) also found that executive perceptions of firm performance and other firm attributes were negatively associated with underwater options. The Dunford et al. (2005) study was not designed to address two additional important factors: First, it measured how many of an executive's options were underwater not the *degree* to which executives portfolios were underwater, and second, it focused on job search activity and not actual separation. Previous literature (Boswell, Boudreau, & Dunford, 2004; Bretz, Boudreau, & Judge, 1994) shows that job search does not always lead to separation.

In a second study of the impact of underwater options, Carter and Lynch (2004) examined underwater stock options in the context of the consequences of repricing practices. They found that firm-level executive turnover rates were higher among firms with more deeply underwater stock options but found little evidence that repricing reduced executive turnover. Like other repricing studies, they did not distinguish between voluntary and involuntary turnover. Finally, their data reflected the years 1998–1999, prior to the peak of the dot-com economy, making it difficult to generalize their findings to other time periods.

Although direct evidence of the effect of underwater options on the turnover of valued executives is limited, firms continue to use controversial retention practices (see Figure 1). Prior research has not adequately examined the impact on voluntary turnover of either the existence of underwater options or of the extent to which stock options are underwater. Costly and controversial retention tactics continue to be based on the largely untested assumption that underwater options cause executives to jump ship. If this assumption is not true, then such practices may be ineffective in retaining key executives and possibly even a waste of valuable resources. From a theoretical perspective, the low correlation between variation in BS valuation and variation in the value of underwater options allows us to test whether executive turnover behaviors reflect perceptual responses not captured by BS valuation alone.

Thus, this study advances the literature in three important respects. First, we address key methodological shortcomings noted in previous research by employing a time-series panel data analysis of 11 years of data from 1996 to 2006 (which span the rise and fall of the dot-com economy); we also distinguish between voluntary and involuntary executive turnover; and we calculate multiple measures of stock option portfolio value. Second, we add a behavioral perspective to the traditional financial perspective of the effects of underwater options. Underwater options are particularly useful in this regard because underwater stock options carry a positive time value, reflected in BS pricing, yet they may signal negative firm attributes and lead to expectations of long-term firm performance challenges that prompt executives to leave the firm voluntarily. Finally, we directly examine how voluntary executive turnover is influenced by both the *existence* of underwater options and by the *amount* that options are out-of-the-money.

These findings will not only empirically answer fundamental questions about the severity of the voluntary turnover effect of underwater options but also provide practical insight into the potential effectiveness of various compensation adjustment tactics designed to retain highly valued executives with underwater portfolios. It is important to understand how both the existence and the depth of underwater options impacts voluntary

turnover because the more nuanced our understanding of how they work, the more sophisticated the basis for organizational decisions to undertake them, and the better they can be explained to shareholders.

The Time Value of Stock Options and the BS Pricing Model

Stock options are nontradable rights to purchase a certain number of shares of stock in the firm at a certain (exercise) price (Hall, 2000). Stock options are designed to provide long-term incentives, typically vesting over 4–5 years and expiring after a 10-year period (Huddart, 2003). Although employee stock options are not transferable (Hall & Murphy, 2002), and thus cannot actually be traded in the market, the value of stock options is most often described in terms of their "fair value," or the amount for which they would be bought or sold on the market if they were tradable (Eaton & Prucyk, 2005). Numerous factors can influence the fair value of stock options such as the volatility of the firm's stock price, dividend rates, the time to maturity, and the dividend yield (Hall, 2000; Hill & Stevens, 2002). For example, the fair value of a stock option is generally increasing in stock price volatility, dividend yield, and in the time to expiration (Black & Scholes, 1973; Hull, 2002). Thus, though a tradable stock option may be currently underwater (when the current stock price is below the option exercise price), its economic value may still be positive, based on the likelihood it may be in-the-money in the future (Hill & Stevens, 2002).

Several models (e.g., binomial models, BS, lattice models, etc.) have been developed to identify the time value of stock options. Among these models, the BS pricing model is the most commonly used method in part because it accounts for several factors (i.e., volatility, time to maturity, and other factors as noted above) affecting the fair value of traded stock options (Hill & Stevens, 2002). Indeed, the BS pricing model has been endorsed by Securities and Exchange Commission (SEC) as a method firms may use to account for the value of the option grants to employees (Eaton & Prucyk, 2005), and the vast majority of research on stock options has used this valuation method as a measure of the value of an executive's portfolio of granted stock options (Hall & Murphy, 2002).

Do the subjective valuations of stock option grants made by those who receive them correspond to BS pricing? Research suggests that individuals pay attention to several factors reflected in the time value of stock options, including volatility and risk (Carpenter, 1998). Findings vary as to whether individuals' subjective valuations of options are above (Devers, Wiseman, & Holmes, 2007) or below (Hall & Murphy, 2002) BS estimates, but research consistently suggests that individuals attend closely to the time value of their option portfolios. Given the finance

expertise typical of top executives, and the fact that most firms use the BS pricing model in federally mandated reports, we would expect them to be aware of the BS value of their options. Previous research has also established that the time value of stock options is negatively associated with executive voluntary turnover (Balsam & Miharjo, 2007). This is consistent with human capital theory (Becker, 1975) predictions that employees will be more likely to quit a low-paying job than they would a high-paying job (Ehrenberg & Smith, 1991) and evidence that pay level and pay satisfaction are robust predictors of executive retention (Bretz et al., 1994; Finkelstein & Hambrick, 1996).

Out-of-the-Money Stock Options: An Opportunity to Test a Multidisciplinary Perspective

Given the logic and research noted above, it would not be surprising if compensation decision makers rely on BS valuation as a proxy for the subjective value of stock option incentives that ultimately drives employee behavior. However, research has generally examined the value of options only when they are in-the-money. When options are underwater, the BS model is far less closely related to fluctuations in the intrinsic value of the option portfolio than when options are in-the-money (Core & Guay, 2002). The mathematical properties of BS make it asymptotically reflective of the spread between the exercise price and market price of the firm's stock (Hall & Murphy, 2002). As Figure 2 indicates, when stock options are in-the-money, the BS value is very highly correlated with intrinsic value, whereas for out-of-the-money options, the correlation is much lower. This mathematical divergence raises the possibility that findings from studies of in-the-money options and studies using BS to value underwater option portfolios may be usefully augmented with other perspectives to understand the impact of underwater options on voluntary turnover.

Although executives are likely to be well aware of the time value of their option portfolios (captured by BS), there are reasons to suggest that underwater stock options are psychologically salient to executives and that they may react to fluctuations in the intrinsic value of their underwater options, even if those fluctuations do not significantly change the BS value of the portfolio. Stock options have become an expected component of executive compensation and represent a key bargaining point in the recruitment process (Brandes, Dharwadkar, Lemesis, & Heisler, 2003), as lucrative stock option grants are becoming increasingly necessary to recruit and retain top executive talent. Stock options now make up a large portion of total compensation (Hall & Knox, 2004) but are not tradable, which prevents executives from hedging the risk of their options (Hall & Murphy, 2002).

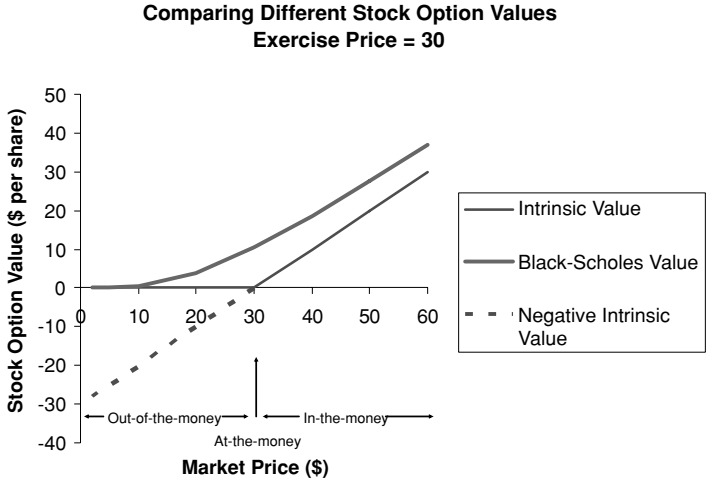

Figure 2: **Comparing Different Stock Option Valuation Methods (Adapted From Hall & Murphy, 2002).**

Moreover, the value of an executive's stock options is a highly visible symbol of a firm's success and desirability (Seethamraju & Zach, 2003). Research indicates that executives prefer to work for winning firms (Bretz et al., 1994). Dunford et al. (2005) found that executives with a high percentage of underwater stock options in their portfolios reported more negative attitudes about the company's performance and its attributes. These findings are consistent with "the meaning of money" literature in applied psychology indicating that pay is symbolic of status, respect, achievement, and success (Furnham & Argyle, 1998; Mitchell & Mickel, 1999).

Behavioral economics theories also suggest that executives may react to underwater stock options. Research shows that individuals demonstrate *myopic loss aversion* when making decisions about investments, being sensitive to reductions in the value of their investments, and typically evaluating investments over a relatively short time period of about 1 year (Benartzi & Thaler, 1995; Haigh & List, 2002; Thaler, Tversky, Kahneman, & Schwartz, 1997). Research on the factors that motivate stock option exercise supports these findings. Huddart and Lang (1996) found that employees exercise stock options too early, sacrificing as much as half of their BS value. Hemmer, Matsunaga, and Shevlin (1996) found that early stock option exercise among executives increased with stock price volatility. Finally, Heath, Huddart, and Lang (1999) found that employees not only exercised their stock options too early (sacrificing their

BS value), but they also tended to evaluate their stock option portfolios over a 1-year period.

Thus, drawing on research from applied psychology and behavioral economics, it appears that executives may be sensitive to underwater options in ways that have not been investigated. Even when underwater stock options carry a positive BS value, the signal sent simply by their being underwater may prompt executives to leave the firm because the current underwater value suggests that they are working for a "losing" organization. Moreover, fluctuations in underwater option portfolio value (changes in the negative value of the portfolio) may have stronger effects on behavior than would be reflected in the BS pricing model, due to the asymptotic nature of BS pricing shown in Figure 2. In sum, emerging empirical evidence indicates that the existence of underwater stock options may be a strong "push" factor, prompting talented executives to voluntarily leave their firms. Indeed, research suggests that employees respond as if their subjective valuations were different from BS, considering such factors as risk, endowment effects, and the firms' performance history (Devers et al., 2007; Hall & Murphy, 2002). Even this emerging research on the subjective valuation of stock options has not considered the subjective valuation of underwater options (Devers et al., 2007).

For example, consider an executive with stock options granted 1 year earlier, at an exercise price $20 above the current market price. In other words, those options are $20 per share underwater. The BS pricing model would value such options at approximately positive $16.46 per share,[5] considering the volatility of the stock, the time to maturity (assuming they expire in 9 years), and other factors. In spite of the positive BS value, it seems possible that having options that are $20 out-of-the-money would be a potentially potent signal to the optionholders that the firm is not doing well. Indeed, based on evidence that investors take a short-sighted or myopic view when evaluating their portfolios (Benartzi & Thaler, 1995), we expect executives to be highly sensitive to having options that are currently underwater.

If decision makers assume that executives value their stock option grants at their BS estimated values, when in fact executives also consider whether and to what degree their portfolios are out-of-the-money, there may be significant opportunities to better optimize option-based incentives. For example, evidence suggests that firms invest resources and risk shareholder controversy by pay increases and other tactics designed to offset underwater options, even though BS valuation suggests underwater

[5]Following Hall and Murphy (2002), assuming a 6% risk-free rate and 3% volatility rate. For simplicity, we assume a dividend yield rate of 0, a stock price of $55.34, and an exercise price of $75.34.

options may not have large effects on underlying option value. If evidence suggests that the existence or degree of underwater options adds no value to BS in predicting voluntary executive turnover, it may be that such policies are misguided. On the other hand, if turnover is significantly greater depending on the existence or extent of underwater options, organizations might rationally argue for even more aggressive tactics (e.g., repricing or 6 and 1 exchanges) than pay and bonus increases to offset these effects.

In summary, the relatively flat change in BS valuation in response to changes in underwater option value provides a unique opportunity to test theories from applied psychology and behavioral economics, suggesting that executives' subjective perceptions may not match the BS valuations. The behavioral effects of options by using the BS pricing model may usefully be augmented with information about option intrinsic values when options are underwater, providing a more complete picture of the negative psychological reactions of executives to underwater options. Indeed, executives may be loss averse, and depreciated option portfolios may signal negative firm attributes. Thus, drawing on the meaning of money (Bretz et al., 1994; Furnham & Argyle, 1998) and myopic loss aversion (Benartzi & Thaler, 1995) frameworks, we hypothesize that:

Hypothesis 1: Controlling for the BS value of stock option portfolios, executives with out-of-the-money options will be more likely to voluntarily leave their firms than executives with in-the-money options.

Hypothesis 1 reflects a binary underwater-option valuation, whether the portfolio is underwater or not. Research and theory also suggest that executives are likely to pay attention to how far the options are underwater when considering leaving their firms. Researchers have noted that depreciating value of underwater options may thwart the motivational effect of option grants: "As options move farther out-of-the-money, the pay-to-performance sensitivity of those options decreases as executives (and employees) come to believe that their options have little chance of paying off by moving into-the-money" (Hall & Knox, 2004). As noted in Figure 2, BS valuation is much more strongly correlated with changes in option intrinsic values when they are in-the-money than when they are underwater, so if there are strong reactions to changes in the value of options that are already underwater, there is an opportunity to augment our understanding by adding such factors to executive turnover models.

The negative distance between the current market price and the exercise price may present a uniquely vivid signal of poor organization performance because option holders' attention is drawn to that signal based on the way options are structured. For example, assume that share prices have recently recovered from extremely low levels but are still

below the exercise price. The binary hypothesis would suggest that executives will still be motivated to leave because they still have underwater options in their portfolio. An alternative proposition is that executives may be inclined to consider the much-improved share price as an incentive to stay. Therefore, we hypothesize that voluntary executive turnover will not only be sensitive to the binary variable of whether their option portfolio is underwater but will also be sensitive to the *degree* to which stock options are underwater.

Hypothesis 2: Controlling for the BS value of stock option portfolios, the degree to which executives' stock option portfolios are underwater will be positively related to voluntary executive turnover.

Previous research has identified key differences between CEO and non-CEO positions on the top management team that have important implications for understanding executive turnover dynamics. For instance, CEOs enjoy considerably greater pay and prestige than do their non-CEO counterparts on the top management team (Chen, 2004; Fee & Hadlock, 2003). Along with those privileges, however, CEOs are subject to greater accountability for the firm's performance. A large body of evidence indicate that CEOs are often dismissed when their firms perform poorly (Denis & Denis, 1995; Finkelstein & Hambrick, 1996).

Recent research suggests that different types of executives are evaluated by different performance metrics: CEO performance is typically evaluated based on aggregate measures of firm performance such as total shareholder returns, whereas non-CEO performance also includes more "micro" measures of performance such as divisional performance (Aggarwal & Samwick, 2003). Thus, aggregate firm performance measures may be less reflective of executive ability moving down the top management hierarchy (Fee & Hadlock, 2004). Supporting the view, Fee and Hadlock (2004) found that the relationship between forced turnover and firm performance was greater for CEOs than it was for non-CEOs.

These findings suggest that relationships between stock option portfolio value and voluntary turnover may be best understood by examining the interactive effects of executive type. Given that CEOs are held more accountable than non-CEOs for aggregate firm performance (Aggarwal & Samwick, 2003; Fee & Hadlock, 2003; 2004), they may be especially responsive to underwater stock options. As noted above, stock options are symbolic of a firm's success and desirability (Seethamraju & Zach, 2003), as well as the individual executives' status, respect, and achievement (Mitchell & Mickel, 1999). Thus, we would expect that both the *existence* and *depth* of underwater stock options would be especially salient to CEOs and prompt them to voluntarily leave the firm. Conversely,

non-CEOs may be less likely to leave voluntarily when the options fall underwater. Therefore, we would expect that relationships between the existence and depth of underwater stock options and voluntary turnover would be moderated by executive type.

Hypothesis 3a: The relationship between the *existence* of underwater stock options (i.e., the underwater dummy variable) and voluntary turnover will be moderated by executive type, such that CEOs with out-of-the-money portfolios will be more likely than non-CEOs to leave their firms voluntarily when their option portfolios are underwater.

Hypothesis 3b: The relationship between the *degree* to which stock options are underwater and voluntary turnover will be moderated by executive type, such that the relationship between the depth to which options portfolios are underwater (i.e., negative intrinsic value) and voluntary turnover will be stronger for CEOs than it will be for non-CEOs.

We acknowledge that in many cases, CEOs with underwater stock options will and should appropriately be dismissed by boards of directors. However, as noted earlier, stock options may fall underwater for many reasons well beyond the control of the CEO (Balachandran et al., 2004). Executives with underwater stock options are often highly valued by their firms and shareholders and have plenty of alternative job offers in the external market. If this were not the case, then retention would not be a topic of concern for organizations with underwater options as noted in previous research (Ittner et al., 2003).

Method

Data

All data except for stock prices were drawn from the ExecuComp database, which is an archival data set containing compensation, turnover, stock price, options information, firm performance, and other information pertaining to the top five executives (i.e., the five most highly paid executives in companies at the end of a given year) and their companies. These data are available from SEC disclosure requirements for publicly traded companies in the United States. ExecuComp tracks information for companies in the S&P 1500 index, which comprise S&P 500, S&P MidCap 400, and S&P SmallCap 600. We added information on each firm's stock price at the end of each fiscal year from CRSP, a database of stock prices and returns produced by the Chicago Center for Research into Security Prices.

Independent Variables

To test our hypotheses, we computed the average BS value for all options in each executive's portfolio at each year end. ExecuComp provides the number of options in each executive's portfolio at the end of each fiscal year but only on the options granted in that year. Accordingly, we searched prior years' information to obtain the details for options already included in the portfolio.[6] The BS option value was estimated following Black and Scholes (1973), modified to account for dividend payouts by Merton (1973):[7]

$$\text{Option Value} = Se^{-dT}N(Z) - Xe^{-rT}N(Z - \sigma T^{(1/2)}),$$

where:

$Z = [\ln\ (S/X) + T(r - d + \sigma^2/2)]/[\sigma T^{(1/2)}\ ]$
$N =$ cumulative probability function for the normal distribution
$S =$ market price at year end of underlying stock (from CRSP)
$X =$ exercise price (from ExecuComp)
$\sigma =$ expected stock-return volatility over the life of the option, estimated using the standard deviation of volatility over the prior 60 months and winsorized at the top and bottom 5% (from CRSP)[8]
$r =$ natural logarithm of the risk-free interest rate (from ExecuComp)
$T =$ time to maturity of option, in years (from ExecuComp)
$d =$ natural logarithm of expected dividend yield over life of option, estimated using the company's average dividend yield over the prior 3 years and winsorized at the top 5% (from ExecuComp).

After computing the BS value of all options in the executive's portfolio, we computed the mean value by the total portfolio value by the number of options held to create a concise measure of the executive's portfolio.

Intrinsic value was calculated in a similar manner to BS value. For each set of options granted at each year end, we calculated the difference between the strike price and the year-end stock price, and multiplied this difference by the number of options granted. We did this for all options

[6]We searched as far back as 10 years and required that each executive had portfolio information as far back as 5 years to ensure that our estimates were reasonably accurate. If data were still missing after requiring a minimum of 5 years, we assumed that the options had the same exercise price and grant date as the earliest known options. The correlation between average option value where we delete missing options versus average option value where we use information from the earliest known options is +0.98, suggesting that this assumption has no effect on our results.

[7]Guay (1999) included a helpful discussion on valuing options. We also thank Wayne Guay for his assistance and advice on computing Black–Scholes values.

[8]Winsorizing helps to control for errors and anomalous values and is consistent with ExecuComp's calculations for valuing current-year options.

granted, going back as far as 10 years (and requiring at least 5 years of data before including the estimated value in our final data set). After calculating the aggregate intrinsic value, we calculated the average intrinsic value of each option by dividing by the total number of options in the portfolio.

ExecuComp does not provide information on the specific options exercised in a given year, and therefore we must make assumptions as to the particular options that were exercised in a given year. Our estimation of BS and intrinsic values implicitly assumed "first-in, first-out" for options—that is, the options with the earliest grant date are exercised first, and the most recently granted options are exercised last (consistent with Guay, 1999). We used average values for BS and intrinsic value to provide a concise operationalization of the terms "in-the-money" and "underwater." For example, an executive may have three options grants of 100 options each, with respective average intrinsic values of $10, $–20, and $5. That executive's total intrinsic portfolio value would be $–500 (1,000 – 2,000 + 500), his/her average intrinsic value would be $–1.67. We would consider his/her overall portfolio value to be "underwater," as we discuss below.

Measuring underwater options. To complete our test of Hypothesis 1, we calculated a dummy variable indicating whether their estimated portfolio values were in- or out-of-the-money. Specifically, we added a dummy variable set to 1 if the executive's average option value, calculated as above, was less than 0 (i.e., "out-of-the-money") and 0 otherwise. To test our second hypothesis, we computed two new variables from average intrinsic value, as follows:

(1) Negative intrinsic value was the *minimum* of either average intrinsic value or zero, multiplied by −1 to create a measure that is increasing in the degree to which the average option is out-of-the-money. We multiplied by −1 here to make our results easier to interpret; a positive coefficient on our negative intrinsic value measure suggests that the more the average option is out-of-the-money, the greater the likelihood that the executive will leave voluntarily in the following year.
(2) Positive intrinsic value was the *maximum* of either average intrinsic value or zero.

For example, if executives' portfolios had an average intrinsic value of −3.50 we would create a negative intrinsic value variable set to 3.50 and a positive intrinsic value variable set to 0. If different executives' portfolios had an average intrinsic value of +$8.00, we would create a negative intrinsic value variable set to 0 and a positive intrinsic value variable set to 8.00. Thus, each executive had a non zero value in either positive or negative intrinsic value but never both.

As Figure 2 indicates, the BS estimated value was highly correlated with the options positive intrinsic value, but as stock options fall deeply out-of-the-money, the BS value of stock options follows an asymptotic curve near zero (Hall & Murphy, 2002). We, therefore, needed a measure that would more completely reflect the extent to which executives' stock option portfolios were underwater.

We chose negative intrinsic value for two reasons: First, it has been used in previous research (Carter & Lynch, 2004) to capture the degree to which executives' options are underwater. Second, we chose negative intrinsic value because our theory about executives' psychological response to out-of-the-money options suggests that this measure may reflect the vivid signals residing in the comparison between the current stock price and the option exercise price. We acknowledge that negative intrinsic value is likely to omit some factors that drive subjective value and behaviors (Devers et al., 2007; Hall & Murphy, 2002), but no subjective valuation model of underwater options has yet been developed (Devers et al., 2007). Negative intrinsic value remains the most well-established method for capturing this phenomenon. Our findings may provide further guidance in developing future options valuation approaches that capture responses to underwater options more completely.

Following previous research (Fee & Hadlock; 2003, 2004), executive type was measured using a dummy variable. Executives were coded as 1 if they held the CEO position in the year in which their option portfolio value was measured, and 0 if they did not. This information was drawn from the ExecuComp database.

Dependent Variable

Our dependent variable was voluntary executive turnover, coded as 1 if the executive left the company voluntarily in that year and 0 otherwise. To avoid any "peek-ahead" bias, we compared voluntary turnover in year *t* with options values and company performance measures for the most recent prior fiscal year (i.e., year *t*-1). In other words, our analysis of turnover was based on information publicly known by the date the executive announced his/her departure. This added a conservative bias to our results because an executive could possibly be able to predict current-year performance and factor that into his/her decision to leave the firm. To avoid unnecessary loss of observations, if data were not available as of the prior year, we looked to the most recent year available before the executive's departure (up to 3 years earlier). However, our conclusions were unchanged if we deleted these observations.

After requiring sufficient data to calculate executive stock option portfolio value, our dependent and our independent variables (including controls, which we discuss below), we had 23,354 executive-year observations

in our data set, covering 2,004 firms and 7,418 executives, as detailed in Table 1. Financial statement information was available from 1996 to 2004, and executive turnover information was available from 1996 to early 2007.

TABLE 1
Number of Observations and Turnover Coding

	Panel A: Number of observations		
	Total	CEOs	Non-CEOs
Total observations	23,354	7,748	15,606
Total firms	2,004	119	1,885
Total executives	7,418	1,593	5,825
Voluntary turnover	515	117	398
Involuntary turnover	1,101	396	705
	Panel B: Turnover coding		
Voluntary turnover	Total	CEOs	Non-CEOs
Jump to nonprofit	37	10	27
Jump to other firm	384	84	300
Pursue other interests	61	16	45
Broad resignation	33	7	26
Total voluntary turnover	515	117	398
Proportion with out-of-the-money portfolios	42%	52%	39%
Involuntary turnover			
Health reasons death	42	25	17
Scandal	49	18	31
Forced out	175	80	95
Retirement	740	262	478
Ownership change	34	6	28
Other	61	5	56
Total involuntary turnover	1,101	396	705
Proportion with out-of-the-money portfolios	39%	42%	36%
	Panel C: Turnover by year		
Year	Voluntary		Involuntary
1996	1		10
1997	24		68
1998	47		115
1999	41		123
2000	45		115
2001	65		102
2002	50		100
2003	54		126
2004	83		132
2005	80		154
2006	25		54
2007	0		2
Total turnover	515		1,101

TABLE 1
Continued

Industry	Panel D: Breakdown by industry Number	Proportion
Transportation	2,355	10.1%
Retail	1,947	8.3%
Financial	3,341	14.3%
Service	2,005	8.6%
Manufacturing	10,860	46.5%
Other	2,846	12.2%
Total observations	23,354	100.0%

	Panel E: Voluntary turnover versus in/out-of-money observations		
	In-the-money observations	Out-of-the-money observations	Total
No turnover	15,549	6,189	21,738
Voluntary turnover	298	217	515
Involuntary turnover	676	425	1,101
Total	16,523	6,831	23,354

	Panel F: Turnover voluntary turnover for in/out-of-money proportions		
	In-the-money observations	Out-of-the-money observations	χ^2 test
No turnover	94.1%	90.6%	
Voluntary turnover	1.8%	3.2%	<.01
Involuntary turnover	4.1%	6.2%	<.01
Total	100.0%	100.0%	–

Coding the reason for executive departures. As noted above, existing studies of underwater options (e.g., Carter & Lynch, 2004; Dunford et al., 2005) either do not measure turnover or fail to differentiate between voluntary and involuntary turnover. Therefore, it is difficult to rule out the possibility that executives with underwater options are dismissed for poor firm performance. Unfortunately, ExecuComp does not provide a reason for all executive departures, and the validity of the reasons provided by ExecuComp is questionable because firms sometimes deliberately avoid being forthright in their accounts of why an executive has left. These issues have been addressed in previous finance and accounting studies, and a number of techniques have been developed for ascertaining the reason for executive departures from electronic searches of news articles. Following protocols described by Balsam and Miharjo (2007), Fee and Hadlock (2004), and Huson, Parrino, and Starks (2001), a team of graduate

assistants used Factiva (formerly known as Dow Jones Interactive) to locate *Wall Street Journal*, trade, and industry press articles containing a given executive's name and the name of his/her company. Coders secured at least two corroborating articles before coding the reason for departure. Following Fee and Hadlock (2004), we coded executive departures into one of 10 categories described in the Appendix. These 10 categories were later used to distinguish between voluntary and involuntary turnover events in our analysis. More information about our coding protocol is available in the Appendix or from the first author upon request.

We used the criteria of Fee and Hadlock (2004) to operationalize voluntary turnover. Specifically, we coded a turnover observation as voluntary (1 = *voluntary turnover*) if the reason given for the departure was to join another firm (or nonprofit organization), to pursue other business interests, or where resignation was noted without enough detail to put into a specific category but with enough information to rule out involuntary turnover. For this analysis, all other cases (including involuntary turnover events and nonturnover events) were coded as 0. We defined involuntary turnover as all departures that were related to illness or death, poor performance, scandal, retirement, and changes in firm ownership, or for which no conclusive evidence regarding the reason for departure was available. Our regression results on voluntary and involuntary turnover were substantively equivalent when we excluded health/death and "inconclusive" turnover cases from the data set.

As Table 1 indicates, we found 1,101 incidents of involuntary turnover and 515 incidents of voluntary turnover. The most common type of voluntary turnover was a jump to another firm ($n = 384$). The most common type of involuntary turnover was retirement ($n = 740$). Our voluntary turnover rates are comparable with those reported by Balsam and Miharjo (2007); they report overall voluntary turnover of 3.5%, versus our rate of 2.2% (515 / 23,354). Our lower rate likely reflects differences in our samples of firms. Balsam and Miharjo investigate only in-the-money portfolios and use the Core and Guay (2002) "one-year approximation" algorithm to estimate option values. Because the 1-year approximation is not accurate with out-of-the-money options, we required firms with a minimum of 5 years of prior data instead of 1 year.

Control Variables

We included a number of control variables to rule out alternative explanations and ensure that our results were not merely manifestations of prior findings. To ensure that our results were not being driven by trends in option value fluctuations, we added the 2-year change in average option value winsorized at −200% and +200% to control for outliers

(calculated as the average BS value in year 0 less the average BS value in year −2, divided by the average BS value in year −2). We included the firm's reported return on operating assets (ROA, and all of the following control variables, are provided by ExecuComp)[9] to control for overall firm performance and the number of employees (in thousands) to control for firm size. We also included each executive's total annual salary plus bonus compensation (in thousands) and the value of restricted stock holdings (also in thousands). We controlled for industry fixed effects with dummy variables for the transportation (SIC codes of 4xxx), retail (52xx to 5999), financial (6xxx), services (7xxx or 9xxx), and other industries, and we added year dummies (not shown in our analysis).

We conducted our analysis using the software package STATA (specifically, using the "xtlogit" function, which allows for random effects). We controlled for random effects by firm using each firm's CRSP permanent ID number, or "permno" (specifically, we identify the variable "permno" as the panel variable using "xtset"). Our results were very similar when we controlled for individual executives. A random-effects model allowed for the unit-effect estimators (in our case, the effect of the firm) to vary over time. A random-effects model also allowed us to include firms for which there are no cases of voluntary turnover over our sample period, as these are also valid observations that should not be excluded (see Certo & Semadeni, 2006). As stated previously, we also controlled for fixed effects by year and industry.

Descriptive Statistics

The average total salary and bonus compensation (excluding long-term incentives) for executives in our sample was 1.03 million dollars. Executives' average restricted stock holdings were 1.40 million dollars. Ninety five percent of the executives were men. On average, executives were employed in companies with 21,600 employees, reflecting the fact that the ExecuComp database comprise primarily large companies. About half of the observations in our data were drawn from the manufacturing industry (47%); 14% were from the finance industry, and 10% from transportation, with other industries comprising the remainder. On average, executives' stock options had an estimated BS value of $16.77 each. Options that were in-the-money had a stock price that was $10.06 above their exercise price, and options that were out-of-the-money had a stock price that was

[9]In unreported analyses we also controlled for firm performance using a different measure, the 12-month buy and hold returns. However, given its high collinearity with in-the-money stock option grants (Guay, 1999), and because the results were substantively equivalent with the alternate measure, we left it out of the model.

$1.94 lower than their exercise price. Note that our negative intrinsic value variable is stated as the amount by which the average option is "out-of-the-money," whereas the positive intrinsic value variable is the amount by which the average option is "in-the money." Twenty-nine percent of our observations had an average intrinsic value that was negative. On average, executives' stock option portfolios had a positive intrinsic value of $6.9 million. To facilitate comparisons with prior work (e.g., Fee & Hadlock, 2004), we provide a detailed breakdown of our classification of turnover events by executive type, as shown in Table 1, panels A and B.

Results

Table 1 also shows the proportion of departing executives (both voluntary and involuntary) with underwater portfolios. Specifically, panel E shows the number of observations, and panel F shows their proportions. We used a chi-square test to show that the proportions of departing executives were significantly different between in-the-money and underwater groups. As panel F demonstrates, 1.8% of executives with in-the-money option portfolios left their firms voluntarily, compared to 3.2% of executives with underwater options ($\chi^2 = 42.26$, $p < .01$). Panel F also shows that 4.1% of executives with in-the-money options were terminated compared to 6.2% with out-of-the-money options ($\chi^2 = 48.83$, $p < .01$).

It is important to note that for top executives, both voluntary and involuntary turnover is typically rare, particularly when retirement is excluded as we have done. For example, Chen (2004) compared turnover rates across five studies that *combined* voluntary and involuntary types of turnover and found rates ranging from 7.65% to 12.16%. Looking specifically at voluntary turnover, Balsam and Miharjo (2007) found a turnover rate of 3.4%, which is very similar to our observed rate of 2.2% that excludes retirements (see Table 1). Thus, the differences we found in voluntary turnover between executives with in-the-money and out-of-the money portfolios are quite significant considering the low base rate of the phenomenon. In addition, these differences likely have practical implications.

Research demonstrates that turnover is highly costly to organizations. Cascio and Boudreau (in press) suggest that 1.5 times total compensation (including base, bonus, benefits, and long-term incentives) is a conservative estimate of turnover costs of organizations. Other studies estimate turnover costs to be 50–200% of base salary (Hansen, 1997). Turnover costs are high for many reasons. The cost of losing a valued executive often includes search activity that can last months, executive search organization

fees that typically amount to 30% of first-year total compensation, and investments by top leaders in recruitment and selection activities that require taking time away from other valuable pursuits (Fitz-enz, 1997). There is also the inevitable ripple effect that executive departures create, as those below move upward to fill the cascading set of vacant positions (Workforce, 1998). In short, the loss of a well-performing executive is not a trivial occurrence.

Table 2 shows our means and univariate correlations. Both voluntary and involuntary turnover were positively correlated with the degree to which the portfolio is out-of-the-money and negatively correlated with the degree to which the portfolio is in-the-money. Voluntary turnover was also negatively correlated with the average BS value. Average BS value was highly correlated with positive intrinsic value ($r = .96$), and somewhat negatively correlated with average negative intrinsic value ($r = -.21$). These findings are consistent with Guay (1999), who found that the BS value of stock option grants was highly sensitive to the stock price when stock options were in-the-money but not when out-of-the-money (see also Figure 2, which is based on Hall and Murphy, 2002). Total salary and bonus compensation was negatively correlated with voluntary turnover (the less executives were paid, the more likely they were to leave on their own) and positively correlated with involuntary turnover, possibly because of higher expectations associated with higher pay and the greater chance to disappoint the board after being provided a large pay level.

Table 3 reports our multivariate results, testing Hypotheses 1–3. Multiple executives in the data set were employed in the same firm over a long time period. We thus used the "xt-logit" procedure in STATA to control for random effects by firm in a logistical setting. Our results were similar if we exclude firm effects. As expected, we found that the BS value of executives' stock option portfolios was inversely related to voluntary turnover (see Table 3, panel A). This finding is consistent with previous research (Balsam & Miharjo, 2007) in suggesting that stock options do have a retention effect and that executives' turnover decisions are sensitive to the time value of stock options. The results of our test of Hypothesis 1 are depicted in panel B of Table 3.

After controlling for the BS value of executives' stock option portfolios and other factors, executives with portfolios that were out-of-the-money were more likely to voluntarily leave their firms than executives with option portfolios that were in-the-money (Table 3, panel B, $\beta = .39$, $p < .01$). This relationship held after controlling for the degree to which option portfolios were out-of-the money (Table 3 panel D, $\beta = .30$, $p < .01$), providing initial support for Hypothesis 1.

TABLE 2
Descriptive Statistics and Interitem Correlations

No.	Variable	*Mean*	*SD*	1	2	3	4	5	6
1	Voluntary turnover	.02	.15						
2	Involuntary turnover	.05	.21	−.03					
3	Average negative IV	1.94	5.47	.04	.04				
4	Average positive IV	10.06	17.57	−.03	−.03	−.20			
5	Out-of-the-money dummy	.29	.45	.04	.05	.55	−.37		
6	Average BS option value	16.77	19.26	−.03	−.03	−.21	.96	−.35	
7	2-year trend BS option val.	.23	.81	−.01	−.03	−.27	.33	−.41	.30
8	Return on operating assets	3.19	13.45	−.05	−.03	−.16	.16	−.25	.18
9	Number of employees	21.58	56.27	.00	.03	.02	.04	−.01	.06
10	Total salary + bonus compensation	1.03	1.28	−.02	.03	−.01	.16	−.10	.17
11	Restricted stock holdings	1.40	33.68	.00	.00	−.01	.02	−.01	.02
12	Transportation ind. dummy	.10	.30	.00	.02	−.01	−.05	−.01	−.08
13	Retail ind. dummy	.08	.28	−.01	.00	−.02	−.03	.00	−.03
14	Financial ind. dummy	.14	.35	−.02	−.02	−.07	.13	−.13	.11
15	Service ind. dummy	.09	.28	.02	−.01	.02	−.01	.04	.00
16	Other ind. dummy	.12	.33	.00	−.01	.01	−.01	−.01	.00
17	CEO dummy	.33	.47	−.03	.01	.02	.00	.01	.00
18	CEO dummy × average neg. IV	.70	3.63	.01	.03	.62	−.11	.30	−.11
19	CEO dummy × out-of-the-money	.10	.30	.01	.04	.31	−.19	.52	−.18

continued

TABLE 2 (*continued*)

No.	Variable	7	8	9	10	11	12	13	14	15	16	17	18
1	Voluntary turnover												
2	Involuntary turnover												
3	Average negative IV												
4	Average positive IV												
5	Out-of-the-money dummy												
6	Average BS option value												
7	2-year trend BS option val.												
8	Return on operating assets	.15											
9	Number of employees	−.02	.05										
10	Total salary + bonus compensation	.06	.09	.24									
11	Restricted stock holdings	.00	.01	.03	.07								
12	Transportation ind. dummy	.02	−.01	−.01	−.03	.02							
13	Retail ind. dummy	.01	.07	.19	−.02	.00	−.10						
14	Financial ind. dummy	.02	−.02	−.05	.17	.02	−.14	−.12					
15	Service ind. dummy	−.03	−.03	.08	−.02	.00	−.10	−.09	−.13				
16	Other ind. dummy	.04	.00	−.07	−.01	−.01	−.12	−.11	−.15	−.11			
17	CEO dummy	−.01	−.01	.01	.30	.03	−.01	.01	−.01	.00	.00		
18	CEO dummy × average neg. IV	−.15	−.10	.02	.06	.00	.00	−.01	−.04	.01	.01	.27	
19	CEO dummy × out-of-the-money	−.21	−.13	.00	.04	.00	−.01	.00	−.07	.02	.00	.47	.58

Notes. All correlations with an absolute value of .01 or greater are significant at the 5% level or better. Return on operations assets is a percentage. Number of employees is in thousands of dollars. Total dollar compensation and restricted stock holdings are in millions of dollars.

TABLE 3
Regressions on Voluntary Turnover

	Panel A	Panel B	Panel C	Panel D		Panel E	
Variable	Estimate	Estimate	Estimate	Estimate	Odds ratio	Estimate	Odds ratio
Average negative IV			.017**	.013*	1.013*	.016*	1.016*
Average positive IV			−.008	−.004	.996	−.003	.997
Out-of-the-money dummy		.392**		.300*	1.350*	.187	1.205
Average BS option value	−.014**	−.008	−.006	−.005	.995	−.007	.993
2-year trend BS option val.	−.038	.021	−.008	.029	1.029	.027	1.027
Return on operating assets	−.010**	.009**	−.010**	−.010**	.990**	−.010*	.990*
Number of employees	.001	.001	.001	.001	1.001	.000	1.000
Total salary + bonus	−.196**	−.196**	−.206**	−.203**	.816**	−.077	.926
Restricted stock holdings	.000	.000	.000	.000	1.000	.000	1.000
Transportation ind. dummy	−.150	−.106	−.121	−.098	.907	−.116	.890
Retail ind. dummy	−.207	−.179	−.176	−.164	.849	−.151	.860
Financial ind. dummy	−.262	−.212	−.228	−.202	.817	−.264	.768
Service ind. dummy	.230	.230	.234	.233	1.262	.242	1.274
Other ind. dummy	−.135	−.116	−.130	−.118	.889	−.126	.882

continued

TABLE 3 (*continued*)

Variable	Panel A Estimate	Panel B Estimate	Panel C Estimate	Panel D Estimate	Panel D Odds ratio	Panel E Estimate	Panel E Odds ratio
CEO dummy						−.715**	.489**
CEO dummy × average negative IV						−.011	.989
CEO dummy × out-of-the-money						.506*	1.659*
Constant	−2.853**	−3.103**	−2.966**	−3.122**		−3.041**	
Voluntary turnover observations	515	515	515	515		515	
Nonvoluntary turnover observations	22, 839	22, 839	22, 839	22,839		22,839	
Wald chi-square	137.0**	150.6**	148.4**	155.7**		172.5**	
Model improvement relative to panel A		13.6**	11.4**	18.7**		35.5**	
Pseudo-R^2	3.1%	3.3%	3.3%	3.4%		3.9%	

Notes. Panel A shows our regression of voluntary turnover on our control variables alone, including the average portfolio Black–Scholes option value. Panel B adds a dummy variable if the average option intrinsic value is out-of-the-money (testing Hypothesis 1). Panel C adds average negative intrinsic value and average positive intrinsic value (testing Hypothesis 2), where average negative intrinsic value is multiplied by −1 to capture the degree to which options are out-of-the-money. Panel D combines the out-of-the-money dummy and intrinsic value measures. Panel E adds the interaction terms necessary to test Hypotheses 3a and 3b, testing the moderating effects of executive type. *p*-values for model improvement are versus panel A (control variables) and are estimated using chi-square distance (one degree of freedom). $^{*}p < .05$, $^{**}p < .01$.

To test Hypothesis 2 we regressed voluntary turnover on negative intrinsic value (after controlling for BS and other variables) and found that the extent to which executives' stock option portfolios were underwater was positively associated with voluntary turnover (Table 3, panel C, $\beta = .017$, $p < .01$). These findings indicated that executives were more likely to jump ship the farther their option portfolios were out-of-the-money and that this effect held even after controlling for the binary effect of being in- versus out-of-the-money (see Table 3, panel D, $\beta = .013$, $p < .05$). These results suggested that holding the effects of BS values, restricted stock values, and total base plus bonus compensation constant, incremental movements toward the positive range of intrinsic value were important to predicting turnover.

To test the effects of executive type as predicted by Hypotheses 3a and 3b, we added a CEO dummy variable and interaction terms to our regression model (see Table 3, panel E). Our tests of Hypotheses 3a and 3b greatly clarify our results, particularly regarding Hypothesis 1. Table 3 panel E provides evidence that relationships between stock option value and voluntary turnover were different for CEOs and non-CEOs. The CEO dummy variable loaded significantly on voluntary turnover ($\beta = -.715$, $p < .01$, see Table 3 panel E), indicating that in general CEOs were less likely than non-CEOs to leave their firms voluntarily. This is consistent with observations that the CEO position is highly sought after (Chen, 2004; Fee & Hadlock, 2003).

In Hypothesis 3a we predicted that executive type (i.e., the CEO dummy variable) would moderate the relationship between the existence of underwater stock options and voluntary turnover. As Table 3 panel E indicates, we found evidence to support this prediction as the interaction term for the CEO dummy and the out-of-the-money dummy loaded significantly on voluntary turnover ($\beta = .506$, $p < .05$). This moderated relationship is depicted in Figure 3. Note that the slope of the relationship between the underwater dummy and the odds of voluntary turnover was steeper for CEOs than it was for non-CEOs. Voluntary turnover was more sensitive to the existence of underwater stock options for CEOs than for non-CEOs, as the out-of-the-money dummy dropped out of significance in panel E. Thus, Hypothesis 1 was partially supported.

In Hypothesis 3b we predicted that executive type would moderate the relationship between the depth to which options were underwater and voluntary turnover. As Table 3 panel E indicates, we found no evidence to support this prediction. The interaction term for the CEO dummy and negative intrinsic value was not significantly related to voluntary turnover ($\beta = -.011$,ns). These findings provide interesting practical implications for firms seeking to retain valued executives and raise important questions for future research that we address below.

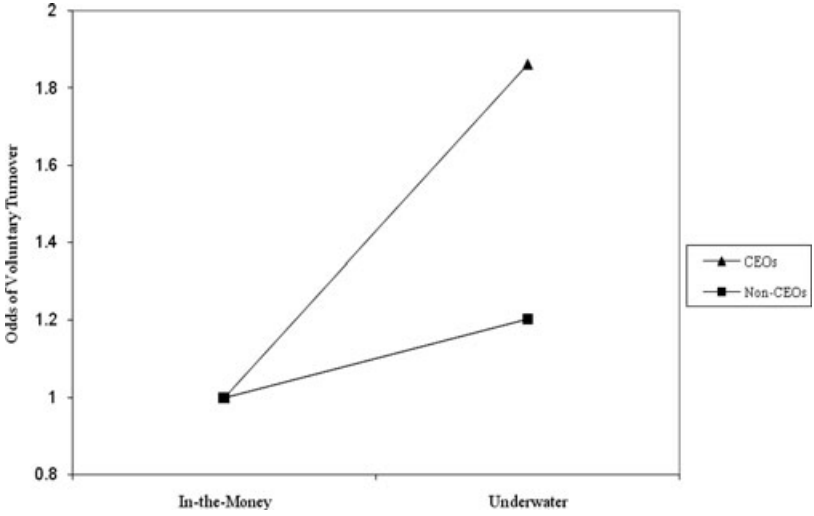

Figure 3: **Executive Type Moderates the Relationship Between the Existence of Underwater Options and Voluntary Turnover.**

Sensitivity Analysis: Stock Options and Involuntary Turnover

Previous research has established strong linkages between poor firm performance and executive dismissal (Parrino, 1997; Warner et al., 1988) such that executives are likely to be replaced when their firm performs poorly (Fee & Hadlock, 2004). To determine whether or not involuntary and voluntary turnover had different antecedents and to check the robustness of our findings, we ran our analyses using involuntary turnover as the dependent variable. The results of these analyses are reported in Table 4. Panel A reports a replication of the voluntary turnover model regression results (i.e., Table 3, panel D predictors) and panel B reports the results of our analysis of the role of executive type in predicting involuntary turnover (i.e., by adding interaction terms and the CEO dummy variable).

We found no evidence that the average negative intrinsic value of executive stock options was associated with involuntary turnover in any of the models (see Table 4, panels A and B). However, we did find partial evidence that CEO involuntary turnover was sensitive to the existence of underwater options. The out-of-the-money dummy loaded significantly on voluntary turnover in panel A but not in panel B, with the addition of the CEO dummy and interaction terms. Interestingly, the interaction of the CEO dummy $\times$out-of-the-money dummy loaded on involuntary turnover at the $p < .10$ level (see panel B). Although this interaction

TABLE 4
Robustness Check: Regressions on Involuntary Turnover

	Panel A		Panel B	
Variable	Estimate	Odds ratio	Estimate	Odds ratio
Average negative IV	.006	1.006	.006	1.006
Average positive IV	.001	1.001	.001	1.001
Out-of-the-money dummy	.245**	1.277**	.153	1.165
Average BS option value	−.005	.995	−.006	.995
2-year trend BS option val.	−.146**	.864**	−.147**	.863**
Return on operating assets	−.005**	.995**	−.005**	.995**
Number of employees	.001**	1.001**	.001**	1.001**
Total salary + bonus	.084**	1.087	.083**	1.087**
Restricted stock holdings	.000	1.000	.000	1.000
Transportation industry dummy	.154	1.167	.155	1.167
Retail industry dummy	−.128	.880	−.127	.880
Financial industry dummy	−.320**	.726**	−.319**	.727**
Service industry dummy	−.213	.808	−.212	.809
Other industry dummy	−.147	.863	−.147	.863
CEO dummy			−.066	.937
CEO dummy × average negative IV			.000	1.000
CEO dummy × out-of-the-money			.256***	1.292***
Constant	−2.665**		−2.642**	
Involuntary turnover observations	1,101		1,101	
Noninvoluntary turnover observations	22,839		22,839	
Wald chi-square	170.1**		174.5**	
Model improvement relative to panel A:			4.4*	
Pseudo- R^2	2.5%		2.6%	

Notes. Panel A replicates our results from Table 4 but with *involuntary* turnover as the dependent variable. Panel B adds the CEO dummy and interaction terms to explore the moderating effects of executive type. *p*-values for model improvement are versus panel A and are estimated using chi-square distance (one degree of freedom). Odds ratios are added in each panel for ease in interpreting regression coefficients. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .10$.

failed to reach conventional levels of significance, the pattern of results supports the notion that CEOs may be viewed as more accountable for firm performance than non-CEOs and more likely to be dismissed when the options fall underwater.

Control variables. Three findings relating to our control variables are noteworthy. First, it is interesting to note that the 2-year trend in average BS value was not related to voluntary turnover in any of the models

(see Table 3). Given the moderate correlation, and possible collinearity bias, between the 2-year trend in BS value and the 1-year BS value of options ($r = .30$), we ran the analysis with the 2-year trend only and found the same results. In fact, we found no evidence that voluntary executive turnover was sensitive to the change in BS value, regardless of the time interval (2–4 years), after controlling for other factors such as firm performance and firm size. Second, confirming evidence found in previous research, we found that ROA was negatively associated with voluntary turnover across all models (see Table 3, panels A–E). Executives were less likely to leave well-performing firms. Finally, total base plus bonus compensation was positively associated with *involuntary* turnover (see Table 4, panels A and B). It is possible that shareholders and boards of directors had higher performance expectations of executives with higher pay, increasing the likelihood that those executives would fail to meet expectations and be dismissed.

Discussion

This longitudinal study of top executives showed that voluntary turnover was more likely to occur as stock option portfolios fell underwater, even after controlling for the most widely used financial measure of option value (BS pricing model), base plus bonus compensation, restricted stock value, and other factors. These findings build on previous research suggesting that equity-based compensation can have retention effects (Balsam & Miharjo, 2007) and that executives pay attention to the time value of their stock option grants (Devers et al., 2007). Indeed, our findings showed that underwater options do pose a retention threat for organizations. It appears that as a firm's stock price falls below the options' exercise price, there may be a much larger danger of executive departure than might be presumed simply by observing the BS values.

Our results also showed evidence that CEO and non-CEO executives differed in their responses to the *existence* of underwater options. One possible explanation for this discrepancy has to do with the increased scrutiny and accountability of CEOs for the firm's performance (Fee & Hadlock, 2004). The existence of underwater stock options may provide a signal to valued CEOs that they would be wise to leave a firm before they are branded in a negative way by the external labor market. It is possible that the unique level of accountability associated with the CEO position makes CEOs particularly sensitive to even slight signals of poor managerial performance. If talented CEOs experiencing firm performance difficulties were to wait until their option portfolios were deeply out-of-the-money to initiate the exit process, then they may no longer have any alternatives in the labor market. Thus, the presence of underwater options

may be an "early warning" sign that CEOs should look elsewhere before lucrative alternatives dry up.

Practical Implications

Earlier we noted that firms use a variety of tactics to retain highly valued executives with underwater stock options. Currently, the most commonly used tactics are increases in executives' base salaries and bonuses, new stock option grants, and grants of restricted stock (Balachandran et al., 2004, see also Figure 1). Research indicates that on average, when choosing to alter executive pay packages in response to underwater options, boards of directors increased executive base pay by 16.4% and increased bonus levels by 182.2% (Balachandran et al., 2004). Yet, few firms are increasing the value of the underwater stock options.

The results of our study suggest that this shift away from increasing the value of underwater stock option portfolios may be unwise. Specifically, our results suggest that firms may not be doing enough to retain valued but underwater executives if they are relying *solely* on base pay, bonus pay, and restricted stock increases. Indeed, our final regression results suggested that salary and bonus compensation ($\beta = -.08$, *ns*) and restricted stock holdings ($\beta = .0$, ns, both from Table 3, panel E) had no significant effect on the likelihood of voluntary turnover. The moderate correlation between total salary and bonus and the CEO dummy ($r = .30$, $p < .01$, see Table 2) suggests that once executive type was controlled for, total base plus bonus compensation had little relationship with voluntary turnover.

In contrast, our results indicated that marginal increases (i.e., increases that don't move an underwater portfolio into-the-money) to executives' stock option portfolios may reduce the odds of turnover substantially. For example, every 1 dollar increase in the average portfolio value decreased the odds of voluntary departure by 1.6%. Thus, if executives' portfolios were underwater by $30 per share, moving them up by $20 per share would reduce the odds of turnover by 32%, even if the increase did not put them back in-the-money.

Retaining CEOs With Underwater Stock Options

Moreover, our results suggested that approaches for retaining CEOs should perhaps be considered separately. Our results suggest that the strongest retention effects for CEOs may come when option portfolios move from a negative overall intrinsic value to a positive overall intrinsic value. In practical terms, the significant interaction variable in Table 3 panel E indicated that CEOs with underwater options respond much more

strongly to having an underwater portfolio than non-CEOs.[10] Thus, it appears that firms could maximize the odds of retaining highly valued CEOs by not only increasing the value of their portfolios incrementally but also enough to move them above the zero point. Our data suggest that bringing CEO underwater option portfolios back into-the-money would reduce the odds of voluntary CEO turnover by almost 50%.[11]

In summary, our data suggest that firms may not be doing enough to retain valued executives with underwater portfolios if they rely solely on base pay, bonus, and restricted stock increases. Our data suggest that firms need to do something to increase the portfolio value itself. For example, this could be done through a 6 and 1 option exchange, which replaces the old options with a higher strike price with new options carrying a lower strike price (usually set at the current market price). After such an exchange, a positive change in the stock price has the same incremental effect on average portfolio value as adding new options to the old, but with the exchange option the portfolio value increases more rapidly with each increase in share price and thus crosses into-the-money with a smaller increase in share price. The 6 and 1 option exchanges also offer the advantage of not incurring the expensing penalties associated with traditional repricing (Balachandran et al., 2004). Conversely, for non-CEOs it may not be necessary to bring the portfolio completely back into-the-money but rather increase the portfolio value incrementally. Thus, firms could offer an exchange of options to a price that is still underwater but significantly above where it had been.

With these recommendations it is important to note that firms should take the volatility of their stock price into consideration when using stock options as incentives. Firms that historically have high volatility in their share price are likely to see a high degree of fluctuation in executives' option portfolios, frequently going in- and out-of-the-money. Our results suggest that stock options falling out-of-the-money may increase turnover propensity so that organizations facing volatility should think carefully about whether they want to create movement over the line. Firms with more historically stable stock prices can probably be "safer" from the dangers of out-of-the money situations. Thus, our findings suggest that even if a firm anticipates growth in share price, if it also expects volatility,

[10] A non-CEO going from in-the-money to underwater is 20.5% more likely to leave voluntarily (i.e., going from an odds ratio of 1:1 to 1.205:1. A CEO going from in-the-money to underwater is about twice as likely to leave (i.e., going from an odds ratio of .489: 1 to 1.022 :1, where 1.022 is the product of the odds ratios for the CEO dummy, the out-of-the-money dummy, and the interaction between the two).

[11] Formally, this represents the difference in odds of the CEO leaving with in-the-money options (about .5:1, from the odds ratio in panel E of Table 3) and the odds of the CEO leaving with underwater options (about 1:1, the product of .489 $\times$ 1.659 $\times$ 1.205).

there may be a hidden consequence in that when things go underwater executives may be more inclined to leave. A firm with similar share price growth, but lower volatility, would avoid this.

Theoretical Implications and Future Research Directions

Earlier we noted that conventional models for valuating stock option (e.g., BS) portfolios account for the time value of stock options. Given the widespread public reporting of the BS value of executives' portfolios, and the advanced financial knowledge of top executives, one might reasonably expect BS values to accurately represent how executives subjectively interpret their portfolios. By this logic, one might expect executive turnover behavior to be more sensitive to the BS value of option portfolios than the intrinsic value of their portfolios. However, this study showed that underwater stock options were salient to executives, even when holding BS values constant. Future research might fruitfully examine the beliefs of individuals faced with underwater options to determine if their responses are consistent with a simple economic calculation (e.g., executives may just add the negative value of this option to the value of their other holdings) or whether they calculate the probability of the portfolio achieving a future positive value.

Our findings also suggest that understanding of executive responses to stock options may be enhanced by a multidisciplinary approach incorporating both behavioral and economic theories. For example, the behavioral economics literature provides evidence that individuals are "myopically loss averse" when making decisions about their investments, such that they evaluate investments over a relatively short period of time of about 1 year (Benartzi & Thaler, 1995). Our evidence that executive voluntary turnover was sensitive to the negative intrinsic value of stock option portfolios after controlling for BS value indicates that even financially savvy top executives may be myopically loss averse when evaluating their portfolios. This finding is consistent with a growing body of evidence that myopic loss aversion can be seen in many different samples, ranging from students to professional stock traders (Haigh & List, 2002; Thaler et al., 1997).

It is possible that underwater stock options are psychologically salient to top executives because they are a signal that they are working for a "losing" organization. Research suggests that the value of an executive's stock options is a highly visible symbol of a firm's attributes, success, and desirability (Dunford et al., 2005; Seethamraju & Zach, 2003), and that executives prefer to work for "winning" firms (Bretz et al., 1994). It is also possible that underwater options are salient because pay is how executives keep score among peers (Pfeffer, 2006; Rubinstein, 1981).

Indeed, evidence from applied psychology shows that pay can be highly symbolic of individuals' status, respect, achievement, and success (Furnham & Argyle, 1998; Mitchell & Mickel, 1999). It would be interesting in future research to incorporate surveys and/or interviews with executives to directly examine how changes in the value of different types of rewards (e.g., long-term incentives such as stock options) impact perceptions of the firm, and signals about achievement, success, and other personal attributes. It would be particularly interesting to examine if and how these perceptions vary between CEOs and non-CEOs.

Finally, our finding that voluntary CEO turnover was particularly sensitive to whether or not the executive portfolios were underwater (i.e., the interaction effect noted in Figure 3) suggests that CEOs may use certain *reference points* when evaluating their stock option portfolios. This evidence of an influential reference point raises the possibility of drawing insights in future research from prospect theory (Kahneman & Tversky, 1979) to better understand how executives and other types of employees react to changes in the value of their stock option portfolios and other forms of pay. This study provides some evidence that the "at-the money point" overall stock option portfolios was an influential reference point for predicting CEO turnover. However, it is not clear from our study which is the *most* salient reference point for CEOs. It would be interesting to identify the point at which the value of the option portfolio is *most* likely to trigger voluntary turnover among executives. This research could have important policy implications about where exercise prices might be optimally set when firms consider repricing. For example, if future research found that the most robust reference point for predicting voluntary CEO turnover was whether or not portfolios were on average 5% in-the-money, then it may make sense for firms to reprice stock option grants such that they are at least 5% in-the-money on the day they are granted or reissued.

Another potentially fruitful opportunity for future research concerns how other behavioral outcomes other than voluntary turnover are associated with changes in portfolio values. Prospect theory holds that individuals are *loss averse*, such that they are more likely to take risks when outcomes are framed as losses, and act more conservatively when outcomes are framed as gains (Kahneman & Tversky, 1979). Numerous empirical studies have shown that individuals facing even small losses often undertake risky behaviors to recoup or avoid losses and that individuals act conservatively when facing gains (Thaler, 1991). Applying prospect theory, it would be interesting to examine if executives' strategic decision making changes when their stock option portfolios fall out-of-the-money. Executives may take greater risks in leading their firms when their options are out-of-the-money so that they can move their portfolios back into the positive region. Conversely, executives' may tend to make more

conservative strategic choices when their portfolios are in-the-money. It would also be interesting to examine how non-CEOs may differ from CEOs in their risk-taking behavior when portfolios are out-of-the-money, given that they are less accountable for firm performance (Fee & Hadlock, 2004).

A third potentially insightful application of prospect theory to the future study of stock options involves the principle of diminishing sensitivity. Kahneman and Tversky (1979) argued that individual's subjective utility or "value function" is concave for gains (where outcomes are above a reference point) and convex for losses (where outcomes are below a reference point). In other words, going from −$100 to −$90 per share out-of-the-money may not feel as satisfying as going from $–20 to $–10 per share out-of-the money, even though the absolute magnitude of the appreciation in value is the same ($10/per share.). It would be interesting to apply Kahneman and Tversky's (1979) concept of diminishing sensitivity to study how different types of changes in stock option value in- and out-of-the-money, impact executive job and work attitudes, as well as their turnover behavior and other types of performance.

In summary, future research on executive compensation, turnover, and other outcomes may be more enlightening when it accounts for factors identified by finance research (primarily, the BS model) but also with an eye toward the limitations of such frameworks for predicting behavior where financial and economic models may fail to adequately account for subjective and perceptual factors. We envision that future studies of employee responses to changes in the value of stock-based rewards will greatly benefit from skillful and precise combinations of theoretical perspectives from behavioral economics and applied psychology, such as myopic loss aversion, meaning of money, and prospect theory.

Study Limitations

There are certain limitations to this study that raise other areas for future research. One limitation is that the uniqueness of the sample may limit the generalizability of the results. Although the sample consists of top five executives from multiple industries and firms, it may be a unique sample because these are large, high-profile companies. It would be interesting to examine the relationship of stock option value on voluntary turnover for executives in smaller companies. It would also be interesting to study the impact of underwater stock options on nonexecutive populations, including mid-level managers and rank-and-file employees.

Our study was also limited in that it used the BS and intrinsic value measures of stock option portfolio value. Research on the subjective valuation of stock option grants suggests that although executives do pay

attention to the factors that influence the time value of options, there is evidence that individual's actual estimates of value are above or below the BS calculations depending on individual circumstances (Devers et al., 2007; Hall & Murphy, 2002). It would be interesting to use emerging models of the subjective valuation of stock options to study how executives' subjective valuations impact voluntary turnover.

Finally, the data on which this study was based were drawn exclusively from archival sources. Although this is a strength in many ways, the lack of direct access to executives through surveys and interviews prevented us from including other variables in our regression models such as job satisfaction, career satisfaction, burnout, and so forth, which have been shown in previous research to be important predictors of executive turnover (Bretz et al., 1994). In future studies of employee responses to changes in the value of stock-based rewards, it would be helpful to be able to tease out the relative strength of attitudinal versus compensation variables in predicting turnover and other important outcomes.

Conclusion

This study investigated the impact of underwater stock options and voluntary executive turnover. In an analysis of U.S. top executives from 1996 to 2006, we found that the degree to which executives' stock options were underwater was positively related to voluntary turnover, after controlling for the BS value and other factors. Moreover, we found that CEO voluntary turnover was particularly sensitive to the presence of underwater stock options in their portfolios. Thus, although underwater options may carry a positive valuation based on BS pricing, these findings support psychological and behavioral theories suggesting that underwater options may signal negative firm attributes and motivate voluntary turnover.

REFERENCES

Aggarwal RK, Samwick AA. (2003). Performance incentives within firms: The effect of managerial responsibility. *Journal of Finance*, *58*(4), 1613–1649.

Balachandran S, Carter ME, Lynch LJ. (2004). Sink or swim? Firms' responses to underwater options. *Journal of Management Accounting Research*, *16*, 1–18.

Balsam S, Miharjo S. (2007). The effect of equity compensation on voluntary executive turnover. *Journal of Accounting and Economics*, *43*, 95–119.

Becker GS. (1975). *Human capital* (2nd ed.). New York: National Bureau of Economic Research.

Benartzi S, Thaler RH. (1995). Myopic loss aversion and the equity premium puzzle. *Quarterly Journal of Economics*, *110*, 73–92.

Black F, Scholes M. (1973). The pricing of options and corporate liabilities. *Journal of Political Economy*, *81*, 637–659.

Boswell WR, Boudreau JW, Dunford BB. (2004). The outcomes and correlates of job search objectives: Searching to leave or searching for leverage? *Journal of Applied Psychology*, *89*, 1083–1091.

Brandes P, Dharwadkar R, Lemesis GV, Heisler WJ. (2003). Effective employee stock option design: Reconciling stakeholder, strategic, and motivational factors. *Academy of Management Executive*, *17*(1), 77–93.

Brenner M, Sundaram RK, Yermack D. (2000). Altering the terms of executive stock options. *Journal of Financial Economics*, *57*, 103–128.

Bretz RD, Jr, Boudreau JW, Judge TA. (1994). Job search behavior of employed managers. PERSONNEL PSYCHOLOGY, *47*, 275–301.

Carpenter J. (1998). The exercise and valuation of executive stock options. *Journal of Financial Economics*, *48*, 127–158.

Carter ME, Lynch LJ. (2004). The effect of stock option repricing on employee turnover. *Journal of Accounting and Economics*, *37*, 91–112.

Cascio WF, Boudreau JW. (in press). *Investing in people.* Upper Saddle River, NJ: Prentice-Hall.

Certo ST, Semadeni M. (2006). Strategy research and panel data: Evidence and implications. *Journal of Management*, *32*, 449–471.

Chen MA. (2004). Executive option repricing, incentives, and retention. *Journal of Finance*, *59*, 1167–1199.

Chidambaran NK, Prabhala NR. (2003). Executive stock option repricing, internal governance mechanisms, and management turnover. *Journal of Financial Economics*, *69*(1), 153–189.

Core J, Guay W. (2002). Estimating the value of employee stock option portfolios and their sensitivities to price and volatility. *Journal of Accounting Research*, *40*(3), 613–630.

Corporate Board. (2001, March/April). More stock options are sinking 'underwater.' *Corporate Board*, *22*, 28.

Denis DJ, Denis DK. (1995). Performance changes following top management dismissals. *Journal of Finance*, *50*, 1029–1057.

Devers CE, Wiseman RM, Holmes MR Jr. (2007). The effects of endowment and loss aversion in managerial stock option valuation. *Academy of Management Journal*, *50*(1), 191–208.

Dunford BB, Boudreau JW, Boswell WR. (2005). Out-of-the-money: The impact of underwater stock options on executive job search. PERSONNEL PSYCHOLOGY, *58*, 67–101.

Eaton TV, Prucyk BR. (2005). No longer an 'option.' *Journal of Accountancy*, *199*(4), 63–68.

Ehrenberg RG, Smith RS. (1991). *Modern labor economics: Theory and public policy* (4th ed.). New York: Harper Collins.

Equilar. (2006, March 27). S&P 500 CEO total direct compensation increases 1.6% to $8.37MM in 2005. Retrieved on September 6, 2006. Available at http://www.equilar.com/press_20060327.html.

Fee CE, Hadlock CJ. (2003). Management turnover across the corporate hierarchy. *Journal of Accounting & Economics*, *37*(2), 3–38.

Fee CE, Hadlock CJ. (2004). Raids rewards and reputations in the market for managerial talent. *Review of Financial Studies*, *16*(4), 1315–2357.

Finkelstein S, Hambrick DC. (1996). *Strategic leadership: Top executives and their effects on organizations*. St. Paul, MN: West.

Fitz-enz J. (1997). It's costly to lose good employees. *Workforce*, *16*(8), 50–51.

Furnham A, Argyle M. (1998). *The psychology of money*. London: Routledge.

Guay W. (1999). An empirical analysis of convexity in the relationship between CEOs wealth and stock price. *Journal of Financial Economics*, *53*, 43–71.

Haigh MS, List JA. (2002). *Do professional traders exhibit myopic loss aversion? An experimental analysis*. Working paper, The University of Maryland, College Park.

Hall BJ. (2000). What you really need to know about stock options. *Harvard Business Review*, *78*, 121–139.

Hall BJ, Knox TA. (2004). Underwater options and the dynamics of executive pay-to-performance sensitivities. *Journal of Accounting Research*, *42*, 365–412.

Hall BJ, Murphy KJ. (2002). Stock options for undiversified executives. *Journal of Accounting and Economics*, *33*(1), 3–42.

Hansen F. (1997). What is the cost of employee turnover? *Compensation & Benefits Review*, *29*, 17–18.

Hansen F, Cummings J. (2005). Stock options down but not out. *Business Finance*, *11*(10), 16.

Heath C, Huddart S, Lang M. (1999). Psychological factors and stock option exercise. *Quarterly Journal of Economics*, *114*, 601–628.

Hemmer T, Matsunaga S, Shevlin T. (1996). The influence of risk diversification on the early exercise of employee stock options by executive officers. *Journal of Accounting and Economics*, *21*(1), 45–68.

Hewitt Associates, Inc. (2004). Hewitt study shows companies revamping executive long-term incentive programs: Executive base pay and bonuses stabilize. Press release (April *8*, 2004). Lincolnshire, IL. Retrieved on October 15, 2007. Available at http://was4.hewitt.com/hewitt/resource/newsroom/pressrel/2004/04-08-04.htm.

Hill NT, Stevens KT. (2002). Showing employees the value of their stock options. *Strategic Finance*, *83*(9), 44–47.

Huddart S. (2003). Retrieved on July 9, 2003. Available at http://www.smeal.psu.edu/faculty/huddart/OptionGlossary/VestingSchedule.shtml.

Huddart S, Lang M. (1996). Employee stock option exercises: An empirical analysis. *Journal of Accounting and Economics*, *21*, 3–43.

Hull JC. (2002). *Options, futures and other derivatives* (5th ed.). Upper Saddle River, NJ: Pearson Higher Education.

Huson MR, Parrino R, Starks LT. (2001). Internal monitoring mechanisms and CEO turnover: A long term perspective. *Journal of Finance*, *56*(6), 2265–2297.

Ittner CD, Lambert RA, Larcker DF. (2003). The structure and performance consequences of equity grants to employees of new economy firms. *Journal of Accounting and Economics*, *34*, 89–127.

Jensen MJ, Meckling WH. (1976). Theory of the firm: Managerial behavior, agency costs, and ownership structure. *Journal of Financial Economics*, *3*, 305–360.

Jensen MJ, Murphy KJ. (1990). Performance pay and top-management incentives. *Journal of Political Economy*, *98*(2), 225–264.

Kahneman D, Tversky A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, *47*(2), 263–291.

Marquez J. (2005). JP Morgan stock option plan throws a lifeline to employees when shares are underwater. *Workforce Management*, *84*(8), 76–77.

Mehran H, Yermack D. (1999). *Compensation and top management turnover*. Working paper, New York University.

Merton RC. (1973). Theory of rational option pricing. *Bell Journal of Economics and Management Science*, *4*, 141–183.

Mitchell TR, Mickel AE. (1999). The meaning of money: An individual-difference perspective. *Academy of Management Review*, *24*(3), 568–578.

Murphy KJ. (1985). Corporate performance and management remuneration: An empirical analysis. *Journal of Accounting and Economics*, *7*, 11–42.
Osterland A. (2001, March). Keeping options afloat. *CFO*, 37–40.
Parrino R. (1997). CEO turnover and outside succession: A cross-sectional analysis. *Journal of Financial Economics*, *46*, 165–197.
Pfeffer J. (2006). Ending CEO pay envy. *Business 2.0*, *7*(5), 62.
Pollock TG, Fischer HM, Wade JB. (2002). The role of power and politics in the repricing of executive options. *Academy of Management Journal*, *45*(6), 1172–1182.
Rubinstein CR. (1981). Survey report on money. *Psychology Today*, *15*(5), 29–44.
Seethamraju C, Zach T. (2003). *Expensing stock options: The role of publicity*. Working Paper, Washington University in St. Louis. Available at SSRN: http://ssrn.com/abstract=461760
Subramanian N, Chakraborty A, Sheikh S. (2007). Repricing and executive turnover. *Financial Review*, *42*, 121–141.
Thaler RH. (1991). *The winner's curse: Paradoxes and anomalies of economic life*. Princeton, NJ: Free Press.
Thaler RH, Tversky A, Kahneman D, Schwartz A. (1997). The effect of myopia and loss aversion on risk taking: An experimental test. *Quarterly Journal of Economics*, *112*, 647–661.
Warner JB, Watts RL, Wruck KH. (1988). Stock prices and top management changes. *Journal of Financial Economics*, *20*, 461–492.
Watson Wyatt Worldwide. (2003). Underwater stock options? Some lifelines. Retrieved on 10/5/2007. Available at http://www.watsonwyatt.com/asia-pacific/pubs/execcomp/showbackarticle.asp?ArticleID=13342.
Workforce. (1998, July). Employee turnover is expensive. *Workforce*, 19.

APPENDIX

We followed previously used methods (Balsam & Miharjo, 2007; Fee & Hadlock, 2004; Huson, Parrino, & Starks, 2001) for identifying the reason for executive departures. Graduate assistant coders conducted electronic searches using the Factiva database (and Google, as a last resort) to find newspaper and magazine articles containing information about executives and their companies following or just prior to their departure date. Following Fee and Hadlock (2004), executive departures were coded into 10 separate categories (see Table 1). Turnover events were *not* classified as voluntary if the executive was 60 years or older to eliminate jumps likely due to retirement (Huson et al., 2001). Following Balsam & Miharjo (2007), we classified departures as due to poor firm performance if executives were under age 60, the departure was not announced at least 6 months in advance, and the announcement did not mention the executive taking a new position. Following Fee and Hadlock (2004), former CEOs who became chairman were coded as retirements. Finally, retirements "include[d] all cases that do not qualify for the other categories and which either include the word 'retire' or reference to retirement type activities" (Fee & Hadlock, 2004, p. 36)

Due to the sheer number of turnover events to be coded ($n = 1{,}616$), it was not possible to have multiple coders for each executive. However, we took careful steps to ensure that our coders followed the exact same procedures. We first asked the graduate assistants to code the first 100 turnover events independently to get a feel for the process and to identify discrepancies in their approaches. The first and second authors also independently coded the first 100. We then met to discuss the 100 cases to resolve discrepancies in the codings and to refine the coding process. We held periodic meetings to discuss questions that arose between the raters and updated the coding protocol as needed. Random spot checks by the first author revealed a 92% accuracy rate across the codings completed by the graduate assistants.