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Are Ex Ante CEO Severance Pay Contracts Consistent with Efficient Contracting?

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Abstract

Efficient contracting predicts that ex ante severance pay contracts are offered to chief executive officers (CEOs) as protection against downside risk and to encourage investment in risky projects with a positive net present value (NPV). Consistent with this prediction, we find that ex ante contracted severance pay is positively associated with proxies for a CEO's risk of dismissal and costs the CEO would incur from dismissal. Additionally, we show that the contracted severance payment amount is positively associated with CEO risk taking and the extent to which a CEO invests in projects that have a positive NPV. Overall, our findings imply that ex ante severance pay contracts are consistent with efficient contracting.

I. Introduction

The practice of awarding large amounts of severance pay to chief executive officers (CEOs) who are dismissed from their positions has come under intense scrutiny.[1] Firms that award severance pay to dismissed CEOs defend this practice by stating that ex ante CEO separation pay contracts help to reduce CEO risk aversion. For instance, in its 2007 proxy statement, Clorox states that "by mitigating the economic hardship associated with unexpected termination, these benefits aid in attracting and retaining named executive officers and encouraging management to take reasonable amounts of risk" (SEC (2007a), p. 21). Similarly, in its 2007 proxy statement, Ameriprise Financial reports that severance pay contracts "allow existing executives to focus on the Company's business without undue distraction regarding their job security" (SEC (2007b), p. 43).

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[1]For instance, see Eric Rosenbaum, "Should Tony Hayward Forfeit His Severance?" *Newsweek* (July 27, 2010). Also, see Alison Vekshin and Ian Katz, "O'Neal's $161 Million Merrill Package May Spur Senate," *Bloomberg* (Nov. 2, 2007).

In this study, we investigate whether ex ante CEO severance pay contracts, which are typically written up several years prior to a CEO's dismissal, are consistent with efficient contracting. Specifically, we test the hypothesis that these contracts exist to provide CEOs with insurance for their human capital and incentives to invest in risky projects with a positive net present value (NPV). This hypothesis is consistent with firms' explanations for why they provide CEOs with such contracts and with predictions from theoretical work. For instance, Ju, Leland, and Senbet (2002) predict that severance pay contracts used in conjunction with executive stock options can reduce CEO risk aversion to a level that would not be possible with stock options alone because these contracts protect CEOs from downside risk, whereas stock options provide only upside gain potential.[2,3] Extant work shows that forced CEO turnover is negatively associated with prior firm performance and that the rate of forced CEO turnover has increased over time (e.g., Huson, Parrino, and Starks (2001), Huson, Malatesta, and Parrino (2004)), which implies that CEOs' downside risk from investing in risky projects has also increased over time. Consequently, understanding the effects of ex ante severance pay contracts on CEOs' risk aversion is important.[4]

We study firms included in the ExecuComp database during 2006 and 2007. We examine firms over these years because in 2006 the U.S. Securities and Exchange Commission (SEC) overhauled the disclosure requirements for executive and director compensation. As part of this overhaul, the SEC required firms to tabulate and quantify in their annual disclosures all severance payments that a dismissed CEO would receive and stated that:

> post-termination compensation may represent a significant commitment of corporate resources and a significant portion of overall compensation . . . termination provisions are distinct from other plans in both intent and scope and moreover, are of particular interest to shareholders. Prior to today's amendments, disclosure did not in many cases capture material information regarding these plans and potential payments under them. (SEC (2006), pp. 113–114)

We take advantage of these new disclosure requirements and hand-collect data from firms' disclosures on the exact amounts of severance pay that a CEO would receive if dismissed. Consistent with the SEC's assertion that, prior to 2006, firms failed to fully disclose the ex ante contracted amounts of severance pay

[2]Furthermore, Ju et al. (2002) point out that because CEOs' wealth is highly concentrated in their firms' stock, at times providing a CEO with a higher amount of stock options can make the CEO more rather than less risk averse. See Lambert, Larcker, and Verrecchia (1991), Carpenter (2000), and Parrino, Poteshman, and Weisbach (2005) for further arguments that granting a CEO additional stock options can make the CEO more risk averse.

[3]Almazan and Suarez (2003) provide a related reason for why ex ante severance pay contracts may induce CEOs to take more risk. They argue that for firms with strong boards, large severance packages serve as a deterrent to firing the CEO, which reduces CEO concerns about being fired and thus mitigates CEO risk aversion.

[4]We note that in the absence of opportunistic behavior on the part of a firm's board, there could be less of a need to provide a CEO with an ex ante severance pay contract, given that in such cases the CEO might expect ex post settling-up activities to occur (e.g., Fama (1980), Brickley, Linck, and Coles (1999)).

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a dismissed CEO would receive, we find evidence suggesting that, prior to 2006, estimates of this amount based on firms' disclosures were, on average, 59% lower than the true ex ante contracted amount. Because our study focuses on ex ante contracted severance pay rather than ex post payouts, we are able to move beyond CEOs who are dismissed from their jobs and conduct powerful cross-sectional tests of the determinants of contracted severance pay and whether, on average, it is associated with CEOs who invest in riskier value-creating projects. Further, we document that the amount of ex post payouts to dismissed CEOs tends to be very close to the ex ante contracted amount of severance pay, which implies that ex ante contracted amounts of this pay are a good measure for the actual insurance provided to a CEO against financial loss resulting from an involuntary termination.[5]

We find that 73.7% of our sample firms have an ex ante severance pay contract in place. For these firms, the average contracted amount of severance pay a dismissed CEO would receive is $9.1 million and consists of cash-based payments and of unvested restricted stock and options that would vest upon a CEO's dismissal. To put this amount into perspective, on average, it is 4.1 times the CEO's annual cash compensation (i.e., salary and bonus) and 1.5 times the CEO's total annual compensation, most of which consists of unexercisable option and restricted stock grants with uncertain payoffs that cannot be converted into cash for several years.

We first investigate the determinants of the ex ante contracted amount of severance pay. CEOs hired from outside the firm rather than promoted internally are expected to face a higher risk of dismissal (e.g., Gillan, Hartzell, and Parrino (2009)). Likewise, CEOs with less tenure are in a more uncertain position with the firm and should face a higher risk of dismissal. However, CEOs with a higher ownership stake are less likely to be fired (e.g., Mikkelson and Partch (1997)), possibly because a higher ownership stake allows CEOs to thwart attempts to replace them. Further, a CEO who has signed a noncompete agreement that prevents the CEO from seeking employment with another firm or a CEO who is farther away from retirement age would have a larger need for insurance for his or her human capital. Thus, if severance pay contracts are used to provide CEOs with insurance for their human capital, then contracted severance pay should be higher if a CEO was hired from outside the firm, has signed a noncompete agreement, or is farther from retirement age, and lower if the CEO has longer tenure or a larger ownership stake in the firm. Consistent with the proposition that these contracts are, in part, designed to provide CEOs with insurance for their human capital, our results support these predictions.

Next, we show that the contracted amount of severance pay is positively associated with firm-level stock return volatility.[6] To verify whether this association can in part be explained by firms using severance pay contracts to provide CEOs

[5]In addition to the financial losses resulting from lost pay from their current employer, dismissed CEOs could suffer further financial losses if the stigma resulting from being involuntarily dismissed hurts their future employment opportunities. See Semadeni, Cannella, Fraser, and Lee (2008) for evidence on how the stigma resulting from executives' failures can affect their careers.

[6]Consistent with efficient contracting, a positive association between firm-level stock return volatility and the ex ante contracted amount of severance pay could also be the result of firms with high stock return volatility using ex ante severance pay contracts to reduce an executive's concern about becoming the firm's CEO.

with risk-taking incentives, we investigate whether this association is more pronounced when it is more important for a firm to provide its CEO with such incentives. We examine two scenarios. First, the rate of forced CEO turnover is higher in industries with more homogeneous firms (e.g., Parrino (1997)). As a result, in such industries, CEOs could have greater concerns that bad outcomes from taking risk might lead to their dismissal, and consequently it would be particularly important to provide these CEOs with risk-taking incentives. Second, for Standard & Poor's (S&P) small- and medium-cap firms as compared to S&P large-cap firms, there is likely a greater need for firm growth because these firms are earlier in their life cycle (e.g., Evans (1987), Agarwal and Gort (1996), (2002)). As such, providing CEOs with incentives to take risk may be more important for S&P small- and medium-cap firms. Consistent with firms using severance pay contracts to provide their CEOs with incentives to take risk, we find that the positive association between contracted severance pay and firm-level stock return volatility is more pronounced for firms that operate in industries with more homogeneous firms and for S&P small- and medium-cap firms as compared with large-cap firms.

To provide further insights on whether severance pay contracts provide CEOs with risk-taking incentives, we examine the associations between contracted severance pay with firm leverage and with the extent to which a CEO makes focused rather than diversifying acquisitions (which tend to reduce firm risk). We find that the contracted amount of severance pay is positively associated with firm leverage, the change in firm leverage since the year the CEO received his or her appointment, and the extent to which the CEO makes focused acquisitions. These results are further evidence that severance pay contracts positively influence CEOs to take risk.

If firms provide CEOs with more contracted severance pay to encourage them to take risk, they do so to increase the likelihood that a CEO invests in riskier projects with a large NPV. Thus, we also examine whether contracted severance pay is positively associated with proxies for whether a CEO invests in value-creating projects. We find that this pay is positively associated with a firm's acquisition announcement returns. Also, consistent with the view that this pay provides CEOs with incentives to make better investment decisions and that investors incorporate this into their valuation of a firm's cash holdings, the value of an incremental dollar of cash holdings is positively associated with contracted severance pay.

We also investigate whether the study's results are driven by variation in contracted severance pay among firms that use severance pay contracts or instead by the mere presence of such a contract. All of our results are robust to studying only firms that use severance pay contracts. However, if we reestimate our tests on all observations, but replace the contracted amount of severance pay with an indicator variable for the existence of a severance pay contract, we find that this indicator variable is not associated with our measures for CEO risk taking or a CEO's propensity to invest in positive-NPV projects. These results suggest that merely providing a CEO with a severance pay contract is not sufficient to induce the CEO to invest in risky positive-NPV projects. Instead, to incentivize a CEO to take such actions, it is important that the contracted severance pay *amount* is sufficiently high.

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Last, we examine whether our results are driven by the proportion of contracted severance pay that is due to unvested stock and options that vest upon termination.[7] This is important in order to distinguish our findings from extant work showing that equity incentives positively influence CEOs to take more risk (Guay (1999), Rajgopal and Shevlin (2002), and Coles, Daniel, and Naveen (2006)). We decompose the amount of contracted severance pay into two components: i) the portion comprised of cash-based payments and ii) the portion comprised of unvested stock and options that would vest immediately upon termination. All of our results are similar when we replace the total contracted severance pay amount with the cash-based component. However, when we reestimate our tests using the unvested option and stock award component of contracted severance pay, we no longer find that severance pay is positively associated with a firm's leverage, the change in firm leverage since the year the CEO took office, or the likelihood that when making an acquisition a CEO makes a focused acquisition. Further, for those results that remain, we document that economic significance substantially declines relative to what we find when the total contracted amount of severance pay is considered. Taken together, these results imply that our study's findings are not merely driven by the risk-taking incentives provided by CEOs' unvested stock and options.

Overall, our paper makes several contributions. First, although we cannot definitively ascribe causality, our findings support the efficient-contracting hypothesis that ex ante severance pay contracts are used to provide CEOs with insurance for their human capital and incentives to invest in risky positive-NPV projects. As such, we build on Gillan et al. (2009), who report results suggesting that, in general, explicit CEO employment agreements that put in writing the terms of employment provide CEOs with these benefits because they insure CEOs against opportunistic behavior by a firm's board.[8] We also build on Yermack (2006), who finds, consistent with efficient contracting, that ex post severance payments made to dismissed CEOs are larger if a CEO is farther from retirement and the expected value of future lost pay is greater.

Our findings are inconsistent with severance pay contracts being a manifestation of agency problems in firms where entrenched CEOs obtain pay beyond the value of their human capital (e.g., Bebchuk and Fried (2003), (2004)). If this were the case, we expect that contracted severance pay would be *higher* for CEOs with a longer tenure or who own a greater fraction of the firm's stock because such executives are more likely entrenched and could have power over the pay-setting process. Instead, we find that this pay is actually *smaller* for these CEOs. Furthermore, prior work suggests that entrenched CEOs make less risky investments with lower NPVs (e.g., Amihud and Lev (1981), Jensen (1986), Shleifer and Vishny (1989), and Gompers, Ishii, and Metrick (2003)). Thus, if contracted severance pay is a proxy for agency problems and entrenched CEOs, this pay

[7]When a CEO has a severance pay contract, about half of the time at least some of the CEO's unvested stock and options vest upon termination. In such cases, these holdings are included in our calculation of ex ante contracted severance pay.

[8]Gillan et al. (2009) show that explicit employment agreements are more likely to be used when CEOs face more uncertainty about the sustainability of their relationship with a firm and when CEOs' expected losses would be greater if a firm failed to honor the terms of an implicit employment agreement whereby a CEO is employed *at will* by the firm's board of directors.

should be *negatively* associated with the extent to which a CEO invests in risky projects with a high NPV. However, we find that this pay is positively associated with the extent to which a CEO invests in such projects.

Our study is related to several contemporaneous papers on severance pay contracts. Rusticus (2006), Sletten and Lys (2006), and Rau and Xu (2013) investigate the determinants of the likelihood that there is a severance pay contract in place and find a positive association between this likelihood and firm risk measures. Because these three studies examine the period prior to 2006, before the SEC mandated that firms fully quantify and disclose all ex ante contracted severance pay amounts that a dismissed CEO would receive, they focus on the *existence* rather than the *amount* of contracted severance pay. Given that we study only the period from 2006 onward, we stand apart from these studies and provide evidence on the determinants of the exact *amount* of contracted severance pay. We also move beyond determinants and examine consequences, namely, whether the amount of contracted severance pay encourages the CEO to make riskier investments with a higher NPV. In two other studies, Huang (2011) and Muscarella and Zhao (2011), who also focus on the sample period prior to 2006, find results suggesting that the existence of a severance pay contract is associated with value-decreasing investment choices. However, as reported earlier, our results imply that merely providing a CEO with a severance pay contract is not sufficient to induce the CEO to invest in risky positive-NPV projects; instead, to incentivize a CEO to make such investments, it is important that a firm provides its CEO with sufficiently high contracted amounts of severance pay.

Finally, our paper provides a methodological contribution. Beginning with the 2006 fiscal year, the ExecuComp database reports information on the ex ante contracted amount of severance pay a dismissed CEO would receive. We identify a number of coding errors for this variable. For instance, we find that for 17.5% of firm-years during which a CEO has a severance contract, ExecuComp reports there is no such contract in place. Also, for 10.5% of firm-years when a CEO does not have a severance contract, ExecuComp reports that such a contract exists. Overall, the correlation between what ExecuComp reports for contracted severance pay and the true value for this pay is 0.76. To provide guidance to researchers who will use this new ExecuComp variable, we report the factors that led to the identified errors in this variable.

The remainder of the paper is organized as follows: Section II describes our sample and methodology. Section III presents our empirical findings. Section IV concludes.

II. Sample and Methodology

A. Implications of the 2006 SEC Disclosure Requirements for Executive Compensation

In 2006, the SEC, through Release No. 33-8732a, significantly expanded executive compensation disclosure requirements in an effort to require firms to disclose "all elements of compensation" (SEC (2006)). As a result, beginning in 2006, the SEC requires firms to tabulate and quantify in their disclosures any contracted severance pay that dismissed CEOs would receive. In Appendix A,

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we provide a detailed discussion of the changes in the related required disclosures. Supporting SEC assertions that, prior to 2006, firms failed to disclose the total contracted amount of severance pay a dismissed CEO would receive, in Appendix A we also report evidence suggesting that, prior to 2006, estimates of this contracted amount based on firms' disclosures were, on average, 59% lower than the actual ex ante contracted amount.

In conjunction with the new disclosure requirements, as of 2006 the ExecuComp database reports the ex ante contracted amount of severance pay a dismissed CEO would receive (item TERM_PYMT). We identify a number of coding errors for this variable. To offer guidance to researchers who will use this new variable, in Appendix B we provide details on the identified coding errors, tabulate statistics for these errors, and report the factors that led to the errors.

B. Description of the Hand-Collection Method Used to Collect Severance Pay Data

To calculate the ex ante contracted amount of severance pay a dismissed CEO would receive, we collect from firms' disclosures (DEF-14, DEF-14A, or Item 11 of Form 10-K) the incremental amounts the CEO would receive if he or she is either terminated "without cause" or resigns for "good reason." The term "without cause" is defined in the contract, and "cause" generally includes conditions such as willful misconduct, breach of fiduciary duties, and fraud. However, "cause" does not typically include CEO incompetence or poor firm performance. The term "good reason" is also defined in the contract, and is generally interpreted to be the case where the firm demotes a CEO by substantially reducing his or her responsibilities and/or compensation rather than firing the CEO, and as a result of the firm's actions, the CEO resigns for good reason.

For almost all firms with severance pay contracts, the amount the CEO receives if he or she is terminated "without cause" and the amount the CEO receives if he or she resigns for "good reason" is identical. Thus, we hand-collect this amount. In a few cases, the firm tabulated amounts were slightly different under these two scenarios. In these instances, we hand-collect the higher of these two amounts. Finally, because our variable for contracted severance pay is designed to capture the ex ante, incremental separation pay owed to dismissed CEOs, we remove amounts from the separation payment total that are vested, or already earned by the CEO regardless of whether the CEO remains with the firm. We make this adjustment because these components of severance pay should not provide a CEO with incentives to take risk.

C. Sample Construction and Description

Our initial sample consists of 3,088 firm-years with book assets greater than 0 from the ExecuComp database during 2006 with a fiscal year ending after Dec. 15 and during 2007 regardless of fiscal year-end. For 2006, we examine only firms with a fiscal year ending after Dec. 15 because the new SEC disclosure requirements were applicable to firms in 2006 only if their fiscal year-end was after this date. We also collect data for 2007 to ensure we can analyze at least 1 full calendar year for firms with ExecuComp data. We remove 464 firm-year

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observations where there is a CEO turnover, a firm is acquired, or some other event occurs that precludes our ability to hand-collect information about ex ante severance pay contracts. We also remove 440 firm-year observations that were missing Compustat, Center for Research in Security Prices (CRSP), or ExecuComp data needed to calculate variables for our analyses. Finally, we truncate continuous dependent and independent variables at the top and bottom 1% to mitigate the influence of outliers. This results in the exclusion of 193 firm-years. The final sample consists of 1,991 firm-year observations.

Table 1 reports descriptive statistics. Panel A presents an industry breakdown of our sample into Fama–French (1997) 10-industry groupings. Panel B reports information on CEO and firm characteristics. The average CEO in our sample is 55 years old and has tenure of about 7 years. Also, 28% of our sample firms are run by CEOs who were hired from outside of the firm, and 42% of our sample firms' CEOs have a noncompete agreement.

Panel B of Table 1 also shows that for the 1,468 firm-years (73.7% of our sample) for which contracted severance pay is nonzero, average contracted severance pay is $9.1 million, of which average contracted cash-based severance pay is $5.2 million and the average value of a CEO's unvested restricted stock and

TABLE 1

Descriptive Statistics of Sample Firms

The sample consists of firms included in the ExecuComp database in 2006 with a fiscal year-end after Dec. 15 and firms included in this database in 2007 regardless of fiscal year-end. Panel A of Table 1 presents an industry breakdown of our sample firms. Industries are defined according to the Fama–French (1997) 10-industry breakdown obtained from Kenneth French's Data Library (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html). Panel B presents descriptive statistics of our sample firms. CEO tenure is calculated as the current year less the year in which the CEO took the position with the firm. Outside CEO is equal to 1 if the current CEO was hired from outside the firm, and 0 otherwise. The noncompete dummy is equal to 1 if the CEO has a noncompete agreement attached to his or her severance payment agreement, and 0 otherwise. Data on whether a CEO was hired from outside the firm and whether the CEO has a noncompete agreement are collected from firms' proxy statements. Contracted severance pay is calculated following the hand-collection procedures described in Section II.B and is the total value of severance pay owed to the CEO in the event of termination without cause or a resignation for good reason, after removing any amounts of severance pay that are already vested or earned by the CEO. Contracted cash-based severance pay is equal to the value of all contracted severance pay benefits that a dismissed CEO would receive minus the value of unvested restricted stock and options that would vest immediately upon CEO dismissal. Contracted value of unvested restricted stock and options is the value of unvested restricted stock and options that would vest immediately upon CEO dismissal. Total compensation, salary, and bonus are as reported in ExecuComp. Vega is the change in the value of the CEO's stock option and stock portfolio for a 1% increase in stock return volatility, calculated as by Core and Guay (2002). Delta is the change in the value of the CEO's stock option and stock portfolio for a 1% increase in stock price. Total leverage is defined as the firm's total debt scaled by the market value of assets (i.e., total book value of debt plus market value of equity). Stock return volatility is calculated, as by Guay (1999), as the annualized standard deviation of daily natural logarithmic stock returns (in %) over 240 trading days, starting with the last 120 trading days of the current fiscal year and ending with the first 120 trading days of the following fiscal year, multiplied by $252^{(1/2)}$. Firm age is calculated with CRSP listing data. All compensation data items are in thousands of dollars.

Panel A. Industry Breakdown of Sample Firms

	Number	Percent
Business equipment	341	17.1%
Financial services	327	16.4%
Manufacturing	315	15.8%
Wholesale, retail, and some services	247	12.4%
Other	208	10.4%
Healthcare, medical equipment, and drugs	142	7.1%
Utilities	118	5.9%
Oil, gas, and coal extraction and products	109	5.5%
Consumer nondurables	98	4.9%
Consumer durables	51	2.6%
Telephone and television transmission	35	1.8%
Total	1,991	

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TABLE 1 (continued)
Descriptive Statistics of Sample Firms

Panel B. Descriptive Statistics of CEO and Firm Characteristics

	N	Mean	P25	Median	P75
CEO Characteristics					
CEO age	1,991	55.44	51.00	56.00	60.00
CEO tenure	1,991	6.75	2.00	5.00	9.00
Outside CEO	1,991	0.28	0.00	0.00	1.00
Noncompete dummy	1,991	0.42	0.00	0.00	1.00
CEO stock ownership %	1,991	1.23	0.12	0.30	0.87
Contracted severance pay	1,991	6,848.33	0.00	2,324.98	7,126.17
Contracted severance pay, if nonzero	1,468	9,147.70	1,632.49	4,244.95	10,019.86
Contracted cash-based severance pay, if nonzero contracted severance pay	1,468	5,182.67	1,177.51	2,647.48	5,571.13
Contracted value of unvested restricted stock and options, if nonzero contracted severance pay	1,468	3,965.03	0.00	333.90	3,668.07
Contracted severance pay/Value of CEO equity stake	1,991	1.33	0.00	0.32	1.27
Contracted severance pay/Value of CEO equity stake, if nonzero contracted severance pay	1,468	1.80	0.22	0.68	1.79
Contracted cash-based severance pay/Value of CEO equity stake, if nonzero contracted severance pay	1,468	1.22	0.13	0.40	1.10
Contracted value of unvested restricted stock and options/Value of CEO equity stake, if nonzero contracted severance pay	1,468	0.57	0.00	0.03	0.53
Ratio of ex post severance pay to ex ante contracted severance pay for dismissed CEOs	23	1.04	0.94	1.00	1.07
Total annual compensation	1,991	5,896.26	2,015.67	3,914.00	7,860.73
Total annual compensation, if nonzero contracted severance pay	1,468	6,296.55	2,204.94	4,155.15	8,352.62
Salary	1,991	793.20	550.00	750.00	988.47
Bonus (includes both discretionary and plan-based cash bonus)	1,991	1341.89	350.00	831.19	1750.00
Vega	1,991	134.01	23.28	68.05	164.68
Delta	1,991	612.39	105.72	265.82	661.23
Firm Characteristics					
Book assets ($millions)	1,991	9,670.60	906.59	2,649.30	8,178.39
Total leverage	1,991	0.38	0.21	0.36	0.53
Stock return volatility	1,991	0.36	0.26	0.35	0.45
Market-to-book assets	1,991	1.83	1.21	1.55	2.15
Firm age	1,991	24.88	11.00	18.00	35.00

options that would immediately vest upon termination is $4 million.[9,10] For firms with nonzero severance pay, on average, the value of this pay is 1.8 times the value of the CEO's equity stake. For these firms, the average ratios of contracted cash-based severance pay and the value of unvested restricted stock and options that would vest upon dismissal to the value of the CEO's equity stake are 1.22 and 0.57, respectively. To get a sense of whether one of these two components is responsible for most of the variation in severance pay, we calculate the coefficient of variation of these two components and of the ratio of each component to the value of the CEO's equity stake (not tabulated). The first two coefficients of variation are 1.97 and 2.11, and the latter two coefficients of variation are 2.45 and 3.40. These results suggest that, on average, both of these components account for important fractions of total contracted severance pay and that variation in this pay is driven by both of the components.

[9]Although not tabulated, for firms with severance pay contracts, contracted severance pay is, on average, 4.1 times the CEO's annual cash compensation (i.e., salary and bonus) and 1.5 times total annual pay, which consists mostly of grants of unexercisable stock options and restricted stock with uncertain payoffs that cannot be converted into cash for several years. Thus, the large severance payment a dismissed CEO would typically receive relative to the CEO's annual compensation should provide the CEO with some insurance for his or her human capital and with risk-taking incentives.

[10]Contracted cash-based severance pay is equal to the value of all contracted severance pay benefits that a dismissed CEO would receive minus the value of unvested restricted stock and options that would vest upon dismissal.

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Panel B in Table 1 also provides an estimate of how the actual amount of ex post severance pay provided to dismissed CEOs compares with the ex ante contracted amount of this pay. Following the methodology detailed in Yermack (2006), we identify 23 instances in which a CEO of one of our sample firms during 2006 or 2007 is involuntarily dismissed the following year.[11] Panel B shows that for the 23 turnovers, on average, the ratio of the ex post payout to the ex ante contracted amount of severance pay is 1.04. The correlation between these two amounts is 0.99. The fact that the amounts of ex post payouts are very close to the ex ante contracted severance pay amounts suggests that the latter amounts are a reliable measure for the actual insurance provided to a CEO against financial loss from an involuntary termination.[12]

III. Results of Empirical Tests

A. The Determinants of Ex Ante Contracted Severance Pay

To investigate whether severance pay contracts are consistent with efficient contracting, we first examine the determinants of the contracted amount of severance pay. Table 2 presents the results of this analysis. Models 1 and 2 report estimates from Tobit models censored at 0, where the dependent variable is the contracted amount of severance pay that a dismissed CEO would receive. In these two models and throughout the paper, we scale the contracted severance pay amount by a measure for the CEO's wealth (i.e., the market value of firm equity shares held by the CEO). Although our focus is on the determinants of the contracted *amount* of severance pay, we also report in models 3 and 4 evidence on the determinants of the *existence* of a severance pay contract. To do so, we use probit models in which the dependent variable equals 1 if there exists such a contract, and 0 otherwise.

The main variables of interest in the Table 2 models are whether the CEO was hired from outside of the firm, the CEO's ownership, tenure, whether the CEO has signed a noncompete agreement, and the expected number of years until retirement. Following Yermack (2006), we calculate years until retirement as 65 minus the CEO's age, setting the minimum value to 0. We expect CEOs hired from outside the firm, CEOs who own less of the firm's equity, and CEOs who have shorter tenure to face a higher risk of dismissal and to require greater insurance

[11] Among our sample firms, we first identify 93 cases in which a CEO with a severance pay contract is no longer the CEO in the following year. To identify which of the CEOs was involuntarily dismissed, we follow Yermack (2006) and i) consider if there is no relationship between the executive and the firm 1 year after the turnover event, ii) read through proxy statements and *Wall Street Journal* articles and look for language that clearly indicates the CEO was fired, and iii) take into account the CEO's age and the time frame over which the turnover was announced and executed. We find that in 23 of the 93 turnover events that we investigate (25% of these turnovers), it is clear the CEO was involuntarily dismissed. This percentage is close to that found in Huson et al. (2001) and Yermack (2006), who classify 23%–24% of turnover events as forced.

[12] We also identify seven cases in which there is a forced CEO turnover, but there is no ex ante severance pay contract in place. In none of these cases did the dismissed CEO receive material ex post severance payments. This is additional evidence that ex ante contracted amounts of severance pay are a good indicator of the actual insurance provided to a CEO and of the risk-taking incentives provided by contracted severance pay.

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TABLE 2

Tobit and Probit Models of the Determinants of Ex Ante Contracted Severance Pay

The sample in Table 2 consists of firms included in the ExecuComp database in 2006 with a fiscal year-end after Dec. 15 and firms included in this database in 2007 regardless of fiscal year-end. Columns 1 and 2 of Table 2 consist of pooled Tobit regression models where the dependent variable is equal to the CEO's ex ante contracted severance pay, calculated following the hand-collection procedures described in Section II.B, and is the total value of severance pay that is not vested or already earned that is owed to the CEO in the event of termination without cause or a resignation for good reason, scaled by the market value of all equity shares owned by the CEO. Columns 3 and 4 consist of pooled probit regression models where the dependent variable is equal to 1 if the CEO has an ex ante severance pay contract, and 0 otherwise. Years to retirement is defined as by Yermack (2006) and is equal to 65 minus the age of the CEO in the current year, with the minimum value equaling 0. CEO stock percentage ownership is scaled by 100. Industry dummies are included in models 2 and 4 using the Fama–French (1997) 10-industry breakdown from Kenneth French's Data Library. Continuous variables are truncated at the top and bottom 1%. Significance levels using 2-tailed *p*-values for whether estimates are different from 0 are in parentheses. Marginal effects are presented for the probit models.

	Amount of Severance Pay (Tobit)		Existence of Severance Pay (Probit)	
	Model			
	1	2	3	4
Intercept	0.0003 (0.993)	−0.0002 (0.995)	−0.0227 (0.256)	−0.0250 (0.211)
Outside CEO	0.3683 (0.000)	0.3506 (0.000)	0.1753 (0.000)	0.1757 (0.000)
CEO stock percentage ownership	−5.5210 (0.000)	−5.3072 (0.000)	−1.0830 (0.003)	−1.0207 (0.005)
CEO tenure	−0.0140 (0.000)	−0.0148 (0.000)	−0.0036 (0.028)	−0.0040 (0.017)
Noncompete dummy	0.4427 (0.000)	0.4266 (0.000)	0.2509 (0.000)	0.2477 (0.000)
Years to retirement	0.0070 (0.029)	0.0068 (0.032)	0.0024 (0.163)	0.0025 (0.153)
Vega	0.0004 (0.002)	0.0002 (0.137)	0.0000 (0.538)	0.0000 (0.791)
Delta	−0.0001 (0.017)	−0.0001 (0.049)	0.0000 (0.618)	0.0000 (0.439)
Firm age	−0.0012 (0.244)	−0.0006 (0.610)	−0.0011 (0.043)	−0.0009 (0.151)
Total leverage	0.3362 (0.007)	0.4714 (0.000)	0.0128 (0.848)	0.0094 (0.897)
ln(Book assets)	−0.0530 (0.004)	−0.0375 (0.052)	−0.0067 (0.498)	−0.0026 (0.802)
Market-to-book assets	−0.0491 (0.071)	−0.0486 (0.078)	−0.0415 (0.003)	−0.0455 (0.002)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	No	Yes	No	Yes
Pseudo-R^2	0.119	0.129	0.143	0.151
N	1,991	1,991	1,991	1,991

for their human capital. Thus, we predict that the amount of contracted severance pay is positively associated with whether a CEO is hired from outside the firm and negatively associated with CEO percentage equity ownership and tenure. Costs of dismissal to the CEO should be higher and the need to provide insurance greater if a CEO has signed a noncompete agreement or is farther away from retirement. Consequently, we predict that the promised payment to a dismissed CEO is positively associated with whether the CEO has signed a noncompete agreement or is farther away from retirement.

In the Table 2 models we control for other CEO and firm characteristics. We include the vega and delta of the CEO's stock and option portfolio, which measure risk-taking incentives and the pay-for-performance sensitivity provided by

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stock and options.[13] These two variables control for the possibility that risk-taking incentives from a CEO's stock and option holdings could be correlated with the amount and existence of contracted severance pay. To control for risk characteristics of the firm, we include firm age, leverage, firm size, and the market-to-book assets ratio as independent variables. In addition, we include year fixed effects. Finally, in models 2 and 4 we include industry fixed effects.

Table 2 documents that, as predicted, the amount and existence of contracted severance pay are positively associated with whether the CEO was hired from outside the firm and whether the CEO has signed a noncompete agreement. These relations are economically important. The regression coefficients from models 2 and 4 imply that if the CEO was hired from outside the firm, this increases contracted severance pay by 26% and the likelihood the CEO has a severance pay agreement by 18%.[14,15] Likewise, the existence of a noncompete agreement increases contracted severance pay by 32% and the probability that a CEO has a severance pay contract by 25%.

Table 2 also shows that both the amount and presence of contracted severance pay are significantly negatively associated with CEO ownership and tenure. These relations are also economically significant. A 1-standard-deviation decrease in CEO ownership or tenure increases contracted severance pay by 14% and 8%, respectively, and increases the probability that the CEO has a severance pay contract by 3% in both cases.[16]

The results for models 1 and 2 of Table 2 show that contracted severance pay is significantly positively associated with the expected number of years until a CEO's retirement, which is consistent with the proposition that when the expected value of future lost salary for a dismissed CEO is greater, contracted severance pay is higher. This finding is economically important. A 1-standard-deviation increase in the expected number of years until a CEO's retirement would lead to a

[13] An alternative pay-for-performance measure is the change in the value of the CEO's portfolio of stock and options for a $1,000 increase in shareholder wealth. The results of the Table 2 models as well as the results of all the other regression models in our tables are unchanged if we replace delta with this alternative measure. Likewise, the results of all the regression models in the paper are robust to including vega as a control but not delta, or vice versa. Potentially, the level of cash compensation a CEO receives could also affect the CEO's risk preferences. We reestimate all the regression models in our tables controlling for either the CEO's annual salary and cash bonus scaled by the market value of the CEO's equity shares or the natural logarithm of the CEO's annual salary and cash bonus and find that all of our results are robust to including these controls in our models.

[14] We note that the economic significance of the results from our Tobit regressions are calculated using the unconditional change in the dependent variable, which is censored at 0 and continuous above 0.

[15] Throughout the paper, when we report economic significance, we do so for models that include industry fixed effects. The economic significance results for models that do not control for industry fixed effects are very similar.

[16] A potential concern with the results for CEO ownership in models 1 and 2 of Table 2, which provide evidence on the determinants of contracted severance pay, is that because we scale this pay by the market value of the CEO's equity shares, this could potentially induce a mechanical negative association between the dependent variable and CEO percentage ownership. To address this concern, we reestimate these two models after replacing the dependent variable with contracted severance pay scaled by the market value of a firm's equity. The results for CEO ownership are robust to using this alternative specification. Further, when we use this alternative specification, except for the variable for number of years to retirement, all of the main independent variables of interest in the Table 2 Tobit models with significant and predicted coefficients retain significant coefficients.

28% increase in contracted severance pay. However, the results for models 3 and 4 show that the likelihood that a CEO is provided with a severance pay contract is not associated with the expected number of years until the CEO's retirement.

Overall, the Table 2 findings support the prediction that severance pay contracts are in part designed to provide CEOs with insurance for their human capital and the hypothesis that these contracts are consistent with efficient contracting.[17] Further, because CEOs with a larger ownership stake in the firm or longer tenure are more likely entrenched, the Table 2 findings for CEO tenure and ownership are opposite to the prediction generated by an alternative hypothesis that these contracts are more likely and of greater value when the CEO is entrenched.[18]

B. The Association between Ex Ante Contracted Severance Pay and CEO Risk Taking

We next examine how contracted severance pay is associated with proxies for CEO risk taking. In doing so, we provide insights into whether the amount of contracted severance pay impacts CEO risk taking. As discussed earlier, if contracted severance pay encourages CEOs to take risk, we should find a positive association between the amount of this pay and proxies for CEO risk taking. However, there are two caveats to our tests in this section of the paper. First, as shown in Table 2, contracted severance pay is itself determined by a number of CEO characteristics. Second, CEOs of riskier firms may be more concerned that bad outcomes from taking risk would lead to their dismissal. Thus, consistent with efficient contracting, riskier firms could offer a CEO a greater amount of contracted severance pay to reduce his or her concern with becoming the firm's CEO and to encourage risk taking after taking office.

[17] In models 3 and 4 of Table 2 that examine the determinants of the existence of a severance pay contract, we use contemporaneous variables to explain the presence of such a contract. However, in most cases the decision to provide a CEO with a severance pay contract is made at the time the CEO is hired. Thus, we conduct two tests to examine whether the results for these models are robust to using variables calculated at the year the CEO was hired. First, we change the years-to-retirement variable so that it is measured at the year the CEO was hired and find that this does not affect any of the results. Second, we calculate all of the independent variables at the year the CEO was hired and drop the CEO tenure variable from the models. This reduces the sample by 32% because for some firms we are unable to calculate firm characteristics and/or CEO compensation control variables. Here, we find that all of the significant associations documented in models 3 and 4, except for the association between CEO ownership and the presence of a severance pay contract, are robust to this alternative specification. Further, using this alternative specification, we find a positive association between the number of years a CEO has until retirement and the presence of a severance pay contract.

[18] Because the alternative hypothesis for the existence of severance pay contracts predicts that these contracts represent rent extraction in firms with agency problems that are run by entrenched CEOs, we do not explicitly control for a firm's corporate governance because this could bias our results against finding support for this alternative hypothesis. As robustness checks, we reestimate all the regression models in the paper after including as controls for a firm's governance the fraction of its board that is made up of outside directors, whether it has a busy board, total institutional ownership, and the concentration of the institutional ownership of a firm's shares. These controls are potentially relevant, given findings that CEO turnover and hiring decisions are affected by board composition (e.g., Weisbach (1988), Borokhovich, Parrino, and Trapani (1996), and Huson et al. (2001)) and that CEO turnover and post-turnover outcomes are associated with institutional equity ownership (e.g., Parrino, Sias, and Starks (2003), Huson et al. (2004)). All of the study's results are robust to including in our models the controls just mentioned.

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We take the following approach to examine whether contracted severance pay (at least in part) induces CEOs to take more risk. First, we follow Guay (1999) and use firm-level stock return volatility as a proxy for CEO risk taking. We then supplement this measure with additional proxies for CEO risk taking, including the amount of firm leverage, the change in leverage from the year the executive became CEO to the current year, and the extent to which the CEO makes focused rather than diversifying acquisitions (which tend to reduce firm risk). Studying the change in leverage from the year the executive becomes CEO until the current year and whether a CEO makes focused acquisitions allows us to examine specific actions related to the risk-taking behavior of an executive *after* becoming CEO, which provides additional insights into whether contracted severance pay induces CEOs to take more risk.

1. The Association between Ex Ante Contracted Severance Pay and Stock Return Volatility

Table 3 provides the results of ordinary least squares (OLS) regressions of firm-level stock return volatility on contracted severance pay and control variables using heteroskedastic-robust standard errors that are clustered by firm. The dependent variable in the Table 3 models is stock return volatility, calculated, following Guay (1999), over the last 120 trading days of the current fiscal year and the first 120 trading days of the following fiscal year. To control for risk-taking incentives coming from a CEO's stock and option holdings, we include the vega and delta of the CEO's stock and option portfolio. We also control for firm characteristics that could be associated with firm risk (i.e., firm age, size, leverage, market-to-book assets, and research and development (R&D) expenses/sales). Finally, we include year fixed effects, and in model 2 we also include industry fixed effects.

The Table 3 results show there is a significant positive relation between contracted severance pay and firm-level stock return volatility, which is consistent with efficient contracting.[19] These results are economically significant; a 1-standard-deviation increase in severance pay is associated with 2.1% greater stock return volatility.[20,21] Further, these results are inconsistent with an alternative hypothesis that severance contracts represent rent extraction in firms that are run by entrenched CEOs. This hypothesis would generate the empirical prediction that contracted severance pay is negatively associated with CEO risk-taking behavior.

[19]The financial crisis of 2007 could lead to increases in firm-level stock return volatility during 2007. To ensure that the Table 3 results are not somehow driven by this, we reestimate the Table 3 models only on data for 2006. We find that the Table 3 results are very similar when we consider only 2006.

[20]Although not tabulated, we also find a statistically significant and economically important positive association between contracted severance pay and idiosyncratic stock return volatility. A 1-standard-deviation increase in contracted severance pay is associated with idiosyncratic stock return volatility that is 8.0% higher.

[21]Clayton, Hartzell, and Rosenburg (2005) show that firm-level stock return volatility can increase for up to 2 years subsequent to the hiring of a new CEO from outside the firm. As a robustness check, we verify whether including CEO tenure and an indicator variable for whether the current CEO was hired from outside the firm affects the Table 3 results, and we find that this table's results are unchanged if we control for these two variables.

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TABLE 3

Regressions of Stock Return Volatility on Ex Ante Contracted Severance Pay

The sample in Table 3 consists of firms included in the ExecuComp database in 2006 with a fiscal year-end after Dec. 15 and firms included in this database in 2007 regardless of fiscal year-end. Models 1 and 2 are pooled OLS regression models. The dependent variable is stock return volatility calculated, following Guay (1999), as the annualized standard deviation of daily natural logarithmic stock returns (in %) over 240 trading days, starting with the last 120 trading days of the current fiscal year and ending with the first 120 trading days of the following fiscal year, multiplied by $252^{(1/2)}$. Ex ante contracted severance pay is calculated following the hand-collection procedures described in Section II.B and is the total value of severance pay that is not vested or already earned that is owed to the CEO in the event of termination without cause or a resignation for good reason, scaled by the market value of all equity shares owned by the CEO. Industry dummies are included in model 2 using the Fama–French (1997) 10-industry breakdown obtained from Kenneth French's Data Library. Continuous variables are truncated at the top and bottom 1%. Significance levels using 2-tailed *p*-values for whether estimates are different from 0 corrected for heteroskedasticity using the White (1980) correction and corrected for serial dependence of error terms using standard errors that are clustered at the firm level are in parentheses.

	Model	
	1	2
Intercept	−0.1408	−0.1397
	(0.000)	(0.000)
Ex ante contracted severance pay	0.0022	0.0022
	(0.001)	(0.000)
Vega	0.0001	0.0000
	(0.128)	(0.620)
Delta	0.0000	0.0000
	(0.313)	(0.683)
Firm age	−0.0007	−0.0005
	(0.000)	(0.001)
ln(Book assets)	−0.0431	−0.0417
	(0.000)	(0.000)
Total leverage	0.1207	0.1549
	(0.000)	(0.000)
Market-to-book assets	−0.0011	0.0029
	(0.745)	(0.435)
R&D expenses/Net sales	0.0281	0.0360
	(0.013)	(0.009)
Year fixed effects	Yes	Yes
Industry fixed effects	No	Yes
Adj. R^2	0.473	0.514
N	1,991	1,991

2. Cross-Sectional Variation in the Association between Ex Ante Contracted Severance Pay and Stock Return Volatility

To provide insights on whether the positive association between contracted severance pay and stock return volatility is due to this pay encouraging CEO risk taking, we investigate whether this association is more pronounced when it is more important for a firm to provide its CEO with risk-taking incentives. As argued by Gillan et al. (2009), the costs of an involuntary termination are greater for CEOs who invest heavily in their firm-specific human capital because other firms would not likely compensate a CEO for these skills. However, the likelihood that a CEO is fired for poor firm performance should be higher if the CEO's firm operates in an industry with more homogeneous firms. This is because in such an industry the costs to a firm of firing its CEO would be lower given that there would likely be a deeper pool of candidates with the skills to replace the CEO. Supporting this proposition, Parrino (1997) documents that the rate of forced CEO turnover is higher in industries in which firms are more homogeneous, and Gillan et al. (2009) report that CEOs in these industries are more likely to have an explicit employment agreement. Thus, given that CEOs in more homogeneous industries

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may have greater concerns that bad outcomes resulting from risky investments could lead to their dismissal, it could be more important to provide these CEOs with risk-taking incentives.[22]

In Panel A of Table 4, we use the same model as in Table 3, but we partition our sample by the median value of industry homogeneity. Industry homogeneity is measured, following Parrino (1997), using the correlation of stock returns for the

TABLE 4

Partition Regressions of Stock Return Volatility on Ex Ante Contracted Severance Pay

The sample in Table 4 consists of firms included in the ExecuComp database in 2006 with a fiscal year-end after Dec. 15 and firms included in this database in 2007 regardless of fiscal year-end, but constrained to those observations where we were able to construct partitioning variables. Panel A of Table 4 partitions the sample based on industry homogeneity, calculated following Parrino (1997). Panel B partitions the sample based on whether the firm is included in the S&P 500. Within each panel, all models are pooled OLS regression models. The dependent variable is stock return volatility calculated, following Guay (1999), as the annualized standard deviation of daily natural logarithmic stock returns (in %) over 240 trading days, starting with the last 120 trading days of the current fiscal year and ending with the first 120 trading days of the following fiscal year, multiplied by $252^{(1/2)}$. Ex ante contracted severance pay is the CEO's separation payment based on the hand-collection procedures described in Section II.B and is the total value of separation pay that is not vested or already earned that is owed to the CEO in the event of termination without cause or a resignation for good reason, scaled by the market value of all equity shares owned by the CEO. Industry dummies are included in models 2 and 4 using the Fama–French (1997) 10-industry breakdown obtained from Kenneth French's Data Library. Continuous variables are truncated at the top and bottom 1%. Significance levels using 2-tailed *p*-values for whether estimates are different from 0 corrected for heteroskedasticity using the White (1980) correction and corrected for serial dependence of error terms using standard errors that are clustered at the firm level are in parentheses. In addition, we pooled the sample and estimated a fully interacted regression model to test whether the coefficient estimates are different across the partitions. *, **, and *** next to a coefficient estimate indicate that it is statistically different across the two partitions at the 10%, 5%, and 1% significance levels, respectively, using 2-tailed *p*-values.

Panel A. Partition of Sample Firms Based on Industry Homogeneity (Parrino (1997))

	At or above Sample Median		Below Sample Median	
	Model			
	1	2	3	4
Intercept	−0.1512	−0.1503	−0.1295	−0.1296
	(0.000)	(0.000)	(0.000)	(0.000)
Ex ante contracted severance pay	0.0031**	0.0030**	0.0003	0.0004
	(0.002)	(0.001)	(0.714)	(0.637)
Vega	0.0001**	0.0000	0.0000	0.0000
	(0.009)	(0.717)	(0.550)	(0.712)
Delta	0.0000	0.0000	0.0000	0.0000
	(0.177)	(0.363)	(0.268)	(0.402)
Firm age	−0.0009	−0.0003*	−0.0007	−0.0007
	(0.000)	(0.097)	(0.001)	(0.008)
ln(Book assets)	−0.0400	−0.0368	−0.0447	−0.0451
	(0.000)	(0.000)	(0.000)	(0.000)
Total leverage	0.0812**	0.1481	0.1696	0.1790
	(0.001)	(0.000)	(0.000)	(0.000)
Market-to-book assets	−0.0012	0.0080	0.0000	0.0007
	(0.821)	(0.169)	(0.998)	(0.895)
R&D expenses/Net sales	0.1026	0.0966	0.0326	0.0342
	(0.148)	(0.313)	(0.006)	(0.006)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	No	Yes	No	Yes
Adj. R^2	0.484	0.557	0.480	0.485
N	1,029	1,029	907	907

(continued on next page)

[22] Alternatively, in more homogeneous industries the costs to a CEO of an involuntary termination could be lower because in such industries it might be easier for the CEO to find employment at another firm. If this decreases a CEO's concerns about being fired, then in more homogeneous industries it could be less important to provide a CEO with a large amount of contracted severance pay.

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TABLE 4 (continued)

Partition Regressions of Stock Return Volatility on Ex Ante Contracted Severance Pay

Panel B. Partition of Sample Firms Based on Whether the Firm Is Included in the S&P 500

	Not in S&P 500		In S&P 500	
	Model			
	1	2	3	4
Intercept	−0.1494 (0.000)	−0.1497 (0.000)	−0.1211 (0.000)	−0.1213 (0.000)
Ex ante contracted severance pay	0.0023** (0.003)	0.0027** (0.000)	−0.0002 (0.856)	0.0005 (0.585)
Vega	0.0000 (0.544)	0.0000 (0.592)	0.0000 (0.978)	0.0000 (0.918)
Delta	0.0000 (0.622)	0.0000 (0.566)	0.0000 (0.811)	0.0000 (0.558)
Firm age	−0.0004 (0.060)	−0.0007 (0.001)	−0.0009 (0.000)	−0.0006 (0.001)
ln(Book assets)	−0.0490*** (0.000)	−0.0525*** (0.000)	−0.0230 (0.000)	−0.0278 (0.000)
Total leverage	0.1791** (0.000)	0.1486 (0.000)	0.0585 (0.079)	0.0883 (0.018)
Market-to-book assets	0.0009 (0.846)	−0.0025 (0.578)	0.0058 (0.347)	0.0060 (0.337)
R&D expenses/Net sales	0.0305 (0.014)	0.0254 (0.031)	0.0509 (0.391)	0.2093 (0.004)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	No	Yes	No	Yes
Adj. R^2	0.466	0.425	0.409	0.512
N	1,301	1,301	635	635

firms within a 2-digit Standard Industrial Classification (SIC) industry. A higher correlation suggests greater industry homogeneity. We expect the positive association between contracted severance pay and stock return volatility to be stronger for the subset of firms where industry homogeneity is at or above the median, and CEOs are likely to be more concerned that bad outcomes from taking risk could lead to their dismissal.

Panel A in Table 4 shows that there is a significant positive relation between contracted severance pay and firm-level stock return volatility for firms at or above the sample median for industry homogeneity, and that this relation is insignificant for firms below the sample median for industry homogeneity. In addition, the coefficients on contracted severance pay are statistically different across the two groups. These results are consistent with the prediction that firms use severance pay contracts to provide CEOs with risk-taking incentives.

To further investigate whether the positive association between contracted severance pay and stock return volatility is at least partly due to this pay providing CEOs with risk-taking incentives, we consider whether a firm is an S&P small- or medium-cap firm as opposed to a large-cap (i.e., S&P 500) firm. For non–S&P 500 firms, there is likely a greater need for growth because these firms are earlier in their life cycle (e.g., Evans (1987), Agarwal and Gort (1996), (2002)). Thus, it may be more important for these firms to provide their CEOs with incentives to take risk. In Panel B of Table 4 we partition the sample based on whether the firm is in the S&P 500. We find a significant positive relation between contracted

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severance pay and stock return volatility only for non–S&P 500 firms, and that the coefficients on contracted severance pay are statistically different across the two subsamples. These results further support the prediction that firms use severance contracts to provide CEOs with risk-taking incentives.[23]

3. The Association between Contracted Severance Pay with Firm Leverage, Changes in Leverage, and a Firm's Propensity to Make Focused Rather Than Diversifying Acquisitions

Next, in Table 5 we examine whether contracted severance pay is positively related to financial leverage and the change in leverage from the year the CEO took office. Following most work in the capital structure area, we exclude firms operating in the financial services industries from the Table 5 analyses. Because prior work shows that managers have the most influence over capital structure through decisions related to issuing or retiring long-term debt (e.g., Welch (2004)), in the Table 5 models we measure leverage by considering the amount of a firm's long-term debt. Models 1 and 2 are regressions of leverage on contracted severance pay and control variables. The dependent variable is defined as long-term debt divided by the market value of assets, and the control variables are in levels. Models 3 and 4 are regressions of the change in leverage on contracted severance pay and control variables. Here, the dependent variable is the difference between leverage in the current year and the year the CEO took office, and the control variables represent changes in these control variables over the same time period.

As in the previous models, we control for the vega and delta of the CEO's stock and option portfolio. We also control for firm characteristics that affect firm leverage (Kayhan and Titman (2007), Harford, Klasa, and Walcott (2009)) (i.e., operating income; net property, plant, and equipment; selling expenses; the existence and amount of R&D expenses; market-to-book assets; the natural logarithm of book assets; and year fixed effects). In addition, we include industry fixed effects in models 2 and 4. We are unable to calculate the change in contracted severance pay since the year the CEO took office because firms did not fully disclose the information needed to calculate contracted severance pay prior to 2006. Thus, in models 3 and 4 we use the current-year amount of contracted severance pay as a proxy for the average amount of contracted severance pay over the years since a CEO took office. Similarly, we control for the current-year vega and delta of the CEO's stock and option portfolio.

The results in models 1 and 2 of Table 5 show positive associations between contracted severance pay and firm leverage. From the results for model 2, we estimate that a 1-standard-deviation increase in this pay is associated with 5.3% greater firm leverage. Perhaps more importantly, we also find a positive association between this pay and the change in leverage from the year the CEO took

[23] As an alternative to the partition based on whether a firm is included in the S&P 500, we reestimate the models in Panel B of Table 4 after partitioning firms by whether a firm's age is greater than the median sample value. The results of this analysis are qualitatively the same as those presented in this panel.

TABLE 5

Regressions of Leverage and Changes in Leverage on Ex Ante Contracted Severance Pay

The sample in Table 5 consists of firms included in the ExecuComp database in 2006 with a fiscal year-end after Dec. 15 and firms included in this database in 2007 regardless of fiscal year-end, but it excludes firms for which necessary data to calculate variables used in the Table 5 models was unavailable on Compustat, and it also excludes financial services firms (SIC codes 6000–6999). Models 1–4 are pooled OLS regression models. The dependent variable in models 1 and 2 is leverage, defined as long-term debt divided by the market value of assets (i.e., total book value of debt plus market value of equity). The dependent variable in models 3 and 4 is the change in leverage from the year the CEO took office to the current year. Ex ante contracted severance pay is calculated following the hand-collection procedures described in Section II.B and is the total value of severance pay that is not vested or already earned that is owed to the CEO in the event of termination without cause or a resignation for good reason, scaled by the market value of all equity shares owned by the CEO. In models 3 and 4 in which the change in leverage is the dependent variable, all control variables other than vega, delta, and the R&D expense dummy are calculated using the change between the value during the year the CEO took office to the current year. Industry dummies are included in models 2 and 4 using the Fama–French (1997) 10-industry breakdown obtained from Kenneth French's Data Library. Continuous variables are truncated at the top and bottom 1%. Significance levels using 2-tailed *p*-values for whether estimates are different from 0 corrected for heteroskedasticity using the White (1980) correction and corrected for serial dependence of error terms using standard errors that are clustered at the firm level are in parentheses.

	Leverage		Change in Leverage	
	Model			
	1	2	3	4
Intercept	0.0490 (0.057)	0.0338 (0.376)	−0.0061 (0.334)	−0.0077 (0.410)
Ex ante contracted severance pay	0.0033 (0.012)	0.0028 (0.028)	0.0031 (0.017)	0.0027 (0.044)
Vega	−0.0001 (0.003)	−0.0001 (0.001)	0.0000 (0.963)	0.0000 (0.991)
Delta	0.0000 (0.963)	0.0000 (0.803)	0.0000 (0.590)	0.0000 (0.445)
Operating income/Book assets	−0.1503 (0.010)	−0.1721 (0.004)	−0.2423 (0.002)	−0.2345 (0.002)
Net property, plant, and equipment/Book assets	0.0706 (0.000)	0.0919 (0.000)	0.0735 (0.236)	0.0601 (0.321)
Selling expenses/Net sales	0.0216 (0.438)	−0.0091 (0.748)	−0.1543 (0.098)	−0.1633 (0.076)
R&D expenses/Net sales	−0.0492 (0.368)	0.0016 (0.978)	0.3147 (0.147)	0.3057 (0.152)
R&D expense dummy	0.0250 (0.001)	0.0270 (0.002)	−0.0070 (0.296)	−0.0035 (0.739)
Market-to-book assets	−0.0416 (0.000)	−0.0414 (0.000)	−0.0319 (0.000)	−0.0313 (0.000)
ln(Book assets)	0.0185 (0.000)	0.0171 (0.000)	0.0043 (0.461)	0.0054 (0.353)
Year fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	No	Yes	No	Yes
Adj. R^2	0.659	0.675	0.198	0.208
N	1,409	1,409	1,095	1,095

office.[24] From the results for model 4, we determine that a 1-standard-deviation increase in contracted severance pay is associated with a 3.8% increase in firm leverage over this period. These results are consistent with the notion that higher amounts of contracted severance pay mitigate CEO risk aversion. Finally, we note that the Table 5 results do not support a rent-extraction hypothesis for severance

[24]The positive association between contracted severance pay and firm leverage could be partly driven by CEOs being reluctant to work for firms with high leverage and with such firms consequently being more likely to offer a severance pay contract at the hiring time. However, our findings related to the change in leverage after the CEO is hired increase our confidence that contracted severance pay impacts firm leverage.

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pay contracts, given that this hypothesis would predict that severance pay is negatively associated with CEO risk taking.

Table 6 provides evidence on another action the CEO takes after receiving his or her appointment: whether the CEO makes focused rather than diversifying acquisitions. Diversifying acquisitions tend to decrease firm risk. Thus, if contracted severance pay encourages CEO risk taking, then we expect this pay to be positively associated with a CEO making focused acquisitions. The subsample we examine in Table 6 consists of firms in our primary sample that make an acquisition during our 2006–2007 sample period, where the value of the target firm is at least 5% of the value of the acquirer. Data on acquisitions are obtained from the Securities Data Corporation (SDC) Mergers & Acquisitions database. We use a probit regression model where the dependent variable equals 1 if the firm acquires a target in its 2-digit SIC industry, and 0 otherwise.[25] In both of the Table 6

TABLE 6

Probit Models of the Decision to Acquire a Target in the Same Industry as the Acquirer

In Table 6, the sample consists of firms included in our main sample that make an acquisition during 2006 or 2007 where the target firm was at least 5% of the value of the acquirer. Data on acquisitions are obtained from the SDC Mergers & Acquisitions database. The dependent variable is a dummy variable for whether the firm acquired a target in its 2-digit SIC industry. Ex ante contracted severance pay is calculated following the hand-collection procedures described in Section II.B and is the total value of severance pay that is not vested or already earned that is owed to the CEO in the event of termination without cause or a resignation for good reason, scaled by the market value of all equity shares owned by the CEO. Relative size of target to bidder is equal to the transaction value paid for the target divided by the market value of equity of the acquirer. Industry dummies are included in model 2 using the Fama–French (1997) 10-industry breakdown obtained from Kenneth French's Data Library. Reported coefficients represent marginal effects. Continuous variables are truncated at the top and bottom 1%. Significance levels using 2-tailed *p*-values for whether estimates are different from 0 corrected for heteroskedasticity using the White (1980) correction and corrected for serial dependence of error terms using standard errors that are clustered at the firm level are in parentheses.

	Model	
	1	2
Intercept	0.0137	0.0486
	(0.805)	(0.408)
Ex ante contracted severance pay	0.0293	0.0249
	(0.023)	(0.049)
Vega	−0.0004	−0.0005
	(0.123)	(0.040)
Delta	−0.0001	−0.0001
	(0.069)	(0.040)
Market-to-book assets	0.0900	0.0845
	(0.050)	(0.073)
R&D expenses/Net sales	0.7864	0.6163
	(0.030)	(0.164)
Capital expenditures/Book assets	0.1987	0.2103
	(0.718)	(0.764)
ln(Book assets)	0.0630	0.0617
	(0.010)	(0.023)
Relative size of target to bidder	−0.0447	−0.0599
	(0.603)	(0.495)
Year fixed effects	Yes	Yes
Industry fixed effects	No	Yes
Pseudo-R^2	0.051	0.095
N	346	346

[25]If a sample firm makes more than one large acquisition (i.e., acquisition greater than 5% of the value of the firm) in a given year, we consider only the first such acquisition. As robustness tests, we examine whether using the largest acquisition (rather than the first) affects the results of Tables 6 and 7, and find that our results are unchanged.

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models, we control for the vega and delta of the CEO's stock and option portfolio. We control for investment opportunities with market-to-book assets, R&D expenses/sales, and capital expenditures/book assets. We expect that firms with smaller growth opportunities are more likely to look outside their industry when making investments and are thus more likely to make diversifying acquisitions. To control for the potential stage of development of a firm, we include firm size in our models. We also include the relative size of the target to the acquiring firm to control for the extent to which an acquisition is likely to impact a firm's operations. Finally, in model 2 of Table 6 we include industry fixed effects.

The results reported in Table 6 document a positive relation between contracted severance pay and whether a CEO makes a focused acquisition. From the results for model 2, we estimate that a 1-standard-deviation increase in contracted severance pay is associated with a 17.1% higher probability that a CEO makes a focused acquisition. These results are consistent with the notion that higher amounts of contracted severance pay induce CEOs to take risk while they are in office, and they are inconsistent with a rent-extraction hypothesis for these contracts.

C. Ex Ante Contracted Severance Pay and the Value of Firm Investment

If firms provide CEOs with more contracted severance pay to induce them to take risks, they do so to increase the likelihood that a CEO invests in risky projects with a high NPV. Thus, we also investigate whether contracted severance pay is positively associated with whether a CEO makes investments that increase firm value. We examine this issue in two different contexts. First, we examine if this pay is positively associated with announcement returns when a firm makes an acquisition. Second, we determine whether the contribution of cash holdings to firm value is greater when contracted severance pay is higher.

1. Ex Ante Contracted Severance Pay and Acquisition Announcement Returns

Table 7 provides results of OLS regressions of acquisition announcement returns on contracted severance pay and control variables using heteroskedastic-robust standard errors clustered by firm. Our sample of acquisitions is the same as in Table 6. The dependent variable is the $(-1, 1)$ day abnormal return around the acquisition announcement date, calculated using the market model in which the estimation window is the $(-220, -20)$ days prior to the acquisition announcement date. We control for the vega and delta of the CEO's stock and option portfolio, as well as deal and acquirer firm characteristics that affect acquisition announcement returns (i.e., acquirer size and market-to-book assets, the relative size of the target to the acquirer, whether the target is a private firm, and whether the payment for the deal is all cash or all equity).

Table 7 shows that there is a positive association between contracted severance pay and acquisition announcement returns and that this association is economically important. From the results for model 2, we calculate that a 1-standard-deviation increase in contracted severance pay is associated with bidder abnormal returns that are 109 basis points (bps) higher at acquisition announcements. This result is consistent with contracted severance pay encouraging CEO risk taking

TABLE 7

Regressions of Acquisition Announcement Returns on Ex Ante Contracted Severance Pay

The sample in Table 7 consists of firms included in our main sample that make an acquisition during 2006 or 2007 where the target firm was at least 5% of the value of the acquirer. Data on acquisitions are obtained from the SDC Mergers & Acquisitions database. Models 1 and 2 are pooled OLS regression models. The dependent variable is the (−1, 1) day abnormal return around the acquisition announcement date. Abnormal returns are calculated using a market model in which the estimation window is the (−220, −20) days prior to the acquisition announcement date. Ex ante contracted severance pay is calculated following the hand-collection procedures described in Section II.B and is the total value of severance pay that is not vested or already earned that is owed to the CEO in the event of termination without cause or a resignation for good reason, scaled by the market value of all equity shares owned by the CEO. Relative size of target to bidder is equal to the transaction value paid for the target divided by the market value of equity of the acquirer. The private target dummy is equal to 1 if the target firm is private, and 0 otherwise. The all-cash consideration dummy is equal to 1 if the acquirer paid all cash for the target, and 0 otherwise. The all-stock consideration dummy is equal to 1 if the acquirer fully paid for the target with the acquirer's shares, and 0 otherwise. Industry dummies are included in model 2 using the Fama–French (1997) 10-industry breakdown obtained from Kenneth French's Data Library. Continuous variables are truncated at the top and bottom 1%. Significance levels using 2-tailed *p*-values for whether estimates are different from 0 corrected for heteroskedasticity using the White (1980) correction and corrected for serial dependence of error terms using standard errors that are clustered at the firm level are in parentheses.

	Model	
	1	2
Intercept	−0.0839	−0.1245
	(0.901)	(0.864)
Ex ante contracted severance pay	0.2342	0.2551
	(0.007)	(0.004)
Vega	−0.0054	−0.0044
	(0.024)	(0.083)
Delta	0.0000	−0.0001
	(0.974)	(0.871)
ln(Book assets)	0.4615	0.3959
	(0.087)	(0.181)
Market-to-book assets	1.0709	1.2040
	(0.081)	(0.044)
Relative size of target to bidder	−1.4264	−1.6529
	(0.274)	(0.190)
Private target dummy	1.2405	1.3728
	(0.073)	(0.052)
All-cash consideration dummy	0.7019	0.2613
	(0.339)	(0.734)
All-stock consideration dummy	−1.1223	−1.0528
	(0.498)	(0.536)
Year fixed effects	Yes	Yes
Industry fixed effects	No	Yes
Adj. R^2	0.044	0.055
N	346	346

that is value-enhancing. Further, this evidence does not support an alternative hypothesis that severance pay contracts are a proxy for the existence of rent extraction on the part of entrenched CEOs. This hypothesis would predict that contracted severance pay is negatively associated with whether a CEO invests in projects with a high NPV.

2. Ex Ante Contracted Severance Pay and the Contribution of Cash Holdings to Firm Value

Because many investments are financed with a firm's cash reserves, we examine whether the contribution of cash holdings to firm value is positively associated with contracted severance pay. We follow Faulkender and Wang (2006) to estimate how a change in cash holdings leads to a change in firm market value. To do so, we use a sample of 1,042 firm-year observations for which we are able to construct required variables. Table 8 provides the results of our analysis.

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TABLE 8

Ex Ante Contracted Severance Pay and the Market's Valuation of Cash Holdings

The sample in Table 8 consists of firms included in the ExecuComp database in 2006 with a fiscal year-end after Dec. 15 and firms included in this database in 2007 regardless of fiscal year-end, but it excludes firms for which necessary data to calculate variables used in the Table 8 models was unavailable on CRSP or Compustat, and it also excludes financial services firms (SIC codes 6000–6999). Models 1–3 are pooled OLS regression models. The dependent variable is the firm's excess stock return, with excess return defined as the firm's annual fiscal year stock return minus the matched Fama–French (1993) 5 × 5 portfolio's return. Ex ante contracted severance pay is calculated following the hand-collection procedures described in Section II.B and is the total value of severance pay that is not vested or already earned that is owed to the CEO in the event of termination without cause or a resignation for good reason, scaled by the market value of all equity shares owned by the CEO. A Delta (Δ) reflects that the variable is calculated as the change from year $t-1$ to t. The other firm-level independent variables are as follows: cash holdings (cash and short-term investments), earnings (earnings before extraordinary items plus interest, deferred tax credits, and investment tax credits), net assets (total assets minus cash holdings), R&D expenses, interest expense, dividends (common dividends paid), total leverage (total debt divided by market value of assets (i.e., total book value of debt plus the market value of equity)), and net financing (total equity issuance minus repurchases plus debt issuance minus debt redemption). These independent variables, except leverage, are divided by the lagged market value of equity. Time subscripts are included as necessary. Industry dummies are included in model 3 using the Fama–French (1997) 10-industry breakdown obtained from Kenneth French's Data Library. Continuous variables are truncated at the top and bottom 1%. Significance levels using 2-tailed p-values for whether estimates are different from 0 corrected for heteroskedasticity using the White (1980) correction and corrected for serial dependence of error terms using standard errors that are clustered at the firm level are in parentheses.

	Model		
	1	2	3
Intercept	−0.1111 (0.000)	−0.1075 (0.000)	−0.0099 (0.828)
ΔCash holdings	2.4840 (0.000)	2.4903 (0.000)	2.4529 (0.000)
Contracted severance pay/Value of CEO equity stake		−0.0011 (0.623)	−0.0022 (0.343)
Contracted severance pay/Value of CEO equity stake × ΔCash holdings		0.0995 (0.007)	0.1060 (0.004)
ΔEarnings	1.5514 (0.000)	1.5442 (0.000)	1.5156 (0.000)
ΔNet assets	0.4475 (0.000)	0.4392 (0.000)	0.4457 (0.000)
ΔR&D expenses	2.9858 (0.108)	3.4613 (0.061)	3.5642 (0.050)
ΔInterest expense	−5.5716 (0.005)	−5.7351 (0.005)	−5.1089 (0.011)
ΔDividends	7.0971 (0.033)	6.6944 (0.046)	7.8464 (0.013)
Cash holdings$_{(t-1)}$	0.2770 (0.007)	0.2618 (0.010)	0.3019 (0.007)
Total leverage	0.1468 (0.002)	0.1537 (0.001)	0.1437 (0.002)
Net financing	−0.4596 (0.011)	−0.4684 (0.010)	−0.4822 (0.007)
Vega		−0.0001 (0.057)	−0.0001 (0.026)
Delta		0.0001 (0.097)	0.0001 (0.147)
Cash holdings$_{(t-1)}$ × ΔCash holdings	−2.5204 (0.057)	−2.8345 (0.031)	−2.5971 (0.048)
Total leverage × ΔCash holdings	−1.7897 (0.138)	−2.2936 (0.058)	−2.3082 (0.055)
Vega × ΔCash holdings		0.0007 (0.631)	0.0005 (0.745)
Delta × ΔCash holdings		−0.0003 (0.232)	−0.0002 (0.302)
Industry fixed effects	No	No	Yes
Adj. R^2	0.207	0.216	0.244
N	1,042	1,042	1,042

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Model 1 is a base-case OLS model identical to the model used by Faulkender and Wang (2006). Models 2 and 3 use the same independent variables as model 1, but include contracted severance pay, the vega and delta of the CEO's stock and option portfolio, and interactions of these three variables with the current-year change in cash holdings.

The results for model 1 of Table 8 show that the coefficient on the change in current-year cash holdings is significant and positive.[26] This implies that the marginal value of an extra dollar of cash is positive. The results for models 2 and 3 show that the coefficient on the interaction of contracted severance pay with the change in current-year cash holdings is also significant and positive. This indicates that the marginal value of an extra dollar of cash is positively associated with contracted severance pay. This result is economically important. Following the approach used by Faulkender and Wang (2006) to calculate the value of an incremental dollar of cash, we find that the marginal value of a dollar of cash for firms with the mean value of contracted severance pay is 9.7% higher than it is for firms with 0 contracted severance pay. Finally, we note that the Table 8 results are not supportive of a rent-extraction hypothesis for severance pay contracts predicting that these contracts proxy for the existence of entrenched managers who are likely to make investments that have a lower NPV.

D. The Amount of Contracted Severance Pay versus the Existence of an Ex Ante Severance Pay Contract

As reported earlier, 73.7% of the firms we study use severance contracts. One concern with the results in Tables 3–8 that contracted severance pay is positively associated with measures for CEO risk taking and the extent to which a CEO invests in positive-NPV projects is that these results could be driven solely by the existence of a severance contract, rather than the contracted amount of severance pay. To address this concern, we reestimate the models in Tables 3–8 only on those firm-years with a severance contract in place. Also, we reestimate the models in these tables on the full set of observations, but in lieu of the amount of contracted severance pay variable, we include an indicator for the presence of a severance contract.

Table 9 reports the results of these reestimations of the models from Tables 3–8. For brevity, we tabulate only the regression coefficients on the contracted severance pay variable and the indicator for whether there is a severance contract in place. The results for the models that are estimated only on the subsample of firm-years with a severance pay contract show that the statistical and economic importance of the findings in Tables 3–8 is robust to examining only these firm-years. However, the results for the models that are run on the full set of observations but replace the contracted severance payment variable with an indicator for the presence of a severance contract show that none of the findings in Tables 3–8 hold. Taken together, the Table 9 results suggest that providing a

[26]The magnitude of the coefficient on the change in current-year cash holdings is larger than that of Faulkender and Wang (2006). Presumably, this occurs due to our shorter sample period. When we estimate their model over their sample period and study the same set of firms examined in their study, we obtain a coefficient on the change in current-year cash holdings that is similar in magnitude to what they report. The results for models 2 and 3 of Table 8 are similar if we exclude vega, delta, and their interactions with the change in current-year cash holdings.

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TABLE 9

The Amount of Contracted Severance Pay versus the Existence of an Ex Ante Severance Pay Contract

Table 9 reestimates the regressions in Tables 3–8 in two ways. First, we reestimate the regressions on a reduced sample after removing those firms that do not offer their CEOs a severance pay contract. Second, we reestimate the regressions on the full sample but replace the continuous contracted severance pay variable with a dummy variable equal to 1 if a firm offers its CEO a severance pay contract, and 0 otherwise. For brevity, we report the coefficients only for the variables of interest. For our reestimations of the Table 8 regression model, the coefficients on the interactions of the severance-pay-related variables and the variable for ΔCash holdings are reported. All variables and models are as defined previously. Industry dummies are included in all models using the Fama–French (1997) 10-industry breakdown obtained from Kenneth French's Data Library. Continuous variables are truncated at the top and bottom 1%. Significance levels using 2-tailed *p*-values for whether estimates are different from 0 corrected for heteroskedasticity using the White (1980) correction and corrected for serial dependence of error terms using standard errors that are clustered at the firm level are in parentheses.

Panel A. Stock Return Volatility Regressions (Tables 3 and 4)

		Stock Return Volatility Partitions			
	Table 3	Panel A of Table 4		Panel B of Table 4	
	Stock Return Volatility	Above Median Parrino	Below Median Parrino	Outside S&P 500	In S&P 500
Reduced Sample Where Severance Pay Exists					
Contracted severance pay/Value of CEO equity stake	0.0027	0.0031	0.0010	0.0028	0.0005
p-value	(0.000)	(0.001)	(0.216)	(0.000)	(0.647)
Adj. R^2	0.521	0.560	0.509	0.451	0.561
N	1,468	708	716	971	453
Economic significance					
A 1-standard-deviation increase in severance pay	3.0% increase	3.6% increase	N/A	3.1% increase	N/A
Full Sample					
Severance pay contract dummy	−0.0063	0.0009	−0.0139	−0.0081	−0.0024
p-value	(0.271)	(0.899)	(0.152)	(0.281)	(0.776)
Adj. R^2	0.516	0.558	0.496	0.470	0.525
N	1,991	1,029	907	1,301	635

Panel B. Regressions of Risk-Taking Outcomes (Tables 5–8)

	Leverage Levels (Table 5)	Changes in Leverage (Table 5)	Acquisition in Same Industry (Table 6)	Acquisition Returns (Table 7)	Value of Cash Holdings (Table 8)
Reduced Sample Where Severance Pay Exists					
Contracted severance pay/Value of CEO equity stake	0.0034	0.0027	0.0196	0.2905	0.0968
p-value	(0.011)	(0.052)	(0.015)	(0.002)	(0.018)
Adj. R^2/Pseudo-R^2	0.684	0.273	0.109	0.159	0.275
N	1,056	840	268	268	757
Economic significance					
A 1-standard-deviation increase in severance pay	7.0% increase	4.6% increase	Higher by 15.0%	Higher by 1.38%	
Change in value of cash holdings when firm provides the average severance pay amount					9.5% increase
Full Sample					
Severance pay contract dummy	−0.0025	−0.0081	0.0905	−0.3875	0.2004
p-value	(0.706)	(0.783)	(0.176)	(0.582)	(0.584)
Adj. R^2/Pseudo-R^2	0.679	0.213	0.086	0.077	0.246
N	1,409	1,095	346	346	1,042

CEO with a severance pay contract is not sufficient to induce the CEO to invest in risky projects with a high NPV. Instead, to incentivize a CEO to take such actions, it is important that a firm ensures that the contracted severance pay amount is sufficiently high.[27]

[27]The Table 9 results are very similar if industry fixed effects are excluded from the models. As reported in Table 2, the determinants of the existence of a severance contract are similar to the

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E. Do the CEO's Accumulated Unvested Stock and Options Drive the Results Pertaining to CEO Risk Taking and Investment in Positive-NPV Projects?

Prior work suggests that the risk-taking incentives provided by managerial stock and option grants positively influence CEOs to take more risk (e.g., Guay (1999), Rajgopal and Shevlin (2002), and Coles et al. (2006)). When a CEO has a severance pay contract, approximately half of the time at least some of the CEO's unvested stock and option holdings vest upon termination. In such instances, these holdings are included in our calculation of contracted severance pay. In the regression models in our tables, we attempt to control for the risk-taking incentives and the pay-for-performance sensitivity provided by these holdings by including as independent variables the vega and delta of the CEO's stock and option portfolio. However, given the importance of this issue to the interpretations of our study's results, in this section we examine whether the risk-taking incentives provided by these holdings, rather than incremental risk-taking incentives provided by severance pay contracts, could drive the results that the amount of ex ante contracted severance pay is positively associated with proxies for CEO risk taking and whether a CEO invests in projects that have a positive NPV.

To examine this issue, we reestimate the regression models in Tables 3–8 after replacing the variable for total contracted severance pay with either the component of this pay that is based on cash or the component that is based on the CEO's unvested restricted stock and options that would vest immediately upon termination.[28] Table 10 provides the results of these analyses. In this table, we report the regression coefficients on the variables for cash- and equity-based contracted severance pay. When we reestimate our models using only the cash-based component of contracted severance pay as the independent variable of interest, we document that all of the results in Tables 3–8 continue to hold and that generally the results are at least as economically important as the results in these tables. However, when we reestimate the models using the component of contracted severance pay coming from unvested stock and options, we no longer find that contracted severance pay positively impacts a firm's leverage, the change in firm leverage since the year the CEO took office, or the likelihood that when making an acquisition a CEO makes a focused acquisition. Further, for those of the results in Tables 3–8 that do hold using this component of contracted severance pay, we document that economic significance substantially decreases relative to what we find when the full contracted amount of severance pay is considered. Overall, the Table 10

determinants of contracted severance pay. Except for the variable for the number of years to retirement, all of the variables with significant coefficients in the Table 2 Tobit models predicting contracted severance pay remain significant in the Table 2 probit models predicting the existence of a severance contract. Although not tabulated, we reestimate the Table 2 Tobit models using OLS only on those firm-years with severance contracts in place. Except for the variable for the number of years to retirement and the indicator for whether the CEO has signed a noncompete agreement, all of the main independent variables of interest with significant and predicted coefficients in the Table 2 Tobit models remain significant and economically important in explaining contracted severance pay.

[28]The correlation between the two components of contracted severance pay is only 0.29, which suggests that the cash-based component of contracted severance pay is unlikely to reliably proxy for the component of severance pay coming from a CEO's unvested stock and options.

TABLE 10

The Amount of Contracted Cash-Based Severance Pay versus the Amount of Contracted Stock- and Option-Based Severance Pay

Table 10 reestimates the regressions in Tables 3–8 in two ways. First, we reestimate the regressions after replacing total ex ante contracted severance pay with the cash-based component of ex ante contracted severance pay. Second, we reestimate the regressions after replacing total ex ante contracted severance pay with the unvested stock and options component of ex ante contracted severance pay. For brevity, we report the coefficients only for the variables of interest. For our reestimations of the Table 8 regression model, the coefficients on the interactions of the severance-pay-related variables and the variable for ΔCash holdings are reported. All variables and models are as defined previously. Industry dummies are included in all models using the Fama–French (1997) 10-industry breakdown obtained from Kenneth French's Data Library. Continuous variables are truncated at the top and bottom 1%. Significance levels using 2-tailed *p*-values for whether estimates are different from 0 corrected for heteroskedasticity using the White (1980) correction and corrected for serial dependence of error terms using standard errors that are clustered at the firm level are in parentheses.

Panel A. Stock Return Volatility Regressions (Tables 3 and 4)

		Stock Return Volatility Partitions			
	Table 3	Panel A of Table 4		Panel B of Table 4	
	Stock Return Volatility	Above Median Parrino	Below Median Parrino	Outside S&P 500	In S&P 500
Cash-Based Component of Severance Pay					
Cash-based component of ex ante contracted severance pay/Value of CEO equity stake	0.0028	0.0029	−0.0003	0.0021	0.0007
p-value	(0.003)	(0.006)	(0.859)	(0.031)	(0.673)
Adj. R^2	0.518	0.529	0.494	0.434	0.446
N	1,991	1,029	907	1,301	635
Economic significance					
A 1-standard-deviation increase in severance pay	2.1% increase	2.8% increase	N/A	2.1% increase	N/A
Unvested Stock and Options Component of Severance Pay					
Unvested stock and options component of ex ante contracted severance pay/Value of CEO equity stake	0.0028	0.0044	0.0010	0.0046	−0.0020
p-value	(0.010)	(0.010)	(0.388)	(0.000)	(0.260)
Adj. R^2	0.516	0.528	0.490	0.466	0.457
N	1,991	1,029	907	1,301	635
Economic significance					
A 1-standard-deviation increase in severance pay	1.3% increase	2.8% increase	N/A	2.3% increase	N/A

Panel B. Regressions of Risk-Taking Outcomes (Tables 5–8)

	Table 5		Table 6	Table 7	Table 8
	Leverage Levels	Changes in Leverage	Acquisition in Same Industry	Acquisition Returns	Value of Cash Holdings
Cash-Based Component of Severance Pay					
Cash-based component of ex ante contracted severance pay/Value of CEO equity stake	0.0047	0.0047	0.0362	0.3375	0.0977
p-value	(0.006)	(0.022)	(0.019)	(0.001)	(0.048)
Adj. R^2/Pseudo-R^2	0.671	0.226	0.074	0.107	0.248
N	1,409	1,095	346	346	1,042
Economic significance					
A 1-standard-deviation increase in severance pay	11.7% increase	4.5% increase	Higher by 15.9%	Higher by 1.10%	
Change in value of cash holdings when firm provides the average severance pay amount					6.1% increase
Unvested Stock and Options Component of Severance Pay					
Unvested stock and options component of ex ante contracted severance pay/Value of CEO equity stake	0.0025	−0.0013	0.0510	0.2192	0.2521
p-value	(0.518)	(0.602)	(0.127)	(0.015)	(0.009)
Adj. R^2/Pseudo-R^2	0.669	0.223	0.081	0.084	0.249
N	1,409	1,095	346	346	1,042
Economic significance					
A 1-standard-deviation increase in severance pay	N/A	N/A	N/A	Higher by 0.57%	
Change in value of cash holdings when firm provides the average severance pay amount					4.6% increase

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results are not consistent with the risk-taking incentives provided by CEOs' unvested stock and options driving the results in Tables 3–8.[29,30]

IV. Conclusion

We take advantage of SEC-mandated disclosure requirements on contracted severance pay that took effect in 2006 and require firms to tabulate and quantify in their annual disclosures any ex ante contracted severance payments that dismissed CEOs would receive. We examine the determinants of contracted severance pay and provide evidence suggesting that severance pay contracts are efficient contracting mechanisms that are used, in part, to provide CEOs with insurance for their human capital. As such, our results are consistent with Gillan et al.'s (2009) findings that, in general, explicit employment agreements are used to insure CEOs against opportunistic behavior on the part of a firm's board.

We also investigate whether severance pay contracts provide CEOs with incentives to invest in risky projects with a positive NPV, while recognizing that riskier firms may be more likely to provide CEOs with such contracts. Although we cannot definitively ascribe causality, our findings across tests investigating how contracted severance pay is associated with firm-level stock return volatility and a CEO's propensity to increase firm leverage and make focused rather than diversifying acquisitions are consistent with contracted severance pay encouraging CEOs to take risk. Further, supporting the idea that contracted severance pay provides CEOs with incentives to make investments that have a high NPV, we show that this pay is positively associated with announcement returns when a firm makes acquisitions and with the market's valuation of a firm's cash holdings. Overall, our results support the proposition that severance pay contracts are consistent with efficient contracting.

Finally, our paper provides a methodological contribution by offering guidance to researchers who plan to use the ExecuComp database variable for the

[29] As discussed earlier, one reason why in some cases a CEO's unvested stock and options might not provide the CEO with risk-taking incentives is that CEOs' wealth is often concentrated in their firms' stock. As a result, in some cases, granting a CEO additional stock and options can result in the CEO becoming more rather than less risk averse (e.g., Lambert et al. (1991), Carpenter (2000), and Parrino et al. (2005)).

[30] We also conduct the following additional robustness tests. First, we investigate whether removing the vega and delta control variables affects the results of the analyses that consider the component of contracted severance pay based on the CEO's unvested stock and options and find this does not affect the results. Second, we reestimate the regression models in Tables 3–8 after including in these models a dummy variable for whether the vega of a CEO's stock and option portfolio is above the sample median and the interaction of this variable with contracted severance pay. We find no instances where the coefficient on the interaction variable is significant, which is further evidence that the risk-taking incentives provided by a CEO's unvested stock and options do not drive the study's results. Finally, for the analyses related to changes in firm leverage, we consider the possibility that, due to annual stock and option grants, over time the amount of a CEO's unvested stock and options may rise, leading to increased risk-taking incentives for the CEO. To address the issue that such increases could result in the CEO raising firm leverage, we include in the model for this analysis the change since the year the CEO took office in the delta and vega of the CEO's stock and option portfolio or the change in the value of the CEO's unvested stock and options over this period or both of these change variables. We find that these additional controls do not affect the results of the analyses examining changes in leverage.

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ex ante contracted amount of severance pay that a dismissed CEO would receive. ExecuComp reports this variable beginning in 2006. We identify a number of important coding errors on the part of ExecuComp for this variable and report the factors that led to the identified errors in this variable.

Appendix A. Discussion of Differences between the Pre-2006 Disclosures and the Disclosures from 2006 Onward for Ex Ante Contracted Severance Pay

As discussed in Section II, as of 2006 the SEC specifically requires firms to tabulate and quantify in their annual disclosures any ex ante contracted severance payments that dismissed CEOs would receive. Prior to 2006, firms' disclosures related to severance pay consisted of a statement as to whether a severance agreement exists and a narrative description of the material payments due upon CEO termination.[31] However, firms were not required to quantify the payments, and the information necessary to quantify them was often not provided.[32] Additionally, firms were not required to even report or describe payments less than $100,000 annually.[33] Finally, prior to 2006, firms were not required to describe (or quantify) the amount of any separation benefits that are already effectively "vested" (i.e., have already been earned by the CEO, such as vested stock options), which the CEO would receive regardless of whether he or she stays with or leaves the firm. This last issue is particularly relevant for our analyses because we focus on the ex ante incentives that contracted severance pay create due to the risk for a CEO of being dismissed from his or her position. Thus, it is important to remove amounts from severance pay that are already earned by the CEO because these amounts should not provide incentives to take risk.

The new disclosure rules address all of these issues by requiring firms to specify, quantify, and tabulate *all* contracted payments a dismissed CEO would receive. Also, the rules require firms to tabulate these potential payments across several termination scenarios, including both an involuntary termination and a normal departure from the firm. To provide evidence on whether the mandated changes in disclosure requirements in 2006 led to differences in estimates of the ex ante contracted amount of severance pay a dismissed CEO would receive, we calculate (but do not tabulate) estimates for this amount during the 2005 year for a random group of 114 firms included in our sample that had severance contracts in place in 2006. These firms consist of one-fifth of our sample firms that had

[31] Prior to 2006, firms were also required to report in an exhibit to their Form 10-K details about ex ante severance pay contracts in a narrative form. However, quantitative information provided in these exhibits relating to the amount of ex ante contracted severance pay was not incremental to the information provided in proxy statements.

[32] For instance, prior to 2006, there was a lack of disclosed information on CEOs' option portfolios (i.e., number of options; exercise dates and exercise prices), pension plans (i.e., actuarially calculated estimates of the NPV of additional years of pension service credit), and unvested balances in nonqualified retirement plans. Also, although firms reported some information on formulas for calculating multiples of various components of a CEO's pay that would be due following dismissal, firms were often very vague about how these formulas were used. Finally, prior to 2006, firms had discretion with respect to disclosing "other perquisites" that a CEO receives as part of his or her severance package. For example, in 2006 American Airlines disclosed that, upon termination, the CEO would receive $270,000 of lifetime air travel benefits, whereas in 2005 this amount was not disclosed.

[33] Companies could subcategorize a CEO's potential separation payments such that they were less than $100,000 and therefore did not need to be described, even if the cumulative amount of such benefits would significantly exceed $100,000. Common individual items in this category include the following: i) continued health-care insurance; ii) continued life insurance; iii) outplacement services, including use of company office and administrative support; iv) continued use of financial planning services; and v) continued use of company car.

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such contracts in 2006.[34] For these firms, we find that in 2005 the mean and median values for the estimate of contracted severance pay are $3.6 million and $2.2 million, respectively, whereas in 2006 the corresponding mean and median values are $8.8 million and $4.4 million, respectively. This implies that between these 2 years the mean and median values of this estimate increase by 144% and 100%, and that prior to 2006, estimates of contracted severance pay based on firms' disclosures were, on average, 59% lower than the true amount.[35,36]

Our 2005 estimates of the ex ante contracted amount of severance pay are incorrect mostly because of vague firm explanations for calculating multiples of various components of a CEO's pay that would be due upon dismissal and the difficulty in estimating separation benefits based on the information provided within the proxy statement during this year (i.e., continuation of salary and bonus, option values, long-term cash payout incentive plans, pension/retirement enhancements, and continuation of other benefits). When possible, we estimated contracted severance pay in 2005 using the data provided in the proxy statement. For instance, if the disclosure stated that the CEO would receive a multiple of his or her base salary and "target" bonus payment (i.e., the largest possible bonus, regardless of whether it was earned), and it was not clear from the firm's disclosure what the "target" bonus would be, we would apply the multiple to the CEO's base salary for 2005 and the actual bonus paid in 2005. However, in other cases, there was no information available to even make an estimate. For example, if a dismissed CEO receives additional pension or postretirement benefits as part of his or her severance package, typically no information is provided in pre-2006 proxy statements that can be used to calculate the value of these benefits. Finally, when comparing the disclosures in the 2005 and 2006 proxies, we found that in 2006 there is more information pertaining to other perquisites that a CEO would receive as part of his or her severance benefits. Likewise, we find evidence of more disclosures of severance benefits that individually would have a value of less than $100,000.

Appendix B. Accuracy of the ExecuComp Variable Measuring Ex Ante Contracted Severance Pay

We compare our estimates for the contracted amount of CEO severance pay for the 2006 and 2007 years with the amount of the contracted separation payment listed in ExecuComp (item TERM_PYMT, which ExecuComp starts reporting in 2006, defined as estimated payments in the event of involuntary termination). There are three possible outcomes for this variable: i) missing, ii) a positive number, or iii) 0. TERM_PYMT is missing in 2006 for firms with fiscal years ending before Dec. 15. This is because the new disclosure rules are applicable only to firms with fiscal years ending after Dec. 15, 2006.

We identified a few problems with the TERM_PYMT variable. Panel A of Table B1 reports that for 17.5% of the 1,468 firm-years for which we find that a CEO has a severance

[34] We randomly identify these firms by alphabetically listing our sample firms that had an ex ante severance pay contract in 2006 and then selecting every fifth firm.

[35] For 18 of the 114 firms that we collect data for in 2005, our estimate for the amount of ex ante contracted severance pay using the disclosures from this year is $0. Even if we exclude these firms from our analysis, we still find that there is a large drop in our estimate of contracted severance pay between 2005 and 2006. Specifically, we find that for the 96 firms with nonzero estimates of contracted severance pay during 2005, the mean and median values for this estimate increase by 100% and 47%, respectively, between 2005 and 2006.

[36] For the set of 404 firms in our sample that have severance pay contracts in place during both 2006 and 2007, the mean and median values of the estimate of contracted severance pay decrease by 3% and 0.1%, respectively, between 2006 and 2007. This finding suggests that the large increases in the mean and median values for the estimates of contracted severance pay between 2005 and 2006 are not due to important year-to-year changes with respect to contracted severance pay or to a time trend in which contracted severance pay is markedly increasing over time. Instead, it seems that the large increase in the estimates for contracted severance pay between 2005 and 2006 is due to the fact that, prior to 2006, firms failed to fully disclose the contracted severance pay a dismissed CEO would receive.

TABLE B1

Differences between ExecuComp's and Our Estimates of Contracted Severance Pay

Table B1 describes differences between the ex ante contracted severance pay amounts reported by ExecuComp (variable TERM_PYMT) and the amounts we calculate through the hand-collection procedures described in Section II.B. Panel A presents statistics on differences between ExecuComp and our hand-collection regarding the existence of an ex ante severance pay contract. Panel B reports the Pearson correlation coefficients between the contracted severance pay amount reported by ExecuComp and the amount we calculate through hand-collection from firms' disclosures.

Panel A. The Existence of Contracted Severance Pay

	Percentage of Sample
% of sample firms where hand-collection identifies a CEO as having contracted severance pay, but ExecuComp incorrectly reports that the CEO has 0 contracted severance pay	17.5
% of sample firms where hand-collection identifies a CEO as having 0 contracted severance pay, but ExecuComp incorrectly reports that the CEO has contracted severance pay	10.5

Panel B. Pearson Correlation Reconciliation between ExecuComp and Hand-Collected Contracted Severance Pay

	Pearson Correlation
TERM_PYMT and hand-collected contracted severance pay amount	0.760
After correcting for the following instances:	
ExecuComp incorrectly reports CEO as not having a severance contract	0.890
ExecuComp incorrectly reports CEO as having a severance contract	0.920
ExecuComp incorrectly calculates contracted severance pay	0.955
ExecuComp includes "vested" amount of pay in contracted severance pay	0.995
Other	1.000

pay contact, ExecuComp reports that there is no severance pay contract in place. We looked into what causes this error rate and found that it is largely due to ExecuComp incorrectly reporting that a CEO does not have a severance pay contract when the information relating to the contract in a firm's proxy statement is in narrative rather than tabular format. Panel A also shows that for 10.5% of the 523 firm-years for which we find that a CEO does not have a severance pay contract, ExecuComp reports that there is such a contract in place. Here, we find that an important driver of these errors is that ExecuComp incorrectly codes "change in control" golden-parachute-type payments as "involuntary termination" payments.[37]

Panel B of Table B1 reports that the Pearson correlation between our calculated amount of contracted severance pay and what is reported by ExecuComp for the TERM_PYMT variable is only 0.76. After correcting for instances when ExecuComp incorrectly reports that there is or there is not a severance pay contract in place, this correlation value increases to 0.92. In a number of the cases when ExecuComp correctly reports that there is a severance pay contract in place, ExecuComp incorrectly calculates the contracted severance pay amount. For instance, when tabulating separation pay, if firms do not include a "total" amount that sums all the components of the CEO's separation pay package, then ExecuComp typically incorrectly assumes that the first or last number in the table is the total severance pay that a dismissed CEO would receive, leading to a severe underreporting of the true contracted severance pay amount. When we correct for such errors, the correlation between the amount of contracted severance pay reported by ExecuComp and what we find rises to 0.955. Finally, because our variable for contracted severance pay is meant to capture the ex ante incremental separation pay owed to CEOs who are involuntarily terminated, we remove amounts from the severance pay total that are "vested," or already earned

[37]The ExecuComp variable CHG_CTRL_PYMT separately reports information on golden parachutes. ExecuComp defines this variable as the payments a CEO would receive due to loss of employment resulting from a change in control. We do not study payments the CEO would receive if the CEO loses the position subsequent to the firm being acquired because these payments are meant to increase a CEO's willingness to have the firm acquired if a bidder makes a reasonable offer for the firm rather than to provide the CEO with risk-taking incentives. See Lambert and Larcker (1985), Knoeber (1986), and Hartzell, Ofek, and Yermack (2004) for evidence on golden parachutes.

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by the CEO regardless of whether the CEO remains with the firm. In a number of cases ExecuComp includes these amounts of vested pay in the TERM_PYMT variable. When we remove from the TERM_PYMT variable any vested pay that a CEO has already earned, the correlation between the amount of contracted severance pay reported by ExecuComp and what we obtain through our hand-collection method rises to 0.995.

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