

Are Banks Happy When Managers Go Long?
The Information Content of
Managers' Vested Option Holdings for Loan Pricing

ABSTRACT

While traditional finance theory holds that managers with option-laden incentive contracts may favor equity at the expense of debt, a risk-averse manager may be more likely to retain vested in-the-money options if the manager has private information that the firm's risk-adjusted performance will be better. It follows that vested option holdings should be positively associated with credit quality. In support of this, we find that vested option holdings have a strong negative association with loan pricing, especially for informationally sensitive loans, and also predict higher cash flows and credit ratings, a greater distance to default, and lower equity volatility.

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A fundamental challenge faced by lenders is to determine the credit quality of a loan and price credit accordingly. In that connection, a growing literature has documented how loan pricing varies not only in relation to “hard” information about borrowing firms such as historical cash flows and the collateralizability of assets, but also with loan terms and conditions (Dennis, Nandy, and Sharpe, 2000; Bradley and Roberts, 2004; Demiroglu and James, 2007), the borrower-lender relationship (Degryse and Ongena, 2006; Schenone, 2010; Bharath, Dahiya, Saunders, and Srinivasan, 2011), the syndication process (Carey and Nini, 2007; Ivashina, 2009; Ivashina and Sun, 2011), and the market power of the lender (Ross, 2010).

The literature has paid less attention, however, to those who would be expected to have the most accurate information about a borrowing firm’s business prospects and the greatest influence on a firm’s actions, namely a firm’s senior managers. This is surprising given that the impact of top management on firm behavior and performance has been well established in economics, finance, and strategic management (e.g., Bertrand and Schoar, 2003; Huson, Malatesta, and Parrino, 2004; Finkelstein, Hambrick, and Cannella Jr., 2009), and that senior managers would seem to be the source of much “soft” private information about a firm through their interaction with a lender’s loan officers. We address this gap in the literature by investigating the proposition that managers’ holdings of vested in-the-money options provide a signal of managers’ private information and that this signal is relevant for credit quality.

Intuitively and in accordance with a “traditional view” in financial economics, managers who retain vested in-the-money options may have private information that the firm’s future performance will be *riskier*, raising the option value of the managers’

highly-levered long position (e.g., Jensen and Meckling, 1976; John and John, 1993; Parrino and Weisbach, 1999) but lowering the firm's creditworthiness. A natural hypothesis is then that vested option holdings (in relation to personal wealth) should be *positively* associated with loan pricing. In contrast, an emergent view in financial economics argues that the relationship between the convexity of a manager's compensation profile and risk-seeking may not be monotonic (Lambert, Larcker, and Verrecchia, 1991; Carpenter, 2000; Ross, 2004). In particular, a *risk-averse* manager may be more willing to retain vested in-the-money options when the manager has private information that the firm's expected performance will be better (i.e., generate higher cash flows) and less risky, since, holding expected performance constant, lower risk reduces the probability that the options will lose their intrinsic value. Thus, an alternative hypothesis is that vested option holdings (in relation to personal wealth) should be *negatively* associated with loan pricing.

In this paper, we find robust evidence in support of the alternative hypothesis. In particular, we document that vested option holdings are negatively associated with loan pricing, even when we account for unobservable firm and manager characteristics. The negative association is also robust to controls for recent stock price changes, managerial tenure, and managers' holdings of other equity investments and inside debt. Moreover, the negative association is stronger for more informationally sensitive loans, in which context one would expect signals of managers' private information to be more useful for lenders. Specifically, we find that the negative association is stronger if the loan is made (a) for purposes other than commercial paper backup, (b) to "junk" rather than to investment grade firms, (c) to generally lower quality firms (as measured by Tobin's Q),

and (d) to firms whose distance to default is lower. We also find that vested option holdings predict higher credit quality using three measures – cash flows, long-term credit ratings, and distance to default – and lower equity volatility using three measures – total volatility, volatility adjusted for characteristics, and idiosyncratic volatility. Taken together, these results suggest that managers’ vested option holdings have information content for credit quality by signaling not only higher cash flows but also lower risk in firm performance.

There is mixed evidence on the information content of managers’ option holdings for the public equity markets. Carpenter and Remmers (2001) find no evidence of long-term abnormal returns following option exercises by managers. By contrast, Huddart and Lang (2003) and Aboody, Hughes, Liu, and Su (2008) present evidence that managers retain rather than exercise their options when they have positive private information, and Bartov and Mohanram (2004) find that abnormally large option exercises predict disappointing earnings performance.¹ Unlike these event studies, we study managers’ option holdings relative to their personal wealth as a signal of their firms’ credit quality.

Studies on the relationship between managers’ option holdings and the pricing of public debt have also produced contrasting results. Bagnani, Milonas, Saunders, and Travlos (1994) find that bond yields are higher if an issuing firm’s officers and directors

¹ Aboody et al. (2008) also find that there is information content in how long managers’ retain their underlying shares after option exercise and that the length of this period is positively associated with dividend yield. It is well known that it may be optimal to exercise deep-in-the-money call options early on dividend paying stocks. While we cannot precisely control for these factors, we do control for recent stock price changes and unobservable firm (and manager) heterogeneity. To the extent that these controls do not fully account for optimal dividend capture or other factors influencing how quickly managers monetize the shares they acquire upon option exercise, our econometric tests should be biased *against* finding evidence that managers’ option holdings have information content for credit quality. Generally speaking, moreover, options are exercised for cash; for example, Heath, Huddart, and Lang (1999) find that 90% of the option exercises in their sample were converted directly into cash.

own 5 to 25 percent of the firm's shares and options. Similarly, Ortiz-Molina (2006) observes a positive relationship between at-issue yield spreads in the public debt markets and the percentage of shares and options held by an issuing firm's top five managers. By contrast, Carlson and Lazrak (2010) find that as a CEO's compensation shifts from cash to stock, rates on credit default swaps decline.

In addition to studying the loan market, where banks, as "inside lenders," may use different credit assessment criteria from public debt investors, our study builds on and departs from this literature in two important ways. First, our study of loan pricing distinguishes among the four forms of equity investment managers have in their firms: vested and unvested options and restricted and unrestricted stock. We find that only vested options have a negative association with loan pricing. Second, we use fixed effects for firms (or for a firm and its CEO) and relate managers' option investments in their firms to two distinct proxies for wealth. We thus control for unobservable factors that may simultaneously influence both managers' option investments in their firms and the cost of borrowing, including managers' preferences for risk and possible biases in their exercise behavior.

Finally, voluntarily assuming a highly-levered long position by retaining vested options may be interpreted as a demonstration of "confidence" in a firm's future prospects. On the one hand, theory suggests that confident managers may require less costly incentives, to the benefit of equity investors (Goel and Thakor, 2008; Gervais, Heaton, and Odean, 2011). On the other hand, recent empirical research finds that managerial "overconfidence" or "optimism" leads to suboptimal decision making in capital allocation and the market for corporate control, to the detriment of equity

investors (Hayward and Hambrick, 1997; Malmendier and Tate, 2005, 2008). In contrast, we adopt the perspective of lenders and find that such a demonstration of confidence may be “good news” for them.

The remainder of the paper proceeds as follows. Section 1 discusses why vested in-the-money options may have information content for credit quality. Section 2 presents an empirical analysis of loan pricing, other measures of credit quality, and equity volatility. Section 3 concludes.

1. Theoretical Background

Managers face competing influences in deciding whether to exercise vested in-the-money stock options and exhibit considerable variation in the timing of exercise. On the one hand, managerial stock options are not tradable and difficult to hedge, so exercise may be the only practical means of monetization. Furthermore, even without direct investments in their firms, managers’ wealth is to a large extent linked to their firms’ future performance, leaving managers significantly under diversified. These factors militate in favor of monetizing in-the-money options soon after they vest (Lambert et al., 1991; Huddart and Lang, 1996; Hall and Murphy, 2002). On the other hand, by exercising early, managers forgo substantial option value (Huddart and Lang, 1996; Heath, Huddart, and Lang, 1999).

In weighing these competing influences, managers would be expected to consider their private information about – as well as their ability to influence – their firms’ future performance. It follows that managers’ holdings of vested in-the-money options may convey signals about their firms’ future performance. The question then arises how to interpret these signals. According to the traditional view of managerial risk-taking, by

voluntarily maintaining a highly-levered long position, a manager may be aligning *with* equity investors and *against* debt investors and therefore either anticipate or actively pursue the higher-risk, higher-return strategies preferred by equity investors, as opposed to the lower-risk, lower-return strategies preferred by debt investors. Therefore, a natural hypothesis is that managers' holdings of vested in-the-money options (in relation to personal wealth) should be *positively* associated with loan pricing.

However, managers may be more willing to retain a long position in their firms if the managers have private information that their firms' future risk-adjusted performance will be better. This should be especially true for options, which are generally more sensitive to changes in firm performance than are shares of equivalent value.² It is intuitive that better expected (i.e., mean) performance would be welcomed by debt holders and share holders alike. Moreover, theoretical work has demonstrated that the relationship between the convexity of a manager's compensation profile and risk-seeking behavior may not be monotonic (Lambert et al., 1991; Carpenter, 2000; Ross, 2004; Carlson and Lazrak, 2010). In particular, holding mean future performance constant, a risk-averse manager should be more likely to retain a highly-levered long position in the form of vested in-the-money options if the manager has private information that the expected volatility of, or risk associated with, future performance is lower; such predictability would also be welcomed by debt investors, who do not benefit from positive shocks to firm value but may be harmed by negative shocks. Thus, an alternative hypothesis is that managers' holdings of vested in-the-money options (in relation to personal wealth) should be *negatively* associated with loan pricing.

² Managers would be further motivated to retain options if equity prices do not fully account for managers' option holdings, as suggested by recent empirical work (e.g., Huddart and Lang, 2003; Bartov and Mohanram, 2004).

2. Empirical Analysis

2.1. Data, Variables, and Empirical Specifications

We use several sources for our data. The data on loans come from Loan Pricing Corporation's DealScan. Standard and Poor (S&P)'s CompuStat is the source for firm financial data, as well as information on business and geographic segments and credit ratings. We match DealScan and CompuStat by updating the May 2010 version of the match originally created by Chava and Roberts (2008). Share price information is from CRSP. Information on firms' senior managers as well as their compensation and option holdings comes from S&P's ExecuComp database, which reports information on the top management of firms in the S&P 1,500 index. The sample period is 1992-2010 and includes 3,190 firms, of which 2,515 appear in the DealScan data. Our main loan pricing regressions, which impose certain selection criteria and data availability requirements (as described below), include just over 11,000 loan deals and over 15,000 individual loans.

We hypothesize that the magnitude of a manager's holdings of vested in-the-money options relative to the manager's personal wealth and future earnings potential is a barometer of the manager's perspective on the future cash flows of the firm and the manager's future actions. Personal wealth and future earnings potential are not directly observable. Since annual compensation should be highly correlated with personal wealth, we use it as a proxy, as suggested by Carpenter, Stanton, and Wallace (2006: 8). (Managers may have sources of wealth unrelated to their current compensation, for example from employment with a prior firm; these unobservable sources of wealth should be largely accounted for through our use of fixed effects at the level of the firm or firm-CEO match, as described further below.)

We use two measures of annual compensation. The first is a manager's salary and bonus as reported in ExecuComp's "tcc" field. Though bonuses typically contain an incentive component and salary may increase slowly over time with seniority, these payments tend not to fluctuate from one year to the next as much as other forms of compensation. A variant of total compensation – ExecuComp's "tdc1" field – is a more comprehensive measure that includes, *inter alia*, the total value of restricted stock granted, the total value of stock options granted as per the Black-Scholes formula, and long-term incentive payouts. While tdc1 is the most comprehensive measure of managerial compensation and has been used in prior research (e.g., Bebchuk, Cremers, and Peyer, 2011), tdc1 also fluctuates much more from year to year than the sum of salary and bonus. As neither measure is clearly superior to the other, we use both in our analyses.

We define *Vested Options/Salary & Bonus* as a natural log transformation of the ratio of the value of a manager's vested in-the-money options ("opt_unex_exer_est_val," or unexercised exercisable options, as reported in ExecuComp) to the manager's salary and bonus, and *Vested Options/Total Comp* as the corresponding measure with the variable tdc1 in the denominator. The log transformation is used to reduce skewness.

Everyone on the top management team should be in a position to hold an informed view of the firm's future prospects and, to a greater or lesser degree, influence firm actions. So, in our base case analysis, we calculate *Vested Options/Salary & Bonus* and *Vested Options/Total Comp* for each of a firm's top managers in a given year and use the straight arithmetic average for the top management team as the measure for that firm-

year.³ Generally speaking, firms are required to report compensation and stock ownership data for the firm's CEO and the other four most highly-paid managers, although some firms voluntarily report more. For consistency, we take the five highest paid managers of each firm to be the firm's top management team.

Table 1 presents summary statistics for *Vested Options/Salary & Bonus* and *Vested Options/Total Comp* for the average of firms' top management teams as well as for all the other tabulated variables in the paper. With medians slightly lower than the means, the measures are somewhat skewed. The effect of this should be largely eliminated through the use of fixed effects at the level of the firm or firm-CEO match, as described below.⁴

Our base loan pricing regressions include a range of control variables drawn from recent research. Firm attributes are *Firm Size*, the natural log of book assets; *Leverage*, the ratio of total debt to assets; *OIBD*, the ratio of operating income before depreciation to assets; and *Tangibility*, the ratio of net property, plant, and equipment to assets. Loan attributes are *Term*, the term of the loan in months; and *Loan Size*, the natural log of the loan principal. We also present loan pricing regressions with the following variables: *CEO Tenure*, which is a log transformation of a CEO's tenure with a firm in months; *Distance to Default*, which is a proxy for the probability of default based on the Merton

³ Note that using the aggregate holdings of vested in-the-money options and annual compensation for the top management team would result in a weighted average that implicitly assumed that the information and incentives of more highly paid managers were more relevant, but in an indeterminate way, as one manager might have very high annual compensation, whereas another might have very high holdings of vested options.

⁴ For brevity, Table 1 does not present summary statistics or correlations for *Vested Options/Salary & Bonus* and *Vested Options/Total Comp* as calculated for firms' CEOs alone. These summary statistics and correlations are quite similar to those presented for the average of firms' top management teams.

(1974) model, which we calculate using the methods of Bharath and Shumway (2008).⁵ Δ *Share Price*, or the cube root of the year-on-year change in a firm's stock price; and a log transformation of *Tobin's Q*, which we define as the ratio of (a) the book value of assets plus the market value of equity minus the book value of equity and deferred taxes to (b) the book value of assets. Finally, we consider four other forms of investment that managers have in their firms: (i) *Inside Debt/Salary & Bonus* and *Inside Debt/Total Comp*, (ii) *Restricted Stock/Salary & Bonus* and *Restricted Stock/Total Comp*, (iii) *Unrestricted Stock/Salary & Bonus* and *Unrestricted Stock/Total Comp*, and (iv) *Unvested Options/Salary & Bonus* and *Unvested Options/Total Comp*. These measures are analogous to *Vested Options/Salary & Bonus* and *Vested Options/Total Comp* but substitute, respectively, a manager's (i) accrued pension benefits and deferred compensation, (ii) restricted stock holdings, (iii) unrestricted stock holdings, and (iv) unvested option holdings for the manager's vested option holdings.

We cannot observe managers' risk preferences. Therefore, our empirical strategy is to use firm fixed effects to control for this unobservable factor. Firm fixed effects also control for other unobservable firm attributes that affect credit quality. Since the personnel composing a firm's top management team may change over time, we also perform analyses using the vested option holdings of the CEO alone, allowing us to calculate fixed effects at the level of the match between CEO and firm; this is equivalent

⁵ Specifically, *Distance to Default* is
$$\frac{\ln\left[\frac{(E+F)}{F}\right] + (r_{it-1} - 0.5\sigma_v^2)T}{\sigma_v\sqrt{T}}$$
, where E and F are the

market value of a firm's equity and debt respectively, T is the time period, which we set at 12 months, σ_v is an estimate of the volatility of a firm's debt, and r_{it-1} is an estimate of the return on the firm's equity. Details may be found in Bharath and Shumway (2008). We also obtained qualitatively the same results using the definition of *Distance to Default* from Sundaram and Yermack (2007).

to having a different dummy variable for each CEO a firm has during the sample period. Our loan pricing regressions also include (untabulated) fixed effects (i.e., dummy variables) for the firm’s long-term S&P senior credit rating, the loan purpose as reported in DealScan, and the year the loan was made.⁶

Our measure of loan pricing (i.e., the interest rate) is DealScan’s *All-In Spread Drawn*, which we regress on our measures of managers’ option holdings and the control variables using the most recent data available prior to the closing date of each loan. The *All-In Spread Drawn* is the firm’s total ongoing cost of borrowing in basis points (100ths of 1%), assuming that the loan is fully drawn and fully incorporating ongoing and commitment fees. The *All-In Spread Drawn* is thus the most complete measure of the cost of borrowing associated with a loan offered by DealScan, and has been widely used as a measure of loan pricing in recent studies (e.g., Ivashina, 2009; Ross, 2010). Table 1 provides summary statistics for the *All-In Spread Drawn* expressed in basis points. The mean of 140 is higher than the median of 100, reflecting modest skewness.

Use of the *All-In Spread Drawn* restricts the sample to floating rate loans, which are more common than fixed rate loans in the corporate lending market. To ensure consistency and comparability across observations, we limit the analysis to US\$ LIBOR-based loans of “senior” status. Finally, as some loans are part of multiple-loan deals, we cluster standard errors by deal.

We perform two additional sets of analyses. One set of analyses uses three measures of a firm’s equity volatility as the dependent variable. The first measure,

⁶ The credit rating categories are AAA, AA, A, BBB, BB, B, CCC, CC, C, and D, with unrated loans as the missing category. The loan purpose categories are Mergers & Acquisitions, Commercial Paper Backup, General Corporate Purposes, Leveraged Buyout, Debt Repayment, Working Capital, Project Finance, Recapitalization, Real Estate, and Capital Expenditures, with other purposes as the missing category.

Volatility – Total, is the monthly volatility of a firm’s equity returns in a given year. Recent research suggests that firms with similar characteristics may exhibit similar equity pricing behavior (Daniel and Titman, 1997; Daniel, Titman, and Wei, 2001). We accordingly define our second measure, *Volatility – Characteristics*, as the monthly volatility of a firm’s equity returns in a given year, after adjusting those returns for the returns to one of 25 matching portfolios. These matching portfolios are constructed each year by sorting our population of firms into five groups based on market capitalization and, in each such group, into five additional subgroups based on book-to-market ratio. Our final measure is *Volatility – Idiosyncratic*. Because idiosyncratic volatility requires a regression equation that must be recalculated each year for each firm, we use daily returns, which we regress on the three Fama-French factors and momentum. Given that our sample firms are members of the S&P 1,500 index, we doubt that asynchronous trading is a serious issue. Nonetheless, since small stocks may not react immediately to common news (Lo and MacKinlay, 1990), we apply Dimson’s (1979) method by including two lags for all factors. *Volatility – Idiosyncratic* is the root mean square error from these regressions.

We regress the three measures of equity volatility in the subsequent year on the current values of our measures of managers’ vested option holdings and a set of control variables that include three additional variables that have been linked to equity volatility: *Business Segments*, the number of business segments reported by a firm; *Geographic Segments*, the number of geographic segments reported by a firm; and *Dividend Indicator*, which equals 1 if a firm pays a cash dividend in a given year. We include firm and year fixed effects to capture unobservable heterogeneity and temporal influences on

market volatility. As a robustness check, we also use the lagged values of each measure of equity volatility as an additional control.

The other set of additional analyses considers whether managers' holdings of vested options predict future credit quality. We use three alternative measures of credit quality as the dependent variable in regressions with firm and year fixed effects: *OIBD* and *Distance to Default* (both described above) and *Credit Rating*, which converts a firm's long-term S&P senior credit rating into a numerical score ranging from a low of D (1) to a high of AAA (26). We regress *OIBD*, *Distance to Default*, and *Credit Rating* in the subsequent year on the current values of our measures of managers' vested option holdings. We also include a number of control variables, all of which are described above, to account for other factors that may influence firm performance and, by extension, credit quality. Again for robustness, we use the lagged values of each measure of credit quality as an additional control.

2. 2. Results – Loan Pricing Analysis

2.2.1. Base Case

Table 2 analyzes the relationship between loan pricing and the average holdings of vested in-the-money options of a firm's top management team. Columns 1 and 2 use *Vested Options/Salary & Bonus* and *Vested Options/Total Comp*, respectively. In each regression, the coefficient on the measure of vested in-the-money option holdings is negative and highly statistically significant. The results suggest that a manager's decision to retain vested options is a signal of the managers' private information about their firms, and that this signal is associated with "good news" for lenders. The coefficients are also economically meaningful. A one-standard deviation increase in managers' holdings of

vested in-the-money options in relation to personal wealth is associated with an 8.1-9.7 basis point decrease in the cost of borrowing.

The coefficients on the control variables are consistent across the regressions and in line with expectations. *Leverage* and cash flow (*OIBD*) are both highly statistically significant and have, respectively, the expected positive and negative signs. The positive coefficient on *Term* reflects a liquidity premium for longer maturities, and the negative coefficient on *Loan Size* is indicative of modest economies of scale in borrowing. Asset composition (*Tangibility*) and *Firm Size* are insignificant. At 0.71, the R^2 is relatively high in both regressions, reflecting the explanatory power of the firm fixed effects as well as the many (untabulated) fixed effects for year, loan purpose, and firm credit rating.

2.2.2. *Recent Firm Performance & Future Prospects*

The base case analysis raises the question of whether managers' holdings of vested in-the-money options have specific information content about a firm's credit quality or more generally capture recent performance and overall future prospects as reflected in the firm's share price. Managers may be more inclined to retain vested in-the-money options when the firm is generally doing well, and the equity markets may be similarly attuned to managers' option holdings, giving firms whose managers retain more options a higher valuation. Managers may also be slow to rebalance their portfolios after a recent stock price appreciation. We test this competing explanation by repeating the regressions from Table 2, Columns 1 and 2 in Columns 3 and 4, this time including a measure of the change in a firm's stock price (Δ *Share Price*) over the previous year. Δ *Share Price* is indeed negative and significant, reflecting recent changes to the firm's overall condition, but the coefficients on *Vested Options/Salary & Bonus* and *Vested*

Options/Total Comp are again negative, highly significant, and of similar magnitude. Thus, managers' vested in-the-money option holdings do not merely capture recent performance changes reflected in a firm's share price.

2.2.3. *Other Forms of Equity Investment*

The theoretical argument we have advanced to explain the negative association between vested option holdings and loan pricing could also be applied to the other forms of equity investment that managers have in their firms, namely unvested options, restricted stock, and unrestricted stock. However, we expect the information content of vested options to be greater than that of these alternative forms of equity investment. First, managers' vested option holdings reflect a combination of managers' (a) *private information* about their firm's future risk-adjusted performance and (b) *incentive* to reduce the volatility of their firm's performance to prevent the options from losing their intrinsic value (Carpenter, 2000; Ross, 2004). By contrast, holdings of unvested options and restricted stock cannot signal a manager's private information, because the manager cannot at present monetize them. Second, while holdings of unrestricted stock could reflect private information too, equity options are generally more sensitive to changes in the mean and volatility of a firm's cash flows than are shares of equivalent value (whether restricted or unrestricted) and managers may hold shares for non-financial reasons, for example, to comply with ownership targets or as a symbol of commitment.

To explore this, we rerun the regressions from Table 2, Columns 3 and 4 while pairing each measure of vested option holdings with the equivalent measures of managers' holdings of unvested options, restricted stock, and unrestricted stock. The results are presented in Table 2, Columns 5 and 6. The coefficients on *Vested*

Options/Salary & Bonus and *Vested Options/Total Comp* are again negative and highly statistically significant. Meanwhile, none of unvested options, restricted stock, or unrestricted stock has a statistically significant negative relationship with loan pricing; indeed, restricted stock actually has a marginally significant *positive* relationship with loan pricing in one of the two regressions. There is thus no evidence that managers' other equity investments in their firms replicate the information content of managers' vested option holdings.

2.2.4. *Managerial Heterogeneity*

Although turnover in top management teams is infrequent, it does occur. To rule out the possibility that such changes in personnel are responsible for the negative association between managers' vested option holdings and loan pricing, we control for unobservable attributes at the level of the match between firm and manager by repeating the regressions from Table 2, Columns 1 and 2 in Table 3, Columns 1 and 2, this time using the values of *Vested Options/Salary & Bonus* and *Vested Options/Total Comp* for the CEO alone and calculating fixed effects at the level of the match between firm and CEO. This raises the number of fixed effect categories by over 55% vis-à-vis Table 2.

Again, both *Vested Options/Salary & Bonus* and *Vested Options/Total Comp* are negative and highly statistically significant, suggesting changes in managerial personnel are not driving our results. The magnitude of the coefficients is between 10-33% smaller than the comparable figures in Table 2, indicating that there is information content in the vested option holdings of the entire top management team, not just those of the CEO. At 0.77-0.78, the values of R^2 in Table 3 are about 10% higher than the comparable values in

Table 2, probably as a result of the over 55% increase in fixed effect categories. The coefficients on the control variables are also qualitatively the same as those in Table 2.

2.2.5. *Managerial Tenure*

It is possible that lenders become more familiar with senior managers over time, improving a firm's perceived credit quality or the accuracy of credit assessments. At the same time, holdings of vested in-the-money options may exhibit systematic patterns of change over each manager's tenure with a firm. These factors may be influencing our results and would not be captured by fixed effects at the level of the firm-CEO match, which are time invariant. Therefore, we add *CEO Tenure* to the regressions with firm-CEO fixed effects and report the results in Table 3, Columns 3 and 4. Despite the loss of almost half the observations due to missing data, *Vested Options/Salary & Bonus* and *Vested Options/Total Comp* are again negative and highly statistically significant, and *CEO Tenure* is never significant. There is thus no evidence that managerial tenure is driving our results.

2.2.6. *Inside Debt*

Recent research has demonstrated that managers' holdings of inside debt may counteract the incentivizing effect of equity compensation by inducing greater managerial conservatism (Sundaram and Yermack, 2007; Wei and Yermack, 2011). If managers' vested option holdings are a proxy for, or highly correlated with, managers' inside debt holdings like accrued pension benefits and deferred compensation, our results may reflect the incentive effects of inside debt rather than the information content of managers' vested options holdings themselves.

We test for this alternative explanation in two ways. First, as explained in more detail by Sundaram and Yermack (2007), ExecuComp records the number of years of service a manager has accrued in a company pension plan that falls within the definition of the pay-and-service formula, which applies to roughly five-sixths of the companies with pension plans in their data. This variable dates from the beginning of the ExecuComp database. We accordingly drop every firm from our sample for which any manager in any year has a non-missing value for this variable. While this sample selection procedure will not entirely eliminate firms whose managers have some inside debt, it should result in a sample of firms for which inside debt is a considerably less important influence on managerial behavior than in the full sample. We then rerun the regressions from Table 2, Columns 1 and 2 and report an excerpt of the results in Table 4, Columns 1 and 2. Although the regressions have only around 5,300 observations, an approximate two-thirds reduction from the number of observations in the base case analysis, the coefficients on *Vested Options/Salary & Bonus* and *Vested Options/Total Comp* are still negative and highly statistically significant.

Second, we directly control for inside debt. One challenge is that detailed information about managers' inside debt holdings is not available for any firm prior to 2006 and is available for only about 85% of firms in the loan pricing regressions in the 2006 financial year. (From 2007 onwards, data on inside debt are generally available.) Thus, we undertake the following steps to simultaneously control for managers' inside debt where the necessary data are available while still using the full sample to properly estimate the other control variables and account for unobservable firm heterogeneity. The first step is to partition *Vested Options/Salary & Bonus* (or *Vested Options/Total Comp*)

into two versions: one that applies if *Inside Debt/Salary & Bonus* (or *Inside Debt/Total Comp*) can be calculated and is otherwise zero (i.e., up to 2006 or 2007, depending on the firm), and the other that applies if the inside debt variables cannot be calculated due to missing data and is otherwise zero (i.e., from 2006 or 2007). The second step is to create a dummy variable indicating that data for *Inside Debt/Salary & Bonus* (or *Inside Debt/Total Comp*) are missing.⁷ The third step is to impute a value of zero to *Inside Debt/Salary & Bonus* (or *Inside Debt/Total Comp*) whenever it is missing. We then repeat our analysis of loan pricing with these modifications: The pair of partitioned versions of *Vested Options/Salary & Bonus* (or *Vested Options/Total Comp*) replace the unpartitioned version, and we add the adjusted *Inside Debt/Salary & Bonus* (or *Inside Debt/Total Comp*) variable and the dummy variable, as described above. If managers' vested option holdings are a proxy for managers' inside debt holdings, only the version of *Vested Options/Salary & Bonus* (or *Vested Options/Total Comp*) that applies to loans where data on inside debt holdings are *unavailable* should be negative and significant; the control for managers' inside debt holdings should capture the explanatory power of managers' vested option holdings where data on inside debt are *available*.

However, our findings do not support this alternative explanation. As shown in Table 4, Columns 3 and 4, which present an excerpt of the results, both partitioned versions of *Vested Options/Salary & Bonus* and *Vested Options/Total Comp* are negative and highly statistically significant and do not differ to a statistically significant degree (p -values on the F -tests of equality of 0.45 and 0.92, respectively). Thus, there is no evidence that controlling for inside debt affects the explanatory power of managers'

⁷ We do not tabulate this dummy variable. It is not close to significant, as one would expect given that it is almost collinear with the year fixed effects.

vested option holdings. It is also notable that neither *Inside Debt/Salary & Bonus* nor *Inside Debt/Total Comp* is significant, probably because the data required for these variables are not available for most of the sample period. We believe these results testify to the robustness of the negative association between managers' vested option holdings and loan pricing.

2.2.7. *Information Sensitivity: Loan Purpose*

If managers' holdings of vested in-the-money options reflect private information relevant to a firm's credit quality, we should expect to see a stronger relationship between managers' vested option holdings and the cost of borrowing for more informationally sensitive loans. In that regard, a significant minority of the loans made to the largest US corporations are designed to provide liquidity support for ongoing commercial paper programs. Such loans, which account for about 13.4% of the loans used in the regressions in this paper, are intended to be drawn only in the case of a liquidity shock. As such, these loans are generally issued in respect of underlying commercial paper programs of well-established credit quality in the public debt markets à la Diamond (1991), making such loans informationally insensitive. To the extent that managers' holdings of vested in-the-money options have information content about a firm's future cash flows available for loan repayment and risk of bankruptcy, we would expect the information to be less valuable for commercial paper backup loans than for loans for other purposes.

To test this, we partition both *Vested Options/Salary & Bonus* and *Vested Options/Total Comp* into two versions, one that takes the value of the measure if the loan is for commercial paper backup and is otherwise zero, and the other that takes the value of the measure if the loan is not for commercial paper backup and is otherwise zero. We

then repeat the analysis of Table 2, Columns 1 and 2, this time replacing each unpartitioned variable with the corresponding pair of partitioned variables. Table 5 presents an excerpt of the results in Columns 1 and 2. The coefficient on the version of each measure that applies to non-commercial paper backup loans is always highly statistically significant and much larger in absolute value than the version that applies to commercial paper backup loans, which is never significant. Moreover, an *F*-test rejects the null hypothesis of equality in both regressions at the 1%-level of significance.

2.2.8. *Information Sensitivity: Firm Credit Rating*

By a similar argument, one would expect that to the extent that managers' holdings of vested options reflect private information about credit quality, vested options would have greater information content for firms of *a priori* lower credit quality than of *a priori* higher credit quality. We accordingly partition *Vested Options/Salary & Bonus* and *Vested Options/Total Comp* into three versions, one that applies to investment grade firms (rated BBB- or higher by S&P at the time of the loan, approximately 43.5% of the loans in the regression sample), "junk" firms (rated CCC+ or lower, approximately 26.0% of the loans), and unrated firms, which span the credit spectrum.

The argument above suggests that the coefficients on *Vested Options/Salary & Bonus* and *Vested Options/Total Comp* should be greatest (in absolute value) for junk firms and smallest for investment grade firms, while the coefficients for unrated firms, which, conditional on obtaining a rating, would be a mix of investment grade and junk, should be somewhere in between, perhaps weighted somewhat more heavily toward junk. As an alternative hypothesis, if banks rely on credit ratings as part of the credit evaluation process, the coefficients should be the greatest in absolute value for unrated firms.

However, banks, as inside lenders, perform their own credit evaluation, unlike bond investors, who may rely more heavily on credit ratings to assess credit quality. We accordingly consider this alternative hypothesis unlikely.

We repeat the regressions from Table 2, Columns 1 and 2, this time with the partition by credit rating for both measures of managers' holdings of vested in-the-money options, and report an excerpt of the results in Table 5, Columns 3 and 4. For each measure, the coefficients are in the same descending order of negativity: investment grade, unrated, and junk. Moreover, an *F*-test rejects the null hypothesis of equality between the investment grade and junk versions at the 1% level of significance in both regressions.

2.2.9. *Information Sensitivity: Overall Firm Quality*

If managers' holding of vested options are an important signal of creditworthiness, they should be less valuable to lenders when a firm's overall quality is already known to be high. *Tobin's Q* is a standard proxy for overall firm quality and, as such, would presumably also be negatively associated with loan pricing. We accordingly add *Tobin's Q* as an independent variable as well as its interaction with our measures of managers' vested option holdings to the regressions in Table 2, Columns 1 and 2 and report an excerpt of the results in Table 5, Columns 5 and 6. Consistent with the hypothesis, the main effects of *Tobin's Q* and both *Vested Options/Salary & Bonus* and *Vested Options/Total Comp* are negative and highly statistically significant, while their interaction is positive and significant, suggesting that the information content of managers' vested option holdings is lower when a firm's overall quality is known to be higher.

2.2.10. Information Sensitivity: Distance to Default

More specific to credit quality, one would expect that if, *ceteris paribus*, a firm is more likely to default, the value of credit signals would be greater. We accordingly add a proxy for default probability, *Distance to Default*, as an independent variable as well as its interaction with our measures of managers' vested option holdings to the regressions in Table 2, Columns 1 and 2 and report an excerpt of the results in Table 5, Columns 7 and 8. Again, in each regression, the main effects of *Distance to Default* and both *Vested Options/Salary & Bonus* and *Vested Options/Total Comp* are negative and highly statistically significant, while their interaction is positive and significant. The results not only suggest that *Distance to Default* controls for aspects of credit quality not captured by the other control variables, but also, and in line with the earlier results, that the information content of managers' vested option holdings is greater, the more likely a firm is to default.

2.3. Results – Other Measures of Credit Quality

We hypothesize that managers' vested option holdings are negatively associated with loan pricing because they signal that managers possess soft information relevant to credit quality. A particularly stringent test of this proposition is to see whether this soft information will be reflected in a firm's perceived and actual credit quality at a later stage, i.e., whether managers' vested option holdings predict *future* measures of credit quality. We explore this possibility in three ways.

2.3.1. Cash Flow

Operating cash flows are a primary source of funds to repay debt and are accordingly a key determinant of credit quality. We accordingly test whether managers'

vested option holdings signal higher future cash flows by regressing our measure of operating cash flow (*OIBD*) in the subsequent year on the current values of *Vested Options/Salary & Bonus* and *Vested Options/Total Comp*. The regressions include fixed effects for firm and year, as well as a number of controls to account for other factors that may influence firm performance and thus credit quality. These regressions are presented in Table 6, Columns 1 and 2. Both *Vested Options/Salary & Bonus* and *Vested Options/Total Comp* are positive and highly statistically significant, suggesting that managers' vested option holdings do signal higher future cash flows. As a further test, we add the current value of *OIBD* as an additional control in Columns 3 and 4. Both *Vested Options/Salary & Bonus* and *Vested Options/Total Comp* remain positive and highly statistically significant.

2.3.2. *Credit Rating*

Credit ratings are an important signal of credit quality and may capture aspects of credit quality that are visible to market participants but not to the researcher. We accordingly repeat the regressions in Table 6, Columns 1–4 with *Credit Rating* at the end of the subsequent year as the dependent variable; *Credit Rating* converts a firm's long-term debt rating from S&P into a numerical value ranging from a low of 1 to a high of 26. The results are presented in Table 6, Columns 5–8. In all four regressions, even those that include the lagged value of *Credit Rating* as a control, *Vested Options/Salary & Bonus* and *Vested Options/Total Comp* are positive and highly statistically significant, again suggesting that managers' vested option holdings signal future credit quality.⁸

⁸ The number of observations in Columns 5–8 is about 50% lower than in Columns 1–4, because a long-term credit rating is not available for many firm-years.

2.3.3. *Distance to Default*

Distance to Default is a market-based measure of a firm's probability of default and thus its credit quality. We repeat the regressions in Table 6, Columns 1–4 with *Distance to Default* at the end of the subsequent year as the dependent variable and present the results in Columns 9–12. Once again and consistent with the proposition that managers' vested option holdings signal future credit quality, *Vested Options/Salary & Bonus* and *Vested Options/Total Comp* are positive and highly statistically significant in all four regressions, even when the lagged value of *Distance to Default* is included as an independent variable.

2.4. *Results – Equity Volatility*

We have found evidence that managers' vested option holdings predict higher future cash flows. It is intuitive that managers would hold more of their wealth in vested options in anticipation of higher future cash flows and that lenders would accordingly regard vested option holdings as a signal of credit quality. It is simultaneously possible, however, that managers are also more inclined to retain vested options in anticipation of lower risk in firm performance, which would benefit lenders, too.

Measuring risk in performance on a year-to-year basis is challenging, given that risk can in principle only be measured accurately over a reasonably long and stable period. However, one would expect risk to be reflected to some degree in the volatility of a firm's equity returns, as these returns reflect current performance and expectations about future performance. We accordingly test whether managers' current holdings of vested options predict equity volatility over the subsequent year, using three measures of volatility: raw monthly volatility (*Volatility – Total*), monthly volatility adjusted for

characteristics (*Volatility – Characteristics*), and daily volatility adjusted for the three Fama-French factors plus momentum (*Volatility – Idiosyncratic*). We continue to use firm and year fixed effects and also add controls from the literature on equity volatility.

The results are presented in the Table 7, Columns 1, 2, 5, 6, 9, and 10. In each regression, *Vested Options/Salary & Bonus* and *Vested Options/Total Comp* are negative and highly statistically significant. As a further test to control for trends in volatility, we add the lagged value of each measure of volatility and report the results in Table 7, Columns 3, 4, 7, 8, 11, and 12. Even in this extremely demanding specification, *Vested Options/Salary & Bonus* and *Vested Options/Total Comp* are negative and statistically significant (although only marginally so in one of the regressions with idiosyncratic volatility as the dependent variable). We interpret these results as indicative evidence that managers' holdings of vested options signal credit quality by predicting not only higher cash flows but also lower risk in firm performance.

3. Conclusion

This paper provides evidence that top managers' holdings of vested in-the-money options have information content for credit quality. In particular, the paper finds a strong negative association between (a) managers' holdings of vested in-the-money options (in relation to personal wealth), and (b) the cost of borrowing in the loan market. These results are obtained in analyses that account for unobservable firm and manager characteristics and are robust to controls for recent stock price changes, managers' holdings of other equity investments and inside debt, and managerial tenure. Moreover, the negative association between managers' vested option holdings and the cost of borrowing is stronger for informationally sensitive loans, such as those made (a) for

purposes other than commercial paper backup, (b) to “junk” rather than to investment grade firms, (c) to generally lower quality firms (as measured by Tobin’s Q), and (d) to firms whose distance to default is higher.

We find that vested option holdings predict higher cash flows and credit ratings, as well as a greater distance to default, suggesting that vested option holdings are a signal of managers’ private information, which is later reflected in their firms’ perceived and actual credit quality. Vested option holdings also predict lower equity volatility. The implication is that vested option holdings signal overall better future performance, both in terms of cash flows and risk.

These results have implications not only for the literature on loan pricing, but also for the study of conflicts between investor classes, agency, managerial (over-) confidence, and executive compensation. It is with respect to informationally sensitive loans that one expects the conflict between an equity-aligned manager and debt holders to be greatest; yet, we find that managers’ vested option holdings have the strongest negative association with pricing for such loans. Another important implication is that, in designing executive compensation packages, we need to consider not only the initial incentive effects of any options granted but what managers are likely to do with the options after vesting. Future research and practice may accordingly need to take a more nuanced view of how the interests of various investor classes converge or diverge and how managers’ behavior is affected by the standard tools of executive compensation.

References

- Aboody, D., Hughes, J., Liu, J., Su, W., 2008. Are executive stock option exercises driven by private information? *Review of Accounting Studies* 13, 551–570.
- Bagnani, E., Milonas, N., Saunders, A., Travlos, N., 1994. Managers, owners, and the pricing of risky debt: an empirical analysis, *Journal of Finance* 49, 453–477.
- Bartov, E., Mohanram P., 2004. Private information, earnings manipulations, and executive stock-option exercises, *Accounting Review* 79, 889–920.
- Bebchuk, L., Cremers, M., Peyer, U., 2011. The CEO Pay Slice, *Journal of Financial Economics* 102, 199–221.
- Bertrand, M., Schoar, A., 2003. Managing with style: the effect of managers on firm policies, *Quarterly Journal of Economics* 118, 1169–1208.
- Bharath, S., Shumway, T., 2008. Forecasting default with the Merton distance to default model, *Review of Financial Studies* 21, 1339–1369.
- Bharath, S., Dahiya, S., Saunders, A., Srinivasan, A., 2011. Lending relationships and loan contract terms, *Review of Financial Studies* 24, 1141–1203.
- Bradley, M., Roberts, M., 2004. The structure and pricing of corporate debt covenants, Unpublished working paper.
- Carey, M., Nini, G., 2007. Is the corporate loan market globally integrated? A pricing puzzle, *Journal of Finance* 62, 2969–3007.
- Carlson, M., Lazrak, A., 2010. Leverage choice and credit spreads when managers risk shift, *Journal of Finance* 65, 2323–2362.
- Carpenter, J., 2000. Does option compensation increase managerial risk appetite? *Journal of Finance* 55, 2311–2331.
- Carpenter, J., Remmers, B., 2001. Executive stock option exercises and inside information, *Journal of Business* 74, 513–534.
- Carpenter, J., Stanton, R. Wallace, N., 2006. Estimation of employee stock option exercise rates and firm cost: Methodology, Unpublished working paper. New York University.
- Chava, S., Roberts, M., 2008. How does financing impact investment? The role of debt covenants, *Journal of Finance* 63, 2085–2121.

- Daniel, K., Titman, S., 1997. Evidence on the characteristics of cross sectional variation in stock returns, *Journal of Finance* 52, 1–33.
- Daniel, K., Titman, S., Wei, K., 2001. Explaining the cross-section of stock returns in Japan: factors or characteristics? *Journal of Finance* 56, 743–766.
- Degryse, H., Ongena, S., 2005. Distance, lending relationships, and competition, *Journal of Finance* 60, 231–266.
- Demiroglu, C., James, C., 2010. The information content of bank loan covenants, *Review of Financial Studies* 23, 3700–3737.
- Dennis, S., Nandy, D., Sharpe, I., 2000. The determinants of contract terms in bank revolving credit agreements, *Journal of Financial and Quantitative Analysis* 35, 87–110.
- Diamond, D., 1991. The choice between bank loans and directly placed debt, *Journal of Political Economy* 99, 689–721.
- Dimson, E., 1979. Risk measurement when shares are subject to infrequent trading, *Journal of Financial Economics* 7, 197–226.
- Finkelstein, S., Hambrick, D., and Cannella Jr., A., 2009. *Strategic Leadership: Theory and Research on Executives, Top Management Teams, and Boards*, Oxford University Press, New York.
- Gervais, S., Heaton, J., Odean, T., 2011. Overconfidence, compensation contracts, and capital budgeting, *Journal of Finance*, in press.
- Goel, A., Thakor, A., 2008. Overconfidence, CEO selection, and corporate governance, *Journal of Finance* 68, 2737–2784.
- Hall, B., Murphy, K., 2002. Stock options for undiversified executives, *Journal of Accounting and Economics* 33, 3–42.
- Handa, P., Kothari, S., Wasley, C. 1989. The relation between the return interval and betas, *Journal of Financial Economics* 23, 79–100.
- Hayward, M., Hambrick, D., 1997. Explaining the premiums paid for large acquisitions: evidence of CEO hubris, *Administrative Science Quarterly* 42, 103–127.
- Heath, C., Huddart, S., Lang, M. 1999. Psychological factors and stock option exercise, *Quarterly Journal of Economics* 114, 602–627.
- Huddart, S., Lang, M., 1996. Employee stock option exercises: an empirical analysis, *Journal of Accounting and Economics* 21, 5–43.

- Huddart, S., Lang, M., 2003. Information distribution within firms: evidence from stock option exercises, *Journal of Financial Economics* 34, 3–31.
- Huson, M., Malatesta, P., Parrino, R., 2004. Managerial succession and firm performance, *Journal of Financial Economics* 74, 237–275.
- Ivashina, V., 2009. Asymmetric information effects on loan spreads, *Journal of Financial Economics* 92, 300–319.
- Ivashina, V., Sun, Z., 2011. Institutional demand pressure and the cost of corporate loans, *Journal of Financial Economics* 99, 500–552.
- Jensen, M., Meckling, W., 1976. Theory of the firm: managerial behavior, agency costs and ownership structure, *Journal of Financial Economics* 3, 305–360.
- John, T., John, K., 1993. Top-management compensation and capital structure, *Journal of Finance* 48, 949–974.
- Lambert, R., Larcker, D., Verrecchia, R., 1991. Portfolio considerations in valuing executive compensation, *Journal of Accounting Research* 29, 129–149.
- Levhari, D., Levy, H., 1977. The capital asset pricing model and the investment horizon, *Review of Economics and Statistics* 59, 92–104.
- Lewellen, J., Nagel, S., 2006. The conditional CAPM does not explain asset-pricing anomalies, *Journal of Financial Economics* 82, 289–314.
- Lo, A., MacKinlay, A., 1990. When are contrarian profits due to stock market overreaction, *Review of Financial Studies* 3, 175–205.
- Malmendier, U., Tate, G., 2005. CEO overconfidence and corporate investment, *Journal of Finance* 60, 2661–2700.
- Malmendier, U., Tate, G., 2008. Who makes acquisitions? CEO overconfidence and the market's reaction, *Journal of Financial Economics* 89, 20–43.
- Merton R., 1974. On the pricing of corporate debt: the risk structure of interest rates, *Journal of Finance* 29, 449–470.
- Ortiz-Molina, H., 2006. Top management incentives and the pricing of corporate public debt, *Journal of Financial and Quantitative Analysis* 41, 317–340.
- Parrino, R., Weisbach, M., 1999. Measuring investment distortions arising from stockholder-bondholder conflicts, *Journal of Financial Economics* 53, 3–42.

Ross, D., 2010. The “dominant bank effect”: how high lender reputation affects the information content and terms of bank loans, *Review of Financial Studies* 23, 2730–2756.

Ross, S., 2004. Compensation, incentives, and the duality of risk aversion and riskiness, *Journal of Finance* 59, 207–225.

Schenone, C., 2010. Lending relationships and information rents: do banks exploit their information advantages? *Review of Financial Studies* 23, 1149–1199.

Sundaram, R., Yermack, D., 2007. Pay me later: inside debt and its role in managerial compensation, *Journal of Finance* 62, 1551–1158.

Chenyang, W., Yermack, D., 2011. Investor reactions to CEOs’ inside debt incentives, *Review of Financial Studies*, in press.

Table 1
Descriptive statistics and correlations

This table presents descriptive statistics and correlations for the main variables used in our empirical analyses. The sample comprises the firms in the S&P 1,500 index over the period 1992-2010, as reported by ExecuComp, which is also the source for managers' option holdings. Information on firms' borrowing activity is from DealScan. Financial, segment, and credit rating data are from CompuStat. Stock market data are from CRSP. *All-In Spread Drawn* is the total interest cost of a loan in basis points, assuming the loan is fully drawn. *Business Segments* is the number of business segments reported by a firm. *CEO Tenure* is the natural log of the length of the CEO's service with a firm in months. *Credit Rating* converts a firm's long-term S&P senior credit rating into a numerical score ranging from D (1) to AAA (26). Δ *Share Price* is the cube root of the year-on-year percentage change in a firm's share price. *Distance to Default* is a measure of the probability of default, as described in the text. *Dividend Indicator* equals 1 if a firm pays a cash dividend in a given year. *Firm Size* is the natural log of assets. *Geographic Segments* is the number of geographic segments reported by a firm. To calculate *Inside Debt/Salary & Bonus* and *Inside Debt/Total Comp*, we first calculate the ratio of the value of each manager's accrued pension benefits and deferred compensation to the sum of the salary and bonus earned by that manager or the total compensation earned by that manager. We then calculate the average of this ratio for each firm-year and take a log transformation of this average. *Restricted Stock/Salary & Bonus*, *Restricted Stock/Total Comp*, *Unrestricted Stock/Salary & Bonus*, *Unrestricted Stock/Total Comp*, *Unvested Options/Salary & Bonus*, *Unvested Options/Total Comp*, *Vested Options/Salary & Bonus*, and *Vested Options/Total Comp* are calculated the same way as managers' holdings of inside debt but using managers' holdings of restricted stock, unrestricted stock, unvested options, or vested options in place of accrued pension benefits and deferred compensation. *Leverage* is the ratio of total debt to assets. *Loan Size* is the natural log of loan principal. *OIBD* is the ratio of operating income before depreciation to assets. *Tangibility* is the ratio of net property, plant, and equipment to assets. *Term* is a loan's maturity in months. *Tobin's Q* is a log transformation of the ratio of the market value of assets to the book value of assets. *Volatility – Characteristics* is the monthly volatility of a firm's equity returns after correcting for the returns to a portfolio matched by market capitalization and book-to-market ratio. *Volatility – Idiosyncratic* is the daily volatility of the unexplained variation in a firm's equity returns as per the Fama-French 3-factor plus momentum model. *Volatility – Total* is the monthly volatility of a firm's equity returns.

	Median	Mean	Standard Deviation	1	2	3	4	5	6	7	8	9	10	11	12
1. <i>All-In Spread Drawn</i>	100.00	140.00	125.75												
2. <i>Business Segments</i>	2.00	2.45	1.84	-0.027											
3. <i>CEO Tenure</i>	5.12	4.93	1.00	-0.191	0.087										
4. <i>Credit Rating</i>	17.00	16.87	3.47	-0.617	0.123	0.278									
5. Δ <i>Share Price</i>	0.30	0.07	0.68	-0.104	-0.010	-0.009	0.010								
6. <i>Distance to Default</i>	5.31	6.81	16.53	-0.309	-0.015	0.076	0.423	0.265							
7. <i>Dividend Indicator</i>	1.00	0.54	0.50	-0.270	0.244	0.220	0.415	-0.023	0.017						
8. <i>Firm Size</i>	7.21	7.35	1.81	-0.234	0.327	0.215	0.502	-0.016	-0.055	0.318					
9. <i>Geographic Segments</i>	2.00	2.43	1.81	0.028	0.170	0.001	-0.004	0.000	0.022	-0.010	0.026				
10. <i>Inside Debt/Salary & Bonus</i>	0.61	0.84	0.87	-0.262	0.298	0.254	0.443	0.027	0.033	0.418	0.531	0.069			
11. <i>Inside Debt/Total Comp</i>	0.23	0.40	0.48	-0.180	0.243	0.253	0.321	0.001	-0.031	0.380	0.401	0.017	0.879		
12. <i>Leverage</i>	0.21	0.24	0.83	0.208	0.022	-0.009	-0.308	-0.046	-0.188	0.018	0.011	-0.020	-0.003	-0.002	
13. <i>Loan Size</i>	5.53	5.47	1.29	-0.271	0.234	0.140	0.308	0.022	0.070	0.243	0.622	0.081	0.372	0.236	0.107
14. <i>OIBD</i>	0.13	0.12	0.23	-0.177	0.014	0.084	0.208	0.092	0.135	0.086	0.035	0.030	0.036	0.016	-0.280
15. <i>Restricted Stock/Salary & Bonus</i>	0.00	0.36	0.60	-0.046	0.151	0.029	0.124	0.048	0.011	0.143	0.339	0.071	0.194	0.062	0.009
16. <i>Restricted Stock/Total Comp</i>	0.00	0.18	0.32	-0.074	0.115	0.058	0.125	0.066	0.009	0.147	0.276	0.369	0.081	0.069	0.009
17. <i>Tangibility</i>	0.21	0.28	0.24	-0.001	0.052	0.086	-0.037	-0.004	-0.040	0.209	0.024	-0.040	0.145	0.132	0.069
18. <i>Term</i>	48.00	42.82	24.41	0.159	-0.081	-0.044	-0.278	0.120	0.083	-0.116	-0.163	-0.008	-0.098	-0.084	0.034
19. <i>Tobin's Q</i>	0.37	0.50	0.54	-0.194	-0.151	-0.028	0.183	0.216	0.207	-0.153	-0.316	0.093	-0.100	-0.150	0.010
20. <i>Unrestricted Stock/Salary & Bonus</i>	1.60	1.89	1.43	-0.127	-0.022	0.259	0.160	0.066	0.072	0.007	0.061	-0.044	0.109	0.054	-0.041
21. <i>Unrestricted Stock/Total Comp</i>	0.96	1.36	1.30	-0.111	-0.055	0.258	0.133	0.072	0.067	0.010	-0.037	-0.081	-0.029	0.045	-0.040
22. <i>Unvested Options/Salary & Bonus</i>	0.31	0.59	0.75	-0.145	-0.061	-0.051	0.057	0.307	0.098	-0.163	0.018	0.031	0.102	-0.002	-0.039
23. <i>Unvested Options/Total Comp</i>	0.15	0.34	0.48	-0.142	-0.088	-0.030	0.038	0.310	0.099	-0.157	-0.055	-0.007	0.008	-0.011	-0.039

Table 1
Descriptive statistics and correlations - continued

	Median	Mean	Standard Deviation	1	2	3	4	5	6	7	8	9	10	11	12
24. <i>Vested Options/Salary & Bonus</i>	0.69	0.92	0.93	-0.213	-0.010	0.084	0.158	0.203	0.118	-0.123	0.130	0.037	0.211	0.073	-0.040
25. <i>Vested Options/Total Comp</i>	0.38	0.57	0.64	-0.189	-0.046	0.094	0.134	0.220	0.123	-0.126	0.041	-0.003	0.072	0.054	-0.040
26. <i>Volatility – Characteristics</i>	0.09	0.11	0.07	0.397	-0.132	-0.199	-0.422	-0.144	-0.075	-0.294	-0.319	0.024	-0.201	-0.141	-0.014
27. <i>Volatility – Idiosyncratic</i>	0.02	0.02	0.01	0.425	-0.171	-0.230	-0.460	-0.166	-0.079	-0.340	-0.404	0.017	-0.239	-0.180	-0.041
28. <i>Volatility – Total</i>	0.10	0.12	0.08	0.422	-0.100	-0.202	-0.479	-0.049	-0.139	-0.333	-0.304	0.056	-0.212	-0.151	-0.030

Table 1
Descriptive statistics and correlations - continued

	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
14. <i>OIBD</i>	0.009														
15. <i>Restricted Stock/Salary & Bonus</i>	0.248	0.028													
16. <i>Restricted Stock/Total Comp</i>	0.204	0.022	0.872												
17. <i>Tangibility</i>	0.045	0.101	-0.015	0.000											
18. <i>Term</i>	-0.004	0.045	-0.007	-0.014	0.025										
19. <i>Tobin's Q</i>	-0.036	0.135	-0.028	-0.039	-0.139	0.033									
20. <i>Unrestricted Stock/Salary & Bonus</i>	0.075	0.101	0.154	0.123	-0.066	0.001	0.298								
21. <i>Unrestricted Stock/Total Comp</i>	-0.023	0.090	0.011	0.067	-0.041	0.011	0.247	0.916							
22. <i>Unvested Options/Salary & Bonus</i>	0.091	0.087	0.053	-0.019	-0.128	0.039	0.536	0.264	0.153						
23. <i>Unvested Options/Total Comp</i>	0.020	0.089	-0.068	-0.046	-0.110	0.046	0.504	0.228	0.221	0.884					
24. <i>Vested Options/Salary & Bonus</i>	0.175	0.098	0.108	0.039	-0.130	0.034	0.473	0.320	0.179	0.613	0.509				
25. <i>Vested Options/Total Comp</i>	0.095	0.095	-0.016	0.000	-0.110	0.052	0.438	0.282	0.270	0.514	0.565	0.887			
26. <i>Volatility – Characteristics</i>	-0.232	-0.202	-0.136	-0.142	-0.089	-0.040	0.112	-0.040	-0.041	0.082	0.078	-0.027	-0.030		
27. <i>Volatility – Idiosyncratic</i>	-0.277	-0.235	-0.162	-0.167	-0.110	-0.039	0.131	-0.044	-0.038	0.086	0.088	-0.037	-0.035	0.841	
28. <i>Volatility – Total</i>	-0.221	-0.210	-0.130	-0.132	-0.117	-0.041	0.111	-0.045	-0.052	0.110	0.093	-0.043	-0.053	0.541	0.585

Table 2**Holdings of vested in-the-money options and loan pricing: top management team average**

This table presents regressions of the *All-In Spread Drawn* (the total interest cost of a loan in basis points assuming the loan is fully drawn) on the average holdings of vested in-the-money options of firms' top management teams. To calculate *Vested Options/Salary & Bonus*, *Vested Options/Total Comp*, *Unvested Options/Salary & Bonus*, *Unvested Options/Total Comp*, *Restricted Stock/Salary & Bonus*, *Restricted Stock/Total Comp*, *Unrestricted Stock/Salary & Bonus*, and *Unrestricted Stock/Total Comp*, we first calculate the ratio of the value of each manager's holdings of vested options, unvested options, restricted stock, or unrestricted stock to the sum of the salary and bonus earned by that manager or the total compensation earned by that manager. We then calculate the average of this ratio for each firm-year and take a log transformation of this average. *Firm Size* is the natural log of assets. *Leverage* is the ratio of total debt to assets. *Loan Size* is the natural log of loan principal. *OIBD* is the ratio of operating income before depreciation to assets. *Tangibility* is the ratio of net property, plant, and equipment to assets. *Term* is a loan's maturity in months. Δ *Share Price* is the cube root of the year-on-year percentage change in a firm's share price. Regressions also include untabulated fixed effects for year, firm, loan purpose, and firm credit rating. Standard errors are clustered at the deal level and reported under each coefficient in parentheses. *, **, *** denote significance at the 10%, 5%, and 1% levels respectively.

	1	2	3	4	5	6
<i>Vested Options/Salary & Bonus</i>	-10.41*** (1.29)		-8.91*** (1.31)		-8.41*** (1.53)	
<i>Vested Options/Total Comp</i>		-12.63*** (1.87)		-10.74*** (1.92)		-7.86*** (2.27)
<i>Firm Size</i>	-2.17 (2.34)	-2.89 (2.39)	-2.36 (2.43)	-3.07 (2.45)	-1.93 (2.50)	-2.62 (2.51)
<i>Leverage</i>	57.85*** (9.84)	59.24*** (9.96)	50.01*** (10.22)	51.07*** (10.27)	49.91*** (10.33)	49.17*** (10.39)
<i>Loan Size</i>	-16.51*** (1.23)	-16.58*** (1.23)	-15.87*** (1.24)	-15.92*** (1.24)	-15.84*** (1.27)	-15.90*** (1.26)
<i>OIBD</i>	-155.63*** (18.012)	-158.40*** (18.08)	-139.34*** (17.80)	-140.73*** (17.83)	-136.04*** (18.36)	-135.97*** (18.34)
<i>Tangibility</i>	-4.58 (16.55)	-2.72 (16.74)	-2.92 (14.84)	-1.58 (14.90)	-5.44 (15.45)	-6.01 (15.43)
<i>Term</i>	0.14*** (0.04)	0.14*** (0.04)	0.17*** (0.04)	0.16*** (0.04)	0.17*** (0.05)	0.17*** (0.05)
Δ <i>Share Price</i>			-5.93*** (1.38)	-6.07*** (1.38)	-6.71*** (1.47)	-6.12*** (1.43)
<i>Unvested Options/ Salary & Bonus</i>					0.47 (1.71)	
<i>Unvested Options/Total Comp</i>						-3.94 (2.57)
<i>Restricted Stock/ Salary & Bonus</i>					3.23* (1.88)	
<i>Restricted Stock/Total Comp</i>						-3.18 (3.58)

Table 2**Holdings of vested in-the-money options and loan pricing: top management team average – continued**

	1	2	3	4	5	6
<i>Unrestricted Stock/ Salary & Bonus</i>					-0.35 (1.25)	
<i>Unrestricted Stock/Total Comp</i>						-0.86 (1.39)
<u><i>Fixed Effects</i></u>						
Year	Y	Y	Y	Y	Y	Y
Firm	Y	Y	Y	Y	Y	Y
Loan Purpose	Y	Y	Y	Y	Y	Y
Firm Credit Rating	Y	Y	Y	Y	Y	Y
Observations	15,057	14,960	14,159	14,077	13,629	13,592
<i>R</i> ²	0.71	0.71	0.72	0.72	0.72	0.72

Table 3**Holdings of vested in-the-money options and loan pricing: chief executive officers**

This table presents regressions of the *All-In Spread Drawn* (the total interest cost of a loan in basis points assuming the loan is fully drawn) on the holdings of vested in-the-money options of firms' chief executive officers (CEOs). To calculate *Vested Options/Salary & Bonus* and *Vested Options/Total Comp*, we first calculate the ratio of the value of each CEO's vested option holdings to the sum of the salary and bonus earned by that CEO or the total compensation earned by that CEO. We then take a log transformation of this figure. *Firm Size* is the natural log of assets. *Leverage* is the ratio of total debt to assets. *Loan Size* is the natural log of loan principal. *OIBD* is the ratio of operating income before depreciation to assets. *Tangibility* is the ratio of net property, plant, and equipment to assets. *Term* is a loan's maturity in months. *CEO Tenure* is the natural log of the length of the CEO's service with a firm in months. Variables are defined in the text. Regressions also include untabulated fixed effects for year, firm-CEO match, loan purpose, and firm credit rating. Standard errors are clustered at the deal level and reported under each coefficient in parentheses. *, **, *** denote significance at the 10%, 5%, and 1% levels respectively.

	1	2	3	4
<i>Vested Options/Salary & Bonus</i>	-7.00*** (1.42)		-5.64*** (1.77)	
<i>Vested Options/Total Comp</i>		-11.40*** (1.79)		-11.66*** (2.32)
<i>Firm Size</i>	1.10 (3.42)	-2.39 (3.68)	3.77 (4.54)	6.25 (5.10)
<i>Leverage</i>	51.47*** (13.01)	48.66*** (13.01)	57.59*** (18.87)	55.34*** (19.18)
<i>Loan Size</i>	-16.27*** (1.39)	-16.46*** (1.38)	-19.02*** (1.92)	-18.98*** (1.91)
<i>OIBD</i>	-139.03*** (23.79)	-137.87*** (23.93)	-133.31*** (33.72)	-118.32*** (34.81)
<i>Tangibility</i>	16.38 (20.17)	21.00 (20.57)	44.42 (27.90)	55.07* (29.17)
<i>Term</i>	0.17*** (0.05)	0.16*** (0.05)	0.16*** (0.06)	0.14** (0.06)
<i>CEO Tenure</i>			-1.36 (5.96)	0.10 (5.91)
<u>Fixed Effects</u>				
Year	Y	Y	Y	Y
Firm – CEO	Y	Y	Y	Y
Loan Purpose	Y	Y	Y	Y
Firm Credit Rating	Y	Y	Y	Y
Observations	13,836	13,811	7,297	7,272
R^2	0.77	0.78	0.78	0.78

Table 4**Holdings of vested in-the-money options and loan pricing: controlling for inside debt**

This table presents excerpts of regressions of the *All-In Spread Drawn* (the total interest cost of a loan in basis points assuming the loan is fully drawn) on the average holdings of vested in-the-money options of firms' top management teams. Columns 1 and 2 exclude firms that, for any manager in any year in the ExecuComp database, report a non-missing value for the number of years accrued in the firm's pay-and-service pension plan. In Columns 3 and 4, each measure of managers' holdings of vested in-the-money options is partitioned into a version that applies to loans where the data required to calculate a control variable (*Inside Debt/Salary & Bonus* or *Inside Debt/Total Comp*) for managers' inside debt holdings are available and into a version that applies where these data are unavailable. Columns 3 and 4 also include an untabulated dummy variable indicating whether the data to calculate these controls is missing. To calculate *Vested Options/Salary & Bonus* and *Vested Options/Total Comp*, we first calculate the ratio of the value of each manager's vested option holdings to the sum of the salary and bonus earned by that manager or the total compensation earned by that manager. We then calculate the average of this ratio for each firm-year and take a log transformation of this average. *Inside Debt/Salary & Bonus* and *Inside Debt/Total Comp* are calculated the same way, but with two changes: the value of each manager's accrued pension benefits and deferred compensation is substituted for vested option holdings, and if the data to calculate either variable are missing, the variable is set to zero. The control variables, including fixed effects, are the same as in Table 2. Standard errors are clustered at the deal level and reported under each coefficient in parentheses. In Columns 3 and 4, the *F*-test is conducted with respect to the two versions of *Vested Options/Salary & Bonus* and *Vested Options/Total Comp*. *, **, *** denote significance at the 10%, 5%, and 1% levels respectively.

	1	2	3	4
<i>Vested Options/Salary & Bonus</i>	-9.51*** (2.43)			
<i>Vested Options/Total Comp</i>		-11.42*** (3.26)		
<i>Vested Options/Salary & Bonus x Inside Debt Available</i>			-8.85*** (2.84)	
<i>Vested Options/Salary & Bonus x Inside Debt Unavailable</i>			-11.14*** (1.38)	
<i>Vested Options/Total Comp x Inside Debt Available</i>				-12.46*** (4.46)
<i>Vested Options/Total Comp x Inside Debt Unavailable</i>				-12.91*** (1.97)
<i>Inside Debt/Salary & Bonus</i>			3.75 (3.51)	
<i>Inside Debt/Total Comp</i>				6.55 (6.12)
<i>F</i> -Statistic – Inside Debt Available vs. Unavailable			0.58	0.01

Table 5**Holdings of vested in-the-money options and loan pricing: moderating factors**

This table presents excerpts of regressions of the *All-In Spread Drawn* (the total interest cost of a loan in basis points assuming the loan is fully drawn) on the average holdings of vested in-the-money options of firms' top management teams. In Columns 1 and 2, each measure of managers' holdings of vested in-the-money options is partitioned into a version that applies to commercial paper backup loans and one that applies to other loans. In Columns 3 and 4, each measure is partitioned into three versions based on the firm's credit rating: Investment Grade (BBB- or higher), Junk (BB+ or below), and Unrated. Columns 5 and 6 add *Tobin's Q* and interact it with each measure of managers' vested option holdings. Columns 7 and 8 add *Distance to Default* and interact it with each measure of managers' vested option holdings. To calculate *Vested Options/Salary & Bonus* and *Vested Options/Total Comp*, we first calculate the ratio of the value of each manager's vested option holdings to the sum of the salary and bonus earned by that manager or the total compensation earned by that manager. We then calculate the average of this ratio for each firm-year and take a log transformation of this average. *Tobin's Q* is a log transformation of the ratio of the market value of assets to the book value of assets. *Distance to Default* is a measure of the probability of default, as described in the text. The control variables, including fixed effects, are the same as in Table 2. Standard errors are clustered at the deal level and reported under each coefficient in parentheses. In Columns 1 – 4, the *F*-test is conducted with respect to the different versions of *Vested Options/Salary & Bonus* and *Vested Options/Total Comp*. *, **, *** denote significance at the 10%, 5%, and 1% levels respectively.

	1	2	3	4	5	6	7	8
<i>Vested Options/Salary & Bonus x CP Backup</i>	-1.83 (1.54)							
<i>Vested Options/Salary & Bonus x Not CP Backup</i>	-12.05*** (1.42)							
<i>Vested Options/Total Comp x CP Backup</i>		-0.34 (2.33)						
<i>Vested Options/Total Comp x Not CP Backup</i>		-14.72*** (2.04)						
<i>Vested Options/Salary & Bonus x Investment Grade</i>			-4.04*** (1.44)					
<i>Vested Options/Salary & Bonus x Junk</i>			-19.12*** (2.84)					
<i>Vested Options/Salary & Bonus x Unrated</i>			-16.14*** (2.47)					
<i>Vested Options/Total Comp x Investment Grade</i>				-3.48 (2.40)				
<i>Vested Options/Total Comp x Junk</i>				-24.57*** (3.90)				
<i>Vested Options/Total Comp x Unrated</i>				-15.73*** (3.12)				
<i>F</i> -Statistic – CP Backup vs. Not	36.63***	30.93***						
<i>F</i> -Statistic – Junk vs. Unrated			0.71	3.51*				
<i>F</i> -Statistic – Unrated vs. Investment Grade			19.41***	10.21***				
<i>F</i> -Statistic – Junk vs. Investment Grade			23.50***	21.67***				

Table 5
Holdings of vested in-the-money options and loan pricing: moderating factors - continued

	1	2	3	4	5	6	7	8
<i>Vested Options/Salary & Bonus</i>					-15.35*** (2.11)		-16.94*** (1.89)	
<i>Vested Options/Total Comp</i>						-24.58*** (3.04)		-24.35*** (2.83)
<i>Vested Options/Salary & Bonus x Tobin's Q</i>					14.91*** (2.19)			
<i>Vested Options/Total Comp x Tobin's Q</i>						26.31*** (3.34)		
<i>Tobin's Q</i>					-38.34*** (5.59)	-40.90*** (5.12)		
<i>Vested Options/Salary & Bonus x Distance to Default</i>							1.23*** (0.18)	
<i>Vested Options/Total Comp x Distance to Default</i>								1.93*** (0.25)
<i>Distance to Default</i>							-2.70*** (0.33)	-2.72*** (0.33)

Table 6**Holdings of vested in-the-money options and other measures of credit quality**

This table presents regressions of future *OIBD*, *Credit Rating*, and *Distance to Default* on the average holdings of vested in-the-money options of firms' top management teams. Coefficients and standard errors in the *OIBD* regression are increased by a factor of 100 to improve readability (except for $OIBD_{t-1}$). *OIBD* is the ratio of operating income before depreciation to assets. *Credit Rating* converts a firm's long-term S&P senior credit rating into a numerical score ranging from D (1) to AAA (26). *Distance to Default* is a measure of the probability of default, as described in the text. The subscript $t-1$ denotes a variable's value lagged by one year. To calculate *Vested Options/Salary & Bonus* and *Vested Options/Total Comp*, we first calculate the ratio of the value of each manager's vested option holdings to the sum of the salary and bonus earned by that manager or the total compensation earned by that manager. We then calculate the average of this ratio for each firm-year and take a log transformation of this average. *Business Segments* is the number of business segments reported by a firm. Δ *Share Price* is the cube root of the year-on-year percentage change in a firm's share price. *Dividend Indicator* equals 1 if a firm pays a cash dividend in a given year. *Firm Size* is the natural log of assets. *Geographic Segments* is the number of geographic segments reported by a firm. *Leverage* is the ratio of total debt to assets. Regressions also include untabulated fixed effects for year and firm. Standard errors are reported under each coefficient in parentheses. *, **, *** denote significance at the 10%, 5%, and 1% levels respectively.

	<i>OIBD</i>				<i>Credit Rating</i>				<i>Distance to Default</i>			
	1	2	3	4	5	6	7	8	9	10	11	12
<i>Vested Options/Salary & Bonus</i>	1.95*** (0.08)		1.07*** (0.07)		0.36*** (0.02)		0.24*** (0.01)		0.55*** (0.04)		0.30*** (0.04)	
<i>Vested Options/Total Comp</i>		2.32*** (0.11)		1.32*** (0.09)		0.39*** (0.02)		0.28*** (0.02)		0.71*** (0.06)		0.41*** (0.06)
$OIBD_{t-1}$			0.48*** (0.01)	0.48*** (0.01)								
$Credit\ Rating_{t-1}$							0.77*** (0.01)	0.77*** (0.01)				
$Distance\ to\ Default_{t-1}$											0.16*** (0.01)	0.16*** (0.01)
<i>Business Segments</i>	-0.06 (0.05)	-0.08 (0.05)	-0.02 (0.04)	-0.03 (0.04)	-0.03*** (0.01)	-0.04*** (0.01)	-0.01* (0.01)	-0.02** (0.01)	-0.09*** (0.03)	-0.09*** (0.03)	-0.07*** (0.02)	-0.07*** (0.02)
Δ <i>Share Price</i>	1.68*** (0.08)	1.58*** (0.08)	1.84*** (0.07)	1.79*** (0.07)	0.08*** (0.02)	0.05*** (0.02)	0.17*** (0.01)	0.16*** (0.01)	2.13*** (0.04)	2.11*** (0.04)	2.21*** (0.04)	2.19*** (0.04)
<i>Dividend Indicator</i>	0.65*** (0.21)	0.62*** (0.21)	0.18 (0.18)	0.17 (0.19)	0.93*** (0.04)	0.92*** (0.04)	0.21*** (0.03)	0.19*** (0.03)	0.30*** (0.11)	0.31*** (0.11)	0.22** (0.11)	0.22** (0.11)
<i>Firm Size</i>	-0.70*** (0.12)	-0.48*** (0.12)	-0.88*** (0.10)	-0.78*** (0.10)	0.69*** (0.03)	0.72*** (0.03)	0.00 (0.02)	0.02 (0.02)	-0.33*** (0.06)	-0.27*** (0.06)	-0.20*** (0.06)	-0.17*** (0.06)
<i>Geographic Segments</i>	-0.03 (0.05)	-0.04 (0.05)	0.00 (0.04)	0.00 (0.04)	-0.02** (0.01)	-0.02** (0.01)	-0.02** (0.01)	-0.02** (0.01)	-0.01 (0.03)	-0.01 (0.03)	-0.01 (0.02)	-0.01 (0.02)
<i>Leverage</i>	-2.71*** (0.46)	-3.03*** (0.47)	2.97*** (0.41)	2.86*** (0.42)	-3.43*** (0.11)	-3.51*** (0.12)	-1.01*** (0.09)	-1.02*** (0.09)	-8.99*** (0.24)	-8.99*** (0.24)	-7.01*** (0.24)	-7.02*** (0.24)
<u><i>Fixed Effects</i></u>												
Year	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	27,460	27,179	27,385	27,103	14,375	14,645	13,974	13,898	25,119	24,864	24,418	24,178
R ²	0.66	0.65	0.73	0.73	0.88	0.88	0.94	0.94	0.72	0.72	0.75	0.75

Table 7
Holdings of vested in-the-money options and volatility

This table presents regressions of future *Volatility - Total*, *Volatility - Characteristics*, and *Volatility - Idiosyncratic* on the average holdings of vested in-the-money options of firms' top management teams. Coefficients and standard errors in the *Volatility - Total* and *Volatility - Characteristics* regressions are increased by a factor of 100 and in the *Volatility - Idiosyncratic* regression by a factor of 1,000 to improve readability. *Volatility - Total* is the monthly volatility of a firm's equity returns. *Volatility - Characteristics* is the monthly volatility of a firm's equity returns after correcting for the returns to a portfolio matched by market capitalization and book-to-market ratio. *Volatility - Idiosyncratic* is the daily volatility of the unexplained variation in a firm's equity returns as per the Fama-French 3-factor plus momentum model. The subscript *t-1* denotes a variable's value lagged by one year. To calculate *Vested Options/Salary & Bonus* and *Vested Options/Total Comp*, we first calculate the ratio of the value of each manager's vested option holdings to the sum of the salary and bonus earned by that manager or the total compensation earned by that manager. We then calculate the average of this ratio for each firm-year and take a log transformation of this average. *Business Segments* is the number of business segments reported by a firm. *Dividend Indicator* equals 1 if a firm pays a cash dividend in a given year. *Firm Size* is the natural log of assets. *Geographic Segments* is the number of geographic segments reported by a firm. *Leverage* is the ratio of total debt to assets. Regressions also include untabulated fixed effects for year and firm. Standard errors are reported under each coefficient in parentheses. *, **, *** denote significance at the 10%, 5%, and 1% levels respectively.

	<i>Volatility - Total</i>				<i>Volatility - Characteristics</i>				<i>Volatility - Idiosyncratic</i>			
	1	2	3	4	5	6	7	8	9	10	11	12
<i>Vested Options/Salary & Bonus</i>	-0.20*** (0.05)		-0.17*** (0.05)		-0.26*** (0.05)		-0.27*** (0.05)		-0.63*** (0.08)		-0.24*** (0.07)	
<i>Vested Options/Total Comp</i>		-0.23*** (0.07)		-0.18** (0.07)		-0.27*** (0.06)		-0.32*** (0.06)		-0.61*** (0.11)		-0.19* (0.10)
<i>Volatility - Total_{t-1}</i>			23.03*** (0.69)	22.94*** (0.69)								
<i>Volatility - Characteristics_{t-1}</i>							17.67*** (0.64)	17.55*** (0.64)				
<i>Volatility - Idiosyncratic_{t-1}</i>											437.52*** (6.20)	450.61*** (6.31)
<i>Business Segments</i>	0.06* (0.03)	0.06* (0.04)	0.06* (0.03)	0.06* (0.03)	0.05 (0.03)	0.05 (0.03)	0.04 (0.03)	0.04 (0.03)	0.15*** (0.05)	0.15*** (0.05)	0.06 (0.05)	0.05 (0.05)
<i>Dividend Indicator</i>	-0.21 (0.14)	-0.20 (0.15)	-0.02 (0.14)	-0.01 (0.14)	-0.25** (0.13)	-0.23* (0.13)	-0.05 (0.13)	-0.04 (0.13)	-0.32 (0.21)	-0.29 (0.22)	0.65*** (0.20)	0.70*** (0.20)
<i>Firm Size</i>	-1.03*** (0.08)	-1.07*** (0.08)	0.82*** (0.08)	0.86*** (0.08)	-1.09*** (0.07)	-1.13*** (0.07)	-0.82*** (0.07)	-0.86*** (0.07)	-2.41*** (0.12)	-2.52*** (0.12)	-0.96*** (0.12)	-0.97*** (0.12)
<i>Geographic Segments</i>	0.02 (0.03)	0.02 (0.03)	0.00 (0.03)	0.00 (0.03)	-0.02 (0.03)	-0.02 (0.03)	-0.04 (0.02)	-0.04 (0.03)	-0.01 (0.05)	-0.01 (0.05)	-0.01 (0.05)	-0.01 (0.05)
<i>Leverage</i>	3.54*** (0.32)	3.59*** (0.33)	2.85*** (0.32)	2.92*** (0.32)	3.50*** (0.29)	3.56*** (0.29)	2.99*** (0.29)	3.05*** (0.29)	6.05*** (0.48)	6.18*** (0.49)	3.63*** (0.45)	3.63*** (0.45)
<i>Fixed Effects</i>												
Year	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	28,509	28,216	28,299	28,016	29,971	29,683	29,335	29,069	29,971	29,683	29,335	29,069
R ²	0.54	0.54	0.56	0.56	0.52	0.52	0.53	0.53	0.65	0.65	0.71	0.71