Federal Reserve Bank of New York
Staff Reports

Deferred Compensation, Risk, and Company Value: Investor Reactions to CEO Incentives

Chenyang Wei
David Yermack

Staff Report no. 445
April 2010

Deferred Compensation, Risk, and Company Value: Investor Reactions to CEO Incentives

Chenyang Wei and David Yermack

Federal Reserve Bank of New York Staff Reports, no. 445
April 2010
JEL classification: G14, G32

Abstract

Many commentators have suggested that companies pay top executives with deferred compensation, a type of incentive known as inside debt. Recent SEC disclosure reforms greatly increased the transparency of deferred compensation. We investigate stockholder and bondholder reactions to companies' initial reports of their CEOs' inside debt positions in early 2007, when new disclosure rules took effect. We find that bond prices rise, equity prices fall, and the volatility of both securities drops upon disclosures by firms whose CEOs have sizable defined benefit pensions or deferred compensation. Similar changes in value occur for credit default swap spreads and exchange-traded options. The results indicate a reduction in firm risk, a transfer of value from equity toward debt, and an overall destruction of enterprise value when a CEO's deferred compensation holdings are large.

Key words: deferred compensation, inside debt, executive compensation disclosure

---

Wei: Federal Reserve Bank of New York (e-mail: chenyang.wei@ny.frb.org). Yermack: Stern School of Business, New York University (e-mail: dyermack@stern.nyu.edu). The authors appreciate helpful comments from seminar participants at the 2009 Conference on Empirical Legal Studies, Federal Reserve Bank of New York, Chinese University Hong Kong, City University of Hong Kong, and University of Maryland. Part of this research was completed while Yermack was a visiting professor at Erasmus University Rotterdam.

Deferred Compensation, Risk, and Company Value: Investor Reactions to CEO Incentives

I. Introduction

Following the 2007-08 financial crisis, many commentators and regulators have advocated greater use of deferred compensation for top executives. These recommendations stem from widespread beliefs that stock options and other equity incentives have caused excessive risk-taking by managers of certain firms, particularly those in the financial industry.

Deferred compensation for top managers is not new, but prior research into the topic is almost nonexistent due to limited disclosure requirements prior to 2006. For decades executives have received significant amounts of pay in the form of defined benefit pension plans, and many also participate in both mandatory and voluntary schemes under which they delay the receipt of current-year salary and bonus income, leaving it invested with their firms at a certain rate of return until retirement. These forms of deferred compensation are known to economists as "inside debt," since they represent fixed obligations for the company to make future payments to corporate insiders, and in this paper we will use these terms interchangeably. In the large majority of firms, inside debt obligations are unsecured and unfunded, exposing managers to the same default risks that are borne by outside creditors. In principle, one could also characterize most equity compensation, such as stock options and restricted stock, as "deferred

compensation," since its receipt by the executive is usually delayed by a vesting period lasting several years after the award date. However, equity compensation is fundamentally different from inside debt because its nominal value is contingent upon the future performance of the firm. In this paper, we confine our analysis to the classical forms of deferred compensation, those contracts involving future payments of values that are fixed in advance.

In line with recent reform proposals, Jensen and Meckling (1976, pp. 352-354) and subsequent authors argue that inside debt compensation represents a potential method of reducing the agency costs of debt in a levered firm. Agency costs of debt arise from strategies in which managers change the firm's investment policy, payout policy, or capital structure in ways that reallocate wealth from debtholders to stockholders, usually through some increase in the overall risk of the firm. To counteract this potential problem, Jensen and Meckling suggest an optimal incentive structure under which the manager's personal holdings of the firm's debt and equity should occur in a ratio that mimics the firm's overall external capital structure. However, excessive inside debt compensation could cause problems. Jensen and Meckling elaborate on this point, noting that if a manager's inside debt holdings exceed the amount implied by the condition above, he might manage the firm too conservatively, reducing overall risk in ways that transfer wealth from stockholders to debtholders.

Enhancing transparency of managers' deferred compensation holdings was a key feature of the Securities and Exchange Commission's expansion of executive compensation disclosure at the end of 2006. We use this disclosure reform to study investor reactions to the first reports of CEOs' inside debt positions, at public companies that reported compensation to shareholders in the first months of 2007. We identify 244 companies whose CEOs have positive inside debt

holdings and whose proxy statements with 2006 compensation data are filed in early 2007 during the first wave of disclosures under the SEC's new regulations. About 29% of these CEOs have excessive inside debt under the Jensen-Meckling criterion, as their personal inside debt-equity ratios exceed the external debt-equity ratios of their firms. We examine changes in the value of company stocks and bonds, the implied volatility of exchange traded options, and the spreads of credit default swap derivative securities. In line with theory, we find evidence of transfers of value away from equity and toward debt upon revelations that top managers hold large pension and deferred compensation claims. Our results show that bond prices rise, equity prices fall, and the volatility of both securities drops at the time of disclosures by firms whose CEOs have large inside debt. Changes in the prices of derivative securities are consistent with these results.

Figure 1, a tabulation of monthly regression coefficient estimates, illustrates the overall pattern of results that we observe for corporate bonds. The figure shows the outcomes of a series of ordinary least squares regressions over a sample of 1,010 publicly traded bonds issued by the 244 companies in our sample. The dependent variable equals the yield spread for each bond, or the difference between the bond's yield to maturity at month-end and the yield on a U.S. Treasury bond of similar maturity. The coefficient displayed in the figure is the estimate for the influence of the CEO's relative debt-equity ratio. We define this as the ratio of the CEO's inside debt-equity ratio over the firm's external debt-equity ratio, with the CEO's inside debt-equity ratio equal to the present value of the CEO's pension plus deferred compensation holdings divided by the value of his stock and option holdings.[1] We estimate the monthly regressions in a

[1] The regressions include a full range of additional control variables: firm leverage, firm size (log of assets), return on assets, interest coverage, equity volatility, bond time to maturity, bond coupon rate, the amount of the bond issue outstanding, and indicator variables for secured status, callable status, and credit ratings A, Baa, Ba, B, and Ca and lower. Significance levels are determined by robust standard errors clustered by issuing firm. The R^2 goodness-of-fit

piecewise specification, and the chart shows the estimated slope of the CEO's relative debt-equity ratio for the segment above the critical value of 1.00. As shown in the chart, the CEO's debt-equity ratio, which was unknown to investors prior to March 2007, had no significant impact on corporate bond yields up to that time. After the initial wave of CEOs' inside debt disclosures in March 2007, our cross-sectional estimates of the influence of the CEO's relative debt-equity ratio upon bond prices become consistently negative as theory would predict, with increasing strength and statistical significance month by month, for those observations in which the CEO's inside debt-equity ratio exceeds the firm's external debt-equity ratio.

By showing that investors take close account of managers' large inside debt positions when pricing a firm's external claims, our results extend a nascent literature that illuminates the importance of deferred compensation as an incentive mechanism. Cross-sectional studies of inside debt's role in management compensation have appeared in Sundaram and Yermack (2007) and Gerakos (2007), and these papers provide evidence consistent with the idea that firms use deferred compensation to reduce the potential agency costs of debt implicit in their capital structures. Sundaram and Yermack find that pension values are higher when firm leverage is higher, while Gerakos finds higher pension values in firms with strong credit quality, higher book-to-market ratios, and lower idiosyncratic risk. Sundaram and Yermack also find that when managers hold large inside debt positions, the expected probability of the firm defaulting on its external debt is reduced, consistent with a hypothesis that these managers operate the firm conservatively in order to protect debt values.

Other than Jensen and Meckling (1976), only Edmans and Liu (2009) have studied the

---

measures range from .71 to .83 across the 15 months shown.

theoretical implications of inside debt, although the role of incentive compensation in mitigating the agency costs of debt has been the subject of many papers (see Edmans and Liu, 2009, for a survey).

In many ways our empirical results are the mirror image of those reported in the classic event study by DeFusco, Johnson and Zorn (1990). In that paper the authors examine the announcement effects of executive stock option plans introduced by more than 400 firms between 1978 and 1982. On average these firms' stock prices rise, bond prices fall, and equity volatility rises around the time of the plan disclosures. The authors interpret these results as consistent with a pattern of risk shifting, in which both equity and debt investors expect firms to pursue riskier investment strategies due to the managers' option-based incentive compensation. In our study, the implication of the results is exactly the opposite: to the extent that managers have large unfunded deferred compensation claims against their firms, outside investors expect them to manage their firms conservatively, implying lower-risk investment strategies that would tend to make debt safer and equity less attractive.

Our research adds to an increasing list of studies using the SEC's recent disclosure expansion to illuminate aspects of executive compensation that could not be researched previously. Papers in this category include Grinstein, Weinbaum and Yehuda (2008) and Andrews, Linn and Yi (2009) (executive perquisites); Murphy and Sandino (2010) and Cadman, Carter and Hillegeist (2009) (the influence of compensation consultants); and Faulkender and Yang (2008) and Cadman, Carter, and Semida (2009) (peer groups used for benchmarking executive incentives). We also contribute to the small but growing literature that uses event study methods to examine the impact of corporate disclosures upon the value of debt securities.

While many hundreds of stock price event studies have been published, only several dozen papers have included event studies using publicly traded corporate bonds (see Bessembinder et. al, 2008, for a list of these studies), while only a small handful of papers have conducted event studies using credit default swap spreads (Jorion and Zhang, 2007; Imbierowicz and Wahrenburg, 2009).

The remaining sections of this paper are organized as follows. Section II describes the sample selection process and the resulting dataset. Section III contains the main event study analysis of price changes of company stocks, bonds, and spread changes for credit default swaps. Section IV presents a discussion of the results and conclusion.

II. Sample Selection and Data Description

Although not used by all companies, inside debt compensation for executives generally consists of two pieces: defined benefit pensions and deferred compensation. Pension benefits may sometimes be negotiated, but they usually accrue to managers under company-wide formulas established by each company, often based upon years of service with the firm and each executive's average level of cash compensation. When an executive retires, he can draw the pension in the form of a life annuity or as a single lump sum, equal to the actuarially calculated present value of expected lifetime benefits. Deferred compensation, in contrast, accrues if the executive makes a discretionary investment decision that involves him lending money back to his firm by foregoing cash compensation that he would otherwise be entitled to receive in the current period (in some cases, these deferral decisions are mandatory). Deferred compensation may often be invested either at a fixed rate of return, or in the company's stock, or in a menu of

stock or bond mutual funds chosen by the firm. Many companies allow managers to make frequent changes in how their deferred compensation is invested, though these investment decisions are not observable under current disclosure rules. Deferred compensation is generally paid out to the executive at retirement, although earlier withdrawals are permitted by some firms under certain limited circumstances.

In addition to the incentive implications of these plans, a major motivation for executives to receive inside debt compensation is that its taxation is almost always deferred until the executive receives payouts when retired. For both pension benefits and deferred compensation balances, the amounts due to executives are almost always unfunded and unsecured in order to preserve these tax benefits, so these sums are at risk like other unsecured debt if the firm becomes financially distressed.

In some companies, inside debt values can be large, sometimes exceeding $100 million for a CEO and occasionally amounting to a greater sum than a manager's equity investments in his firm's stock or stock options.[2] However, until 2007 managers' inside debt values were almost never disclosed under the SEC's executive compensation reporting requirements previously in effect. Companies were required to provide certain details about the pension benefits due to an executive, but calculating the expected present value of an individual manager's pension required combining the disclosed data with information from a number of external sources and making sophisticated actuarial computations, a task probably beyond the skills of most investors and even Wall Street analysts (see Sundaram and Yermack, 2007). Even

[2] Seven CEOs on the the ExecuComp database had inside debt balances exceeding $100 million at fiscal year-end 2006. More than two-thirds of the CEOs in the database had nonzero inside debt, with a mean value of $5.7 million. In general inside debt compensation is more common among larger firms in slower-growth sectors of the economy such as manufacturing, utilities, and transportation.

less was disclosed about other forms of deferred compensation; most firms did not even have to report whether their executives even participated in a deferred compensation plan, and in the few cases in which these disclosures were required,[3] the balances held by individual managers were never given. When the SEC announced a pending revision of its executive compensation disclosure rules in 2006, providing more transparency about pensions and deferred compensation was a major priority.

Because the new reports of managers' pension and deferred compensation balances in early 2007 were highly anticipated by the community of executive compensation analysts, consultants, and researchers, we hypothesize that stock and bond prices should have reacted significantly for companies in which these inside debt balances were revealed to be large. Our research strategy uses standard event study methods to assess stock and bond investors' immediate reactions to these disclosures. Therefore, we focus upon publicly traded firms that also had publicly traded long-term debt outstanding at year-end 2006, the time at which the SEC's new disclosure regulations became effective.

We begin by identifying all non-financial Compustat firms with fiscal years ending in December 2006 or later for which Moody's provides a senior bond rating. After discarding a small number of companies with faulty or incomplete compensation disclosures, we retain all firms that file proxy statements with the SEC between January 1, 2007, and April 30, 2007, and report nonzero inside debt holdings for their CEOs. Within this group, we look at the subset that have fixed-rate publicly traded bonds listed on the Mergent Fixed Investment Security Database

[3] Companies had to report only those cases in which the executive received a fixed rate of interest on his deferred compensation, and only if the fixed rate exceeded the "applicable federal rate," an estimate of the risk-free rate specified by the Internal Revenue Service. In practice, very few plans had this structure, as most firms do not offer high fixed-rate interest as an investment option.

in the form of either non-convertible debentures, medium-term notes or zero-coupon bonds. This set of screens give us a preliminary sample of 286 firms. We then require each company to have daily bond pricing data in the Reuters database between June 2006 and August 2007, to have non-missing data for the bond rating, amount outstanding, and time to maturity as of the proxy statement filing date, to have a minimum maturity of one year, and at least 60 end-of-day bond pricing quotes in the 90-day period before the filing date. These screens cause us to discard 42 firms, resulting in a final sample of 244 companies which together have a total of 1,010 distinct bond issues.

We augment our data about corporate debt issues by collecting information about credit default swap (CDS) spreads for our sample companies. These data are available for 195 of our 244 sample firms from Markit CDS Pricing, which maintains the most widely used data source for these contracts. We use daily spread data for five year, senior secured credit default swaps, the most liquid and common CDS contracts, and we collect spreads classified under the "modified restructuring" document clause, a contract term that enumerates the contingencies under which settlement of a CDS contract would be triggered.

Figure 2 shows a timeline of the proxy statement filing dates for the 244 firms that we study. We use these filing dates as the event dates in our analysis, as the SEC always posts incoming documents on its EDGAR website for public viewing within hours their receipt. In 221 cases, the information about CEOs' inside debt holdings was revealed in a definitive proxy statement filed with the SEC at some point during the months of March or April, 2007. In 23 cases firms filed a preliminary proxy statement with full compensation data several weeks in advance of their final proxy filing, with the preliminary document available for public viewing.

In these 23 cases we use the earlier date as the event date, with the first of these disclosures coming on January 18, 2007. Among other patterns, Figure 2 shows a tendency for firms to file proxy statements on Fridays, and it indicates that the first wave of compensation disclosures under the new rules began in earnest during the second week of March 2007 and started to taper off by the end of that month (regulations require firms to make compensation disclosures within 120 days of fiscal year-end, though most comply sooner). We do not extend our sample to companies that filed their first compensation disclosures after the end of April, because we are concerned about the informativeness of these later filings. We conjecture that once investors had seen the inside debt positions of managers at several hundred firms, they would have been able to estimate the holdings of CEOs at companies that had not yet filed and thus would not react as strongly to the later disclosures.

Table 1 presents descriptive statistics about the 244 firms and 1,010 bond issues that we study. Most of our sample companies are large, well-known firms with moderate leverage and investment grade credit ratings. Although we consider all Compustat firms for inclusion in our study, inside debt compensation plans are much more common among larger firms than smaller ones, and a large majority of our sample companies are well-known S&P 500 firms. The typical CEO in our sample is 56 years old and has held his position for a mean of five (median of three) years, although he was likely accumulating inside debt while holding junior management positions prior to becoming CEO.

To value each CEO's holdings of inside debt and equity, we use information in each proxy statement. For inside debt, we take the present value of pension benefits and deferred compensation balances as reported by the company. For inside equity, we take the sum of the

values of direct stock holdings, stock option holdings, unvested restricted stock, and synthetic or performance shares. We calculate stock ownership value by multiplying shares held (including restricted and performance shares) times the stock price on December 31, 2006. We value stock options by applying the Black-Scholes formula to each individual tranche of options held by the CEO and summing the tranche values to an aggregate total. The CEOs in our sample hold a mean (median) of $9.9 million ($5.2 million) of inside debt in their firms, according to the values reported by the companies in our sample, with the majority in the form of pension benefits. The personal inside debt-equity ratio, comparing the value of a CEO's inside debt over his inside equity, has a mean of 0.25 and median of 0.17. In 70 cases out of the 244 firms that we study, or 29%, the CEO's personal inside debt-equity ratio exceeds the company's external debt-equity ratio, providing the apparent incentives for overly conservative management identified by Jensen and Meckling (1976).

Figure 3 shows a scatter plot of the CEO's personal inside debt-equity ratio against the external debt-equity ratio of the firm. Many observations cluster near the 45-degree line, where the ratio between the two values equals the Jensen-Meckling optimum of 1.00. Observations in the upper left part of the chart are those in which the CEO has relatively high equity incentives in a firm with a levered capital structure. In this area, one would expect the CEO to pursue very risky investments and the agency costs of debt to be high. In the lower right of the chart, the opposite situation prevails, with the CEO having a high inside debt position in a relatively unlevered firm. In this area one would expect the opposite agency problem, a CEO managing the firm very conservatively even though external claimholders would have little reason to be concerned about risk-shifting between equity and debt.

III. Analysis

A. Univariate analysis of abnormal returns

We begin by examining the unconditional abnormal returns to debt and equity securities of all 244 firms in our sample around the dates of their proxy statement filings in early 2007. We calculate equity abnormal returns using the Fama-French-Carhart four-factor model, with a 120-day parameter estimation period ending 10 days prior to the event day and the S&P 500 index as the market index. Bond abnormal returns are based upon a two-factor model, using the Citigroup Investment-Grade and Speculative-Grade corporate bond indexes and a 90-day parameter estimation period. These abnormal returns are calculated separately for all 1,010 publicly traded bond issues associated with our 244 sample firms. Finally, we combine the abnormal stock and bond returns into an overall "firm abnormal return" for each of our 244 companies. Firm abnormal returns equal weighted averages of the abnormal returns to the stock and bonds issued by each firm, with the weights equal to the total outstanding market value of each security. If a firm also has debt that is not publicly traded, we include it in the weighted average, with the weight equal to the difference between the book value of total debt and the book value of traded debt, and the abnormal return of non-traded debt assumed to equal zero. We test the sensitivity of our results to these assumptions by changing the abnormal return on non-traded debt to equal the abnormal return on traded debt, and also by changing the weight for non-traded debt to equal the book value of long-term debt minus the book value of traded debt. In all cases the estimated firm CAR is virtually identical in size and significance, so we use the assumptions above in the analysis throughout the paper.

Our computations for bond returns and volatility rely on end-of-day pricing quotes

provided by Reuters, which gathers the data each day based upon market quotes. Actual bond transaction prices are infrequent, because most corporate bonds do not trade regularly even if they are publicly listed. We therefore rely upon Reuters' daily closing price quotes, which the data vendor gathers for corporate bonds throughout each trading day, even if those bonds do not trade. At the end of each day Reuters posts provisional prices for individual bonds and then allows for a "market challenge" period in which clients can submit evidence to challenge Reuters' pricing, with the vendor making adjustments to its posted prices if warranted. We investigated the alternative, described in Bessembinder et. al (2008), of relying upon daily pricing data from actual bond trades on the TRACE database as the basis for calculating abnormal returns. We found that this method vastly reduced the number of available observations, making it impractical for our study.

We also tabulate daily changes in credit default swap spreads for the 195 companies in our sample that have available data. To adjust for market-wide CDS spread movements, we normalize these price changes by the changes in the Markit North American investment grade CDS index for five-year maturities.

Table 2 shows the mean cumulative abnormal returns for the samples of stocks, bonds, and firms overall, as well as CDS spread changes, all measured over a two-day event window that includes the SEC filing date and the subsequent trading date; we use a two-day window because some filings occur late in the day after the market has closed. The overall pattern of returns in the entire sample seems uninteresting, but we find significant differences in the returns to bondholders after partitioning the sample based upon whether the CEO's personal inside debt-equity ratio is less than or greater than the firm's external debt-equity ratio. In the former case,

shown in Panel B of Table 2, we find negative though insignificant bondholder returns upon the disclosure of the CEOs' relatively low inside debt positions. In the latter case, shown in Table C, we find positive and significant bondholder returns when high CEO inside debt holdings are disclosed. These results are in line with our expectations, although we do not find significant results in either subsample for returns to equityholders or to the firm overall.

B. Regression analysis of abnormal returns

Table 3 presents ordinary least squares regression estimates that explore the cross-sectional determinants of the cumulative abnormal returns for stocks, bonds, and firms overall, with the dependent variables defined as in Table 2 above. The main control variable in the regressions is the CEO's relative debt-equity ratio, equal to the CEO's personal inside debt-equity ratio divided by the firm's external debt-equity ratio. In the right half of the table, we use this variable in a piecewise specification, with the estimated slope allowed to vary above the below the critical value of 1.00, where the CEO's personal leverage just equals the firm's overall leverage. In the left half of the table, the variable enters the model with a single slope estimated over its entire range.

We include a variety of control variables in our regressions, because the compensation disclosures that we study occur in a lengthy document, the proxy statement for the annual shareholder meeting. Due to the comprehensive nature of shareholder proxy statements, it is possible that disclosures of CEOs' inside debt holdings might systematically occur in tandem with other types of important corporate governance revelations (Brickley, 1986). A very large number of event studies over the past 30 years have used proxy statement filing dates as the

basis for studying investor reactions to CEO pay, changes in the board of directors, shareholder resolutions, and numerous other topics. We therefore read each of the 244 proxy statements in our sample and identify those that report other events likely to be important to shareholders. After tabulating these data, we use nine indicator variables as controls in our regression in Table 3. These control variables include an indicator that equals one for 26 firms that nominate new independent directors (Rosenstein and Wyatt, 1990) and an additional indicator for three firms that disclose nominations of new grey directors who have conflicts of interest (Shivdasani and Yermack, 1999); an indicator for 27 firms that disclose personal aircraft use by the CEO as a perquisite, after never having made such disclosures in the past (Yermack, 2006); indicator variables for firms in which management proposes shareholder-friendly governance changes, including rescinding super-majority voting requirements (nine firms), introducing majority voting in director elections (12 firms), and declassifying a staggered board of directors (14 firms) (Faleye, 2007); and indicators for firms that receive shareholder resolutions related to the areas of executive compensation (49 firms), other corporate governance issues (62 firms), and social or environmental issues (42 firms) (Karpoff, Malatesta, and Walkling, 1996). Finally, we include two more control variables, an indicator for whether the firm's debt is rated as speculative grade (BB+ or below), and a further indicator for whether the firm operates primarily in the utility industry (SIC code 49), since a large number of these companies appear in our sample. We test the statistical significance of our estimates using robust standard errors, which are clustered at the firm level in the bond CAR regressions.

Estimates in the left half of Table 3 indicate that the abnormal two-day returns to bondholders are positively related to the relative debt-equity ratio of the CEO. This result is

consistent with our prediction, as it implies that revelations of CEOs holding large inside debt positions (those in the lower right region of Figure 3) are welcomed by bondholders, who expect these managers to pursue conservative, low-risk operating strategies. We also find negative but insignificant estimates for the abnormal returns to equityholders as a function of the CEO's relative debt-equity ratio, and significantly negative returns to the firm overall.

In the right half of Table 3, we seek more insight into these findings by decomposing the CEO's relative debt-equity ratio into two pieces, with the slope allowed to vary at the critical value of 1.00. We find a pattern of significant results for the upper range of the variable, when inside debt is high. When the CEO's personal inside leverage exceeds the firm's leverage, it exhibits a negative and significant association with stockholder abnormal returns and a positive and significant association with bondholder returns. For the firm overall, the abnormal returns are negatively and significantly related to the relative inside debt ratio of the CEO in its higher-valued region. Together, these results indicate that when large inside debt positions are disclosed, stock prices fall and bond prices rise, but the negative impact on equity value exceeds the positive gains to bondholders. In other words, a heavy reliance on inside debt compensation appears to reduce the overall value of the firm, apparently by providing incentives for overly conservative management.

Of the control variables, none of those displayed in Figure 3 has a significant estimate, and the large majority of the proxy statement indicator variables have insignificant estimates as well.

Table 4 presents an analysis of two-day CDS spread changes, in a regression format very similar to that used in Table 3. We use the unadjusted CDS spread as the dependent variable and

include the change in the Markit North American Investment Grade CDS Index as an explanatory variable. Results for CDS spreads in Table 4 are quite similar to those observed for corporate bond prices in Table 3. The change in CDS spreads is inversely related to the CEO's relative debt-equity ratio in the overall sample, and the effect is strongest for the subsample of firms for which the CEO's personal leverage exceeds the firm's external leverage. These results reinforce the findings in Table 3 and Figure 1, which suggest that public investors significantly revalue a firm's debt securities upon learning details of the managers' deferred compensation and related inside debt holdings.

We expect that all of our results should be strongest when a company's CEO is relatively young, for two reasons. First, most inside debt balances accrue mechanically with the passage of time, as an executive either acquires increased pension entitlements or earns interest on deferred compensation. Sundaram and Yermack (2007) show a strong correlation between CEO age and accumulated pension entitlements. Second, a younger CEO with incentives to pursue conservative investment policies will probably remain in the job for many more years than an older CEO, implying larger potential transfers of value over time from equityholders to debtholders.

We investigate the role of CEO age in regression analysis shown in Table 5. The regression model is identical to that used in the right half of Table 3, but the sample is partitioned into two groups, based upon whether the CEO is age 59 or less (170 firms), or age 60 or older (74 firms). We again focus on the CEO's relative debt-equity ratio as the main explanatory variable. As shown in table, we observe coefficient estimates of similar magnitude across the two subsamples, but only the estimates for the younger cohort have statistical

significance.

C. Changes in volatility for debt, equity, and the firm overall

We find a general pattern of gains to debtholders and losses to equityholders when firms disclose large inside debt holdings by their CEOs. These returns are consistent with investors expecting a more conservative, lower-risk operating strategy. In addition to the valuation changes we observe, these investor expectations should also imply lower dispersion in daily stock returns. We test this possibility by examining changes in security price volatility before and after the proxy statement filing date on which the CEO's inside debt holdings are first disclosed. Our approach is similar to that used in other papers that study volatility changes in order to infer differences in risk before and after certain events, such as the study of CEO turnover and equity volatility by Clayton, Hartzell, and Rosenberg (2005).

To study changes in volatility, we estimate the time series volatility of all stocks and bonds during the period 90 days prior to the proxy statement filing date, and again for the period 90 days after. For bonds, some of which have irregular trading histories, we require at least 60 days of trading data within each 90-day window in order for the security to be in the sample. After estimating the volatilities for each stock and bond in the sample, we calculate a volatility change ratio for each security by dividing its post-filing volatility into its pre-filing volatility and taking the natural log of this ratio. Finally, we estimate the asset volatility for the firm overall pre- and post-filing. Asset volatility cannot be observed directly, so we use the KMV method to

estimate it by a numerical iteration algorithm.[4] We then calculate a firm volatility change ratio that is analogous to the change ratios for debt and equity volatility. Regression analysis of these volatility change ratios appears in Table 6. The control variables, standard error calculations, and other aspects of the regressions are the same as used in the models of abnormal returns that appear above in Tables 3 and 4, except that we add an additional control variable to each regression, the contemporaneous volatility change ratio for either the equity or bond market index.

For both stocks and bonds, we find reduced volatility after those proxy statement filings that indicate large inside debt holdings by CEOs. In the left half of Table 6, we show negative and significant estimates for the relations between the relative debt-equity ratio of the CEO and the volatilities of debt, equity, and the overall firm. In the right half of the table, we again decompose the relative debt-equity ratio of the CEO into two segments, with the slope allowed to vary above and below the critical value of 1.00. We find that negative and significant relations between the CEO's personal leverage and security volatility changes are concentrated entirely in the segment that lies above 1.00 and implies large managerial inside debt holdings. In all three cases of debt volatility, equity volatility, and asset volatility, the estimated coefficients are stronger and have greater statistical significance in the top segment; all are estimated as positive but insigificant in the lower segment that lies below 1.00. These results show a consistent pattern, that investors react to large inside debt disclosures not only by revaluing debt

[4] The approach is very similar to that used in Sundaram and Yermack (2007). We assume that each firm has a default point equal to the face value of short-term debt plus half the face value of long-term debt. Equity is treated as a Black-Scholes call option on the assets of the firm, with maturity of one year and exercise price equal to the default point. Using the risk-free rate, the firm's market capitalization of equity, and its volatility of equity as additional inputs, it is straightforward to solve for the volatility of cash flows to the firm's assets.

and equity claims against the firm, but also by trading these claims in a pattern that exhibits lower price variability.

To refine our results, we examine changes in the implied volatility of exchange traded options that are associated with 178 of our sample firms. We obtain data from the OptionMetrics Ivy database, which features implied volatilities calculated in a Cox, Ross and Rubinstein (1979) binomial model adjusted for dividends. Some firms have large numbers of exchange traded options, and we impose a number of widely used sample restrictions. Patell and Wolfson (1981) note that several studies have found that implied volatility estimates behave erratically during the last two to four weeks before expiration, and also that options with a very long time to expiration are less sensitive to volatility changes. We therefore study only those options with expiration dates between 28 and 100 days away from the event day, with the latter criteria due to Deng and Julio (2005), and we require each option to have non-zero trading volume between the proxy statement filing day and the end of the event window. We calculate weighted average implied volatilities at the firm level, using each option's vega as the weight (Latané and Rendleman, 1976). We then compute our variable for analysis, which equals the log of the ratio of implied volatility measured two days after the proxy statement filing date, divided by the implied volatility measured one day before the filing.

Table 7 presents our regression analysis of changes in implied volatility. Results are quite similar to the changes in the volatility of equity securities displayed in Table 6. We find that the implied volatility of exchange traded options is reduced as a function of the CEO's personal debt-equity ratio, with the effect concentrated among the subsample of firms in which the CEO's relative debt-equity ratio exceeds 1.00. While the changes in equity volatility shown in Table 6 are computed over 90-day event windows, the analysis in Table 7 shows that the volatility change in concentrated in a very narrow period, from just one day before to two days after the proxy statement filing. We examine results for other windows in the vicinity of the event date and found the strongest volatility changes over the (t-1, t+2)

four-day period.

IV. Conclusions

In this paper we examine the impact of companies' first required disclosures of their CEOs' deferred compensation and other inside debt holdings in early 2007. Although pensions and deferred compensation represent important aspects of executive compensation, very little information was available about them prior to the SEC's expansion of disclosure requirements at the end of 2006.

We find that investors react significantly when a company reports that the CEO holds a large amount of inside debt relative to his equity investment in the firm. Under these conditions, equity prices tend to fall while debt values tend to rise. The net effect appears to destroy enterprise value for these firms overall, as the gains to bondholders appear to be more than offset by losses to stockholders. These valuation changes appear to persist in corporate bond prices for many months after the disclosure date. In addition to the valuation effects that we observe, we find that the volatility of both stocks and bonds falls when large CEO inside debt positions are revealed.

References

Andrews, Angela B., Scott C. Linn, and Han Yi, 2009, Corporate governance and executive perquisites: Evidence from the New SEC Disclosure Rules, unpublished manuscript, University of Oklahoma.

Bessembinder, Hendrik, Kathleen M. Kahle, William F. Maxwell, and Danielle Xu, 2008, Measuring abnormal bond performance, Review of Financial Studies, forthcoming.

Brickley, James A., 1986, Interpreting common stock returns around proxy statement disclosures and annual shareholder meetings, Journal of Financial and Quantitative Analysis 21, 343-349.

Cadman, Brian, Mary Ellen Carter, and Stephen Hillegeist, 2009, The incentives of compensation consultants and CEO pay, unpublished manuscript, University of Utah.

Cadman, Brian, Mary Ellen Carter, and Katerina Semida, 2009, Compensation peer groups and their relation with CEO compensation, unpublished manuscript, University of Utah.

Clayton, Matthew C., Jay C. Hartzell, and Joshua Rosenberg, 2005, The impact of CEO turnover on equity volatility, Journal of Business 78, 1779-1797.

Cox, John C., Stephen A. Ross, and Mark Rubinstein, 1979, Option pricing: A simplified approach," Journal of Financial Economics 7, 229-264.

Cremers, K. J. Martijn, Vinay B. Nair, and Chenyang Wei, 2007, Governance mechanisms and bond prices, Review of Financial Studies 20, 1359-1388.

DeFusco, Richard A., Robert R. Johnson, and Thomas S. Zorn, 1990, The effect of executive stock option plans on stockholders and bondholders, Journal of Finance 45, 617-627.

Deng, Qian, and Brandon Julio, 2005, The informational content of implied volatility around stock splits, unpublished manuscript, University of Illinois.

Edmans, Alex, and Qi Liu, 2009, Inside debt, unpublished manuscript, University of Pennsylvania.

Faleye, Olubunmi, 2007, Classified boards, firm value, and managerial entrenchment, Journal of Financial Economics 83, 501-529.

Faulkender, Michael, and Jun Yang, 2008, Inside the black box: The role and composition of compensation peer groups, unpublished manuscript, University of Maryland.

Gerakos, Joseph, 2007, CEO pensions: Disclosure, managerial power, and optimal contracting, unpublished manuscript, University of Pennsylvania.

Grinstein, Yaniv, David Weinbaum, and Nir Yehuda, 2008, Perks and Excess: Evidence from the New Executive Compensation Disclosure Rules, unpublished manuscript, Cornell University.

Imbierowicz, Bjorn, and Mark Wahrenburg, 2009, Credit rating announcements: The impact of the agency's reason, public information, and M&A, unpublished manuscript, Goethe University Frankfurt.

Jensen, Michael C., and William H. Meckling, 1976, Theory of the firm: Managerial behavior, agency cost, and ownership structure, Journal of Financial Economics 3, 305-360.

Jorion, Philippe, and Gaiyan Zhang, 2007, Good and bad credit contagion: Evidence from credit default swaps, Journal of Financial Economics 84, 860-883.

Karpoff, Jonathan M., Paul H. Malatesta, and Ralph A. Walkling, 1996, Corporate governance and shareholder initiatives: Empirical evidence, Journal of Financial Economics 42, 365-395.

Latané, Henry A., and Richard J. Rendleman Jr., 1976, Standard deviations of stock price ratios implied in option prices, Journal of Finance 31, 369-381.

Murphy, Kevin J., and Tatiana Sandino, 2010, Executive pay and 'independent' compensation consultants, Journal of Accounting and Economics 49, 247-262.

Patell, James M., and Mark A. Wolfson, 1981, The ex ante and ex post price effects of quarterly earnings announcements reflected in option and stock prices, Journal of Accounting Research 19, 434-458.

Rosenstein, Stuart, and Jeffrey G. Wyatt, 1990, Outside directors, board independence, and shareholder wealth, Journal of Financial Economics 26, 175-191.

Shivdasani, Anil, and David Yermack, 1999, CEO involvement in the selection of new board members: An empirical analysis, Journal of Finance 54, 1829-1853.

Sundaram, Rangarajam, and David Yermack, 2007, Pay me later: Inside debt and its role in managerial compensation, Journal of Finance 62, 1551-1588.

Yermack, David, 2006, Flights of fancy: Corporate jets, CEO perquisites, and inferior shareholder returns, Journal of Financial Economics 80, 211-242.

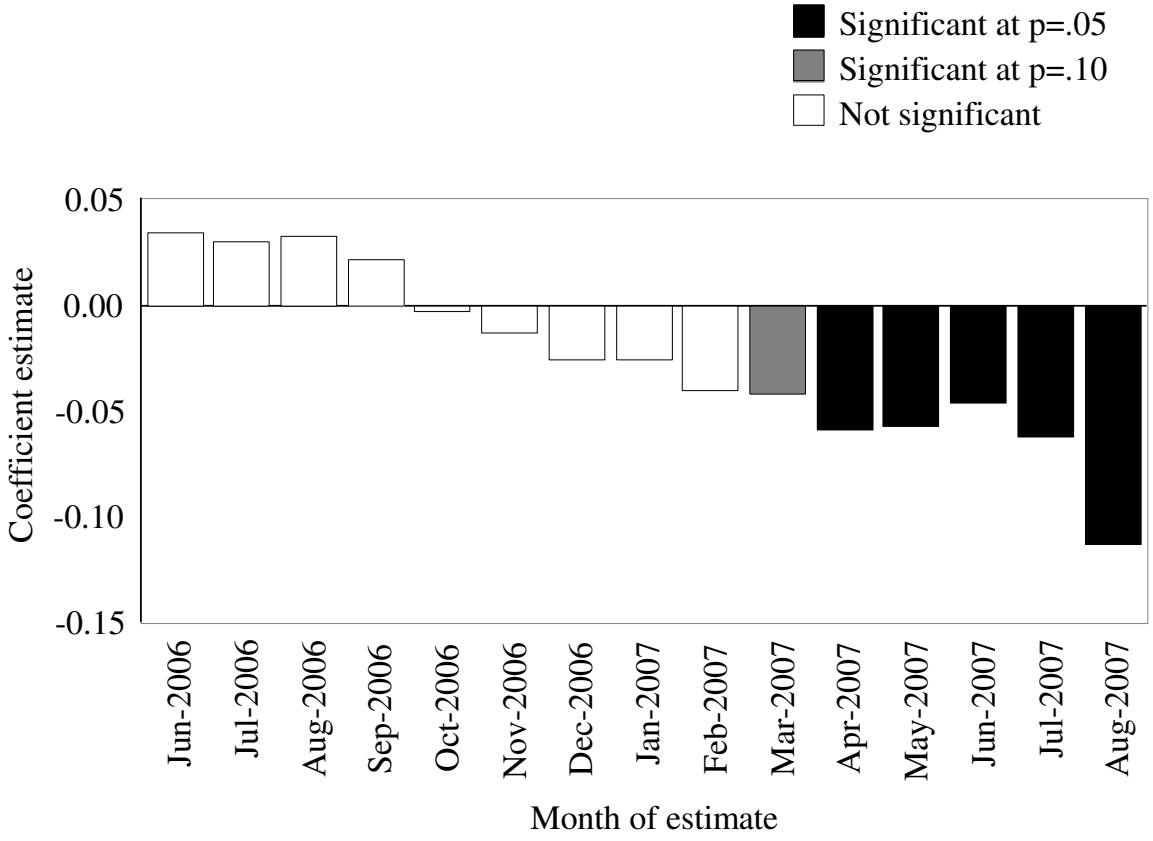

Figure 1
Influence of CEO's debt-equity ratio on corporate bond yield spreads

The figure shows monthly ordinary least squares regression coefficient estimates for the association between a CEO's debt-equity ratio and the yield to maturity of a firm's corporate bonds, measured as the spread above the yield of a U.S. Treasury bond of equal maturity at month-end. Regressions are estimated for a sample of 911 bonds issued by 244 firms, although not all observations appear in each month's sample. The CEO's debt-equity ratio equals the present value of his pension plus deferred compensation claims against his firm, divided by the value of his stock and stock option ownership. The regression uses a piecewise linear specification for this variable, with the slope permitted to change above and below the value of 1. The coefficients displayed in the graph are for the segment above 1. Pension and deferred compensation values are reported by firms in their annual proxy statements filed mostly in March 2007, and stock option values are calculated using the Black-Scholes method from data reported in the same filings. Other control variables in each regression include firm leverage, firm size (log of assets), return on assets, interest coverage, equity volatility, bond time to maturity, bond coupon rate, the amount of the bond issue outstanding, and indicator variables for secured status, callable status, and credit ratings A, Baa, Ba, B, and Ca and lower. Significance levels are determined by robust standard errors clustered by issuing firm. The R^2 goodness-of-fit measures range from .73 to .80 across the 15 months shown.

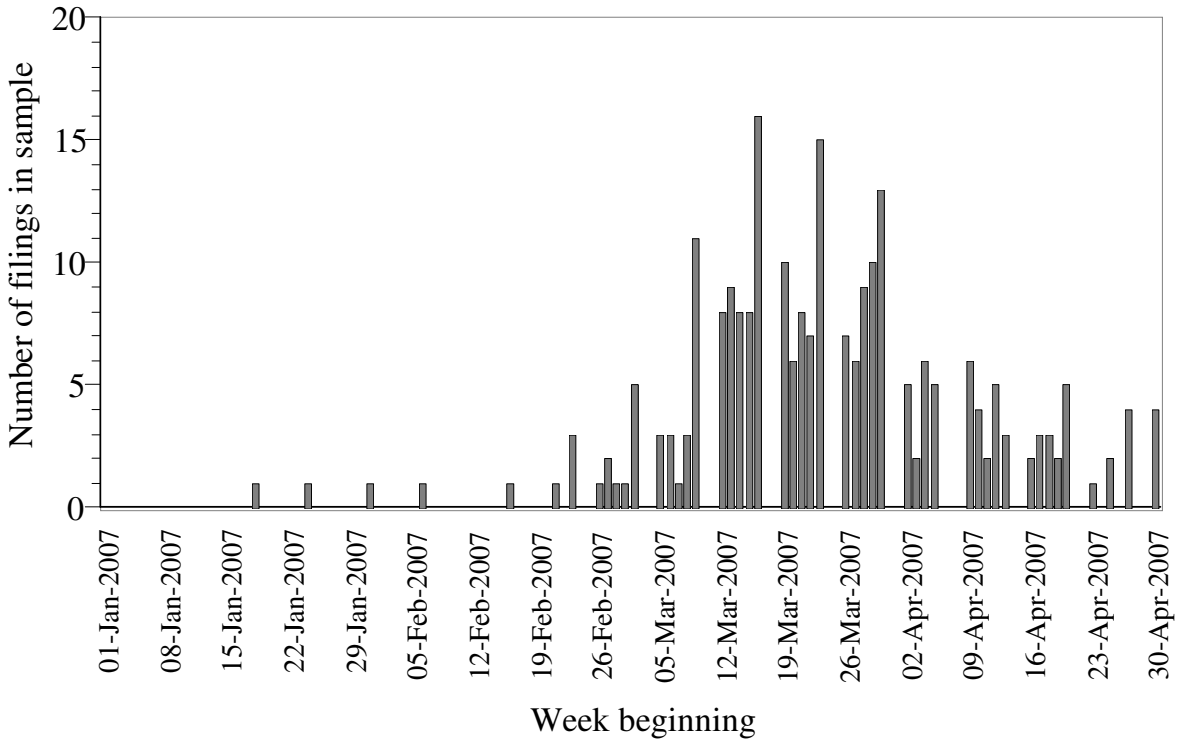

Figure 2
Event dates of sample companies

The chart shows the dates on which proxy statements were filed with the Securities and Exchange Commission by 244 firms whose CEOs held nonzero inside debt in their firms at the end of 2006. The sample includes all Compustat firms with sufficient data available about management compensation and outstanding bond issues. Of the 244 firms, 221 made their disclosures in definitive proxy statements filed beginning February 23, 2007, while the remaining 23 firms made their disclosures in preliminary proxy statements filed as early as January 18, 2007.

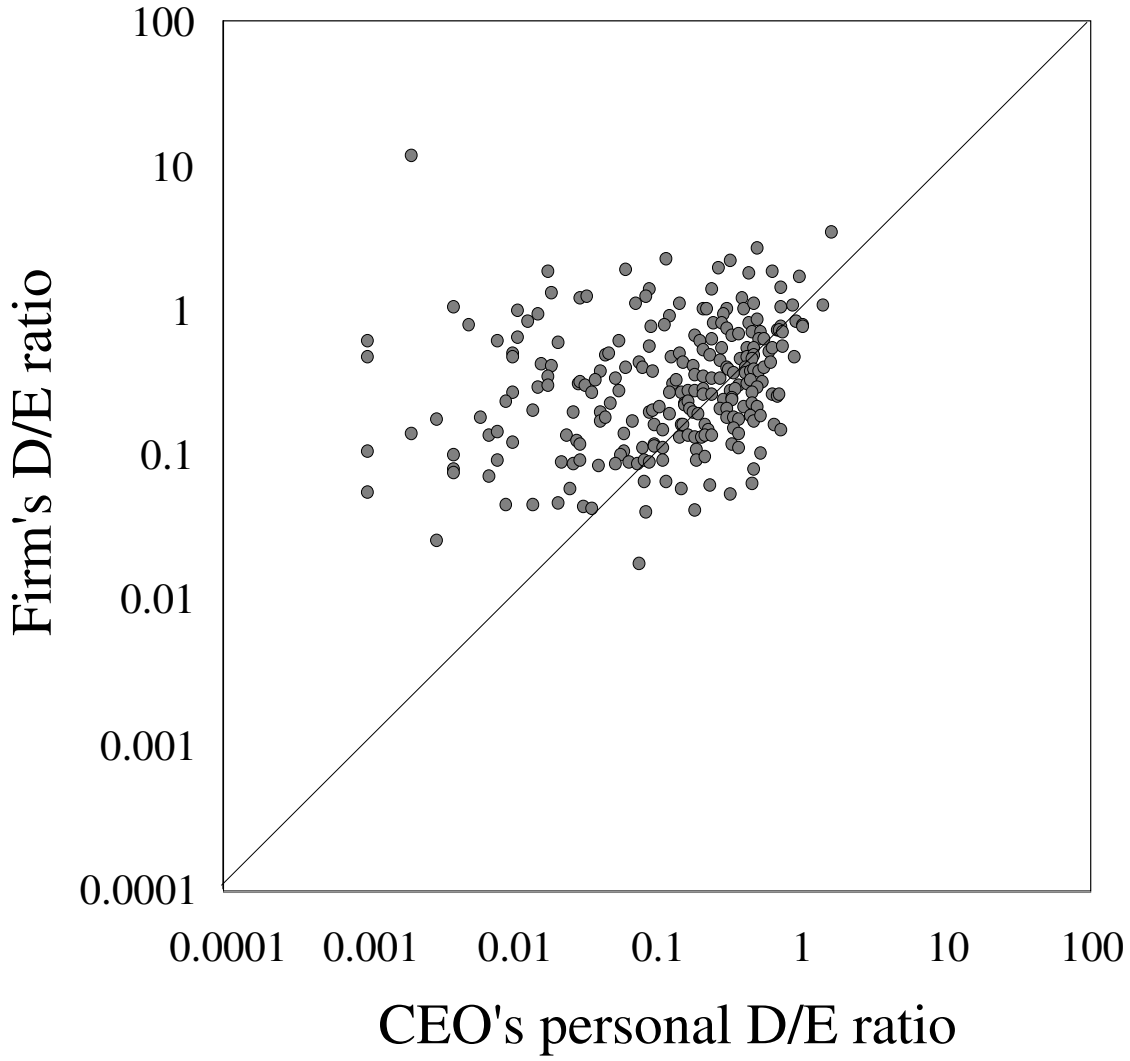

Figure 3
Firm leverage and CEO personal leverage

The figure shows a scatter plot of the CEO's personal leverage on the x-axis and the firm's external leverage on the y-axis. The sample includes 244 observations for firms that reported executive compensation data in proxy statements filed in the spring of 2007. The CEO's personal leverage equals the value of inside debt claims (pension and deferred compensation) divided by the value of equity ownership (shares and stock options). The firm's leverage equals the book value of total debt divided by the market capitalization of common stock. The value of the CEO's inside debt position is reported in proxy statement filings, while the value of CEO stock option holdings is based upon Black-Scholes calculations using characteristics of individual option holdings as disclosed in proxy statements.

Table 1
Descriptive Statistics

Descriptive statistics for a sample of 244 firms with 1,010 identified public debt issues outstanding at the end of 2006, in which the CEO holds a nonzero amount of inside debt. The sample includes all Compustat firms with December fiscal year-ends and bond data available on the Moody's Rating Database and the Mergent Fixed Investment Security Database. All dollar values are in millions. CEO compensation data is based upon information disclosed in proxy statements filed early in 2007, with option values based upon Black-Scholes estimates using data for each individual option tranche outstanding. The CEO's debt equity ratio equals the value of inside debt (pension + deferred compensation) divided by the value of inside equity (stock + options). Leverage equals total debt (book value) over total assets. Return on assets equals EBITDA over total assets. Equity volatility is calculated from daily return data over the 180 days prior to the proxy statement filing date. Bond volatility is calculated from daily return data over the 90 days prior to the filing date. The investment grade indicators for each bond and each firm equal 1 based the Standard & Poor's rating is BB+ or higher as of the proxy statement filing day. Each bond's time to maturity as measured at the end of March 2007.

CEO characteristics	**N**	**Mean**	**Std.Dev.**	**25th %ile**	**Median**	**75th %ile**
Age	244	56.5	5.6	53	57	60
Years as CEO	229	5.0	6.0	1	3	7
Pension indicator	244	0.84	0.37	1	1	1
Deferred comp. indicator	244	0.82	0.39	1	1	1
Pension value	244	$5.3	$7.4	$0.2	$2.7	$7.6
Deferred comp. value	244	$4.6	$12.2	$0.1	$1.1	$3.9
Total inside debt	244	$9.9	$15.2	$2.0	$5.2	$11.0
Stock value	244	$28.2	$51.1	$4.0	$10.5	$28.5
Option and restricted share value	244	$82.3	$340.8	$7.4	$15.8	$37.9
Total equity	244	$110.5	$365.5	$15.0	$35.0	$70.4
CEO debt-equity ratio	244	0.25	0.26	0.04	0.17	0.38
CEO debt-equity ratio ÷ firm debt-equity ratio	244	0.86	1.07	0.15	0.55	1.16

Firm characteristics	**N**	**Mean**	**Std.Dev.**	**25th %ile**	**Median**	**75th %ile**
Total assets	244	$22,648	$56,463	$3,883	$8,510	$22,052
Net sales	244	$16,008	$33,398	$3,012	$6,507	$14,653
Return on assets	244	0.142	0.070	0.097	0.128	0.171
R&D / sales	244	0.021	0.062	0	0	0.018
PPE / total assets	244	0.380	0.242	0.161	0.339	0.572
Leverage	244	0.200	0.119	0.109	0.166	0.283
Market capitalization	244	$19,948	$39,555	$3,188	$7,670	$17,805
Equity volatility	244	0.242	0.095	0.171	0.227	0.287
Investment grade indicator	244	0.76	0.43	1	1	1

Bond characteristics		**Mean**	**Std.Dev.**	**25th %ile**	**Median**	**75th %ile**
Amount outstanding	1,010	$377	$427	$150	$250	$450
Coupon rate (%)	1,005	6.65	1.44	5.75	6.68	7.50
Time to maturity (years)	1,010	12.9	13.8	5	8	20
Investment grade indicator	1,010	0.82	0.39	1	1	1
Callable indicator	1,010	0.71	0.45	0	1	1
Senior indicator	1,010	0.90	0.30	1	1	1
Senior secured indicator	1,010	0.08	0.27	0	0	0
Bond volatility	1,010	0.062	0.028	0.044	0.062	0.079

Table 2
Abnormal Returns Around Dates of Inside Debt Disclosures

Cumulative abnormal returns to securities associated with 244 firms upon disclosures of their CEOs' inside debt holdings in proxy statements filed in early 2007. The sample includes all Compustat firms with December fiscal year-ends and bond data available on the Moody's Rating Database and the Mergent Fixed Investment Security Database. All cumulative abnormal returns are calculated over a two-day window that includes the proxy filing date and the subsequent date. Equity abnormal returns are calculated using the Fama-French-Carhart four-factor model with the S&P 500 index as the market index. Bond abnormal returns are based upon a two-factor model using the Citigroup Investment-Grade and Speculative-Grade corporate bond indexes. The Firm abnormal return is based upon a weighted average of the returns to each firm's equity and debt securities, with the weights equal to the market value of the amount outstanding for each traded security and the book value of non-traded debt. We assume that the abnormal return to non-traded debt is zero. The CDS spread change, market adjusted, equals the two-day change in the spread of credit default swaps for a firm's five-year senior unsecured debt, normalized by the change in the Markit North American investment grade CDS index. Panel A shows results for the entire sample. Panel B shows results for the subsample of CEOs whose personal debt-equity ratio is below the debt-equity ratio of the firm's capital structure. The CEO's debt-equity ratio equals the present value of his pension plus deferred compensation claims against his firm, divided by the value of his stock and stock option ownership. Panel C shows results for the subsample of all other observations.

Panel A: All observations

Variable	Securities	Firms	Mean	*t*-statistic
Equity CAR (0, 1)	244	244	0.099%	0.71
Bond CAR (0, 1)	1,010	244	0.000%	0.01
Firm CAR (0, 1)		244	0.065%	0.71
CDS spread change, market adjusted (0, 1)		195	0.005%	0.40

Panel B: CEO relative leverage <=1

Variable	Securities	Firms	Mean	*t*-statistic
Equity CAR (0, 1)	174	174	0.114%	0.62
Bond CAR (0, 1)	738	174	-0.008%	-0.99
Firm CAR (0, 1)		174	0.079%	0.69
CDS spread change, market adjusted (0, 1)		144	0.004%	0.22

Panel C: CEO relative leverage >1

Variable	Securities	Firms	Mean	*t*-statistic
Equity CAR (0, 1)	70	70	0.062%	0.36
Bond CAR (0, 1)	272	70	0.023%	3.36
Firm CAR (0, 1)		70	0.031%	0.22
CDS spread change, market adjusted (0, 1)		51	0.009%	1.36

Table 3
Regression Estimates of Cumulative Abnormal Returns
Ordinary least squares regression estimates of the cumulative abnormal returns to investors in 244 firms around the dates of proxy statement filings in early 2007. The Equity CAR is the cumulative abnormal stock return estimated from the market model. The Bond CAR is the cumulative abnormal return to holders of 1,010 publicly traded bonds, also estimated from the market model. The Firm CAR is a weighted average of the Equity and Bond CARs calculated using assumptions given in the text. All CARs are estimated over a two-day interval including the event day and subsequent trading day. The CEO's debt-equity ratio is the value of the CEO's inside debt holdings (pension plus deferred compensation) divided by the value of his inside equity holdings (stock plus stock options). The relative CEO debt-equity ratio is the CEO's debt-equity ratio divided by the firm's external debt-equity ratio. The estimate for this variable is disaggregated into two components based upon whether the ratio is greater than or less than 1. The speculative grade rating indicator equals 1 if a bond is rated BB+ or lower for the debt regressions, and if the firm's S&P long-term debt rating is BB+ or lower for the equity and firm regressions. The nine proxy statement control variables are dummy variables that equal 1 when certain corporate governance events, described more fully in the text, are reported in the proxy statement used in the analysis. Huber-White robust *t*-statistics appear in parentheses below each estimate.

Dependent variable: Cumulative abnormal return $_{t(0, 1)}$	Equity CAR	Bond CAR	Firm CAR	Equity CAR	Bond CAR	Firm CAR
Intercept	0.00386	-0.00018	0.00273	0.00177	-0.00022	0.00139
	(1.33)	(1.20)	(1.37)	(0.42)	(1.29)	(0.50)
Relative CEO debt-equity ratio	-0.00147	0.00021 [a]	-0.00137 [c]			
	(1.52)	(3.33)	(1.92)			
Relative CEO debt-equity ratio up to 1.00				0.000325	0.00032	0.00166
				(0.66)	(1.38)	(0.51)
Relative CEO debt-equity ratio above 1.00				-0.00301 [a]	0.00017 [b]	-0.00236 [a]
				(2.83)	(2.28)	(2.81)
Speculative grade rating indicator	0.00040	0.00011	-0.00004	0.00100	0.00013	0.00035
	(0.09)	(0.41)	(0.01)	(0.22)	(0.46)	(0.13)
Utility industry indicator	0.00123	0.00024	0.00076	0.00039	0.00022	0.00022
	(0.46)	(1.06)	(0.42)	(0.15)	(0.96)	(0.12)
Observations	244	1,010	244	244	1,010	244
Adjusted R^2	0.06	0.02	0.06	0.06	0.02	0.06
Proxy statement control variables (9)	No	No	No	Yes	Yes	Yes
Issuer-level clustering (244 firms)	n.a.	Yes	n.a.	n.a.	Yes	n.a.

Significant at 1% (a), 5% (b), and 10% (c) levels.

Table 4
Regression Estimates of Changes in Credit Default Swap Spreads
Ordinary least squares regression estimates of the two-day change in credit default swap spreads for 195 firms around the dates of proxy statement filings in early 2007. Spread data are obtained from Markit CDS Pricing, and the table uses data for five-year senior unsecured debt. The CEO's debt-equity ratio is the value of the CEO's inside debt holdings (pension plus deferred compensation) divided by the value of his inside equity holdings (stock plus stock options). The relative CEO debt-equity ratio is the CEO's debt-equity ratio divided by the firm's external debt-equity ratio. The estimate for this variable is disaggregated into two components based upon whether the ratio is greater than or less than 1. The Markit Spread is the value of the Markit North American investment grade CDS index for five-year maturities. The speculative grade rating indicator equals 1 if a bond is rated BB+ or lower for the debt regressions, and if the firm's S&P long-term debt rating is BB+ or lower for the equity and firm regressions. The nine proxy statement control variables are dummy variables that equal 1 when certain corporate governance events, described more fully in the text, are reported in the proxy statement used in the analysis. Huber-White robust *t*-statistics appear in parentheses below each estimate.

Dependent variable: Log (CDS Spread $_{t-1}$ / CDS Spread $_{t+1}$)		
Intercept	0.009	0.006
	(1.09)	(0.64)
Relative CEO debt-equity ratio	-0.006 [b]	
	(2.01)	
Relative CEO debt-equity ratio up to 1.00		0.0001
		(0.01)
Relative CEO debt-equity ratio above 1.00		-0.009 [c]
		(1.97)
Log (Markit Spread $_{t-1}$ / Markit Spread $_{t+1}$)	0.293 [b]	0.289 [b]
	(2.17)	(2.12)
Speculative grade rating indicator	-0.022 [b]	-0.022 [b]
	(2.50)	(2.36)
Utility industry indicator	0.029	0.028
	(0.90)	(0.88)
Observations	195	195
Adjusted R^2	0.080	0.080
Proxy statement control variables (9)	Yes	Yes
Robust standard errors	Yes	Yes

Significant at 1% (a), 5% (b), and 10% (c) levels.

Table 5

Regression Estimates of Cumulative Abnormal Returns By CEO Age

Ordinary least squares regression estimates of the cumulative abnormal returns to investors in 244 firms around the dates of proxy statement filings in early 2007. Model specifications are identical to those used in the right half of Table 3, with the sample partitioned into subsamples based on CEO age. Huber-White robust *t*-statistics appear in parentheses below each estimate.

Subsample:	CEO age < 60			CEO age ≥ 60		
Dependent variable:	Equity CAR	Bond CAR	Firm CAR	Equity CAR	Bond CAR	Firm CAR
Intercept	0.00757 [a]	-0.00018	0.00564 [b]	0.00836	-0.00025	-0.00609
	(2.43)	(0.88)	(2.37)	(0.81)	(0.88)	(0.92)
Relative CEO debt-equity ratio up to 1.00	-0.00394	0.00028	-0.00354	0.01497	-0.00003	0.01021
	(0.94)	(1.03)	(1.15)	(1.32)	(0.08)	(1.44)
Relative CEO debt-equity ratio above 1.00	-0.00255 [b]	0.00016 [b]	-0.00204 [a]	-0.00369	0.00004	-0.00300
	(2.56)	(2.16)	(2.57)	(1.13)	(1.54)	(1.18)
Speculative grade rating indicator	-0.00246	0.00038	-0.00127	0.00878	-0.00042	0.00414
	(0.56)	(0.97)	(0.47)	(0.81)	(1.11)	(0.65)
Utility industry indicator	0.00023	-0.00008	0.00007	0.00253	0.00090 [a]	0.00215
	(0.07)	(0.29)	(0.03)	(0.39)	(2.76)	(0.56)
Observations	170	713	170	74	297	74
Adjusted R^2	0.10	0.03	0.10	0.12	0.08	0.12
Proxy statement control variables (9)	Yes	Yes	Yes	Yes	Yes	Yes
Issuer-level clustering	n.a.	Yes	n.a.	n.a.	Yes	n.a.

Significant at 1% (a), 5% (b), and 10% (c) levels.

Table 6
Regression Estimates of Changes in Volatility
Ordinary least squares regression estimates of the changes in volatility around the dates of proxy statement filings for securities issued by 244 firms in early 2007. All volatility changes equal the log of the ratio of volatility estimated over the 90-day period after the filing date, divided by the volatility measured in the 90 prior to the filing date. Asset volatility is determined in the KMV framework using numerical solutions. The CEO's debt-equity ratio is the value of the CEO's inside debt holdings (pension plus deferred compensation) divided by the value of his inside equity holdings (stock plus stock options). The relative CEO debt-equity ratio is the CEO's debt-equity ratio divided by the firm's external debt-equity ratio. The estimate for this variable is disaggregated into two components based upon whether the ratio is greater than or less than 1. The speculative grade rating indicator equals 1 if a bond is rated BB+ or lower for the debt regressions, and if the firm's S&P long-term debt rating is BB+ or lower for the equity and firm regressions. The nine proxy statement control variables are dummy variables that equal 1 when certain corporate governance events, described more fully in the text, are reported in the proxy statement used in the analysis. Huber-White robust *t*-statistics appear in parentheses below each estimate.

Dependent variable: log (Volatility $_{[t+1, t+90]}$ / Volatility $_{[t-90, t-1]}$)	Equity volatility change	Bond volatility change	Asset volatility change	Equity volatility change	Bond volatility change	Asset volatility change
Intercept	0.066 [a]	-0.147	0.061 [b]	0.027	-0.184	0.026
	(2.12)	(1.15)	(1.97)	(0.68)	(1.58)	(0.65)
Relative CEO debt-equity ratio	-0.010	-0.053 [c]	-0.009			
	(0.72)	(1.93)	(0.63)			
Relative CEO debt-equity ratio up to 1.00				0.076	0.022	0.070
				(1.50)	(0.24)	(1.38)
Relative CEO debt-equity ratio above 1.00				-0.037 [b]	-0.086 [b]	-0.034 [b]
				(2.38)	(2.04)	(2.17)
CRSP equal-weighted market index volatility change	0.537 [a]		0.428 [a]	0.576 [a]		0.463 [a]
	(4.28)		(3.46)	(4.64)		(3.82)
Merrill Lynch corporate bond index volatility change		1.207			1.235	
		(1.31)			(1.37)	
Speculative grade rating indicator	0.093 [b]	-0.107	0.048	0.104 [b]	-0.098	0.058
	(2.03)	(0.59)	(1.07)	(2.22)	(0.55)	(1.27)
Utility industry indicator	0.277 [a]	-0.055	0.220	0.212 [a]	-0.067	0.206 [a]
	(5.27)	(0.58)	(5.25)	(4.87)	(0.75)	(4.89)
Observations	244	1,010	244	244	1,010	244
Adjusted R^2	0.25	0.01	0.22	0.26	0.01	0.22
Proxy statement control variables (9)	No	No	No	Yes	Yes	Yes
Issuer-level clustering (244 firms)	n.a.	Yes	n.a.	n.a.	Yes	n.a.

Significant at 1% (a), 5% (b), and 10% (c) levels.

Table 7

Regression Estimates of Changes in Implied Volatility

Ordinary least squares regression estimates of changes in implied volatility of exchange traded options around dates of proxy statement filings by 178 firms in early 2007. The dependent variable is the log of the ratio of implied volatility two days after the filing, divided by implied volatility one day before the filing. Implied volatility is measured at the firm level, as the weighted-average implied volatility of all exchange-traded options with maturities between 28 and 100 days. We include all options with non-zero trading volume during the event window and use vega as the weight for each option. The CEO's debt-equity ratio is the value of the CEO's inside debt holdings (pension plus deferred compensation) divided by the value of his inside equity holdings (stock plus stock options). The relative CEO debt-equity ratio is the CEO's debt-equity ratio divided by the firm's external debt-equity ratio. The estimate for this variable is disaggregated into two components based upon whether the ratio is greater than or less than 1. VIX is the level of the Chicago Board Options Exchange volatility index. The speculative grade rating indicator equals 1 if a bond is rated BB+ or lower for the debt regressions, and if the firm's S&P long-term debt rating is BB+ or lower for the equity and firm regressions. The nine proxy statement control variables are dummy variables that equal 1 when certain corporate governance events, described more fully in the text, are reported in the proxy statement used in the analysis. Huber-White robust *t*-statistics appear in parentheses below each estimate.

Dependent variable: log (Implied Volatility $_{t+2}$ /Implied Volatility $_{t-1}$)	Put options	Put options	Call options	Call options
Intercept	0.002	-0.007	-0.009	-0.028 [c]
	(0.14)	(0.39)	(0.75)	(1.69)
Relative CEO debt-equity ratio	-0.014 [c]		-0.015	
	(1.91)		(1.45)	
Relative CEO debt-equity ratio up to 1.00		0.005		0.027
		(0.20)		(1.22)
Relative CEO debt-equity ratio above 1.00		-0.020 [c]		-0.028 [c]
		(1.84)		(1.77)
Log (VIX $_{t+2}$ /VIX $_{t-1}$)	0.358 [a]	0.362 [a]	0.295 [a]	0.303 [a]
	(4.75)	(4.80)	(4.44)	(4.52)
Speculative grade rating indicator	-0.055 [b]	-0.053 [b]	-0.002	0.003
	(2.39)	(2.24)	(0.08)	(0.15)
Utility industry indicator	-0.014	-0.015	0.002	-0.005
	(0.71)	(0.77)	(0.12)	(0.27)
Number of firm-observations	178	178	178	178
Adjusted R^2	0.12	0.12	0.20	0.20
Proxy statement control variables (9)	Yes	Yes	Yes	Yes

Significant at 1% (a), 5% (b), and 10% (c) levels.