

Are Banks Happy when Managers Go Long?

Vested Options and the Cost of Private Debt

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Abstract

In deciding to retain or dispose of vested in-the-money options on their firms' shares, managers may reveal their private information and behavioral intentions. We investigate the implications for loan pricing, finding a strong negative relationship between interest rates and three measures of the value of managers' vested in-the-money option holdings in relation to personal wealth, even when controlling for growth prospects, stock price changes, and unobservable borrower and manager heterogeneity. The relationship is weaker for commercial paper backup loans and stronger for "junk" than for investment grade borrowers, suggesting that option holdings have information content specific to credit quality.

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I. Introduction

Banks face two well-known challenges in screening and monitoring borrowers on behalf of depositors and other ultimate lenders. There is adverse selection, whereby would-be borrowers of different *ex ante* credit quality are difficult to distinguish from each other; and there is moral hazard, whereby a borrower receives a loan and takes actions *ex post* that are contrary to the lender's interests. A growing empirical literature focuses on how the loan market may overcome these agency problems using hard information about borrowers¹ and loan terms and conditions (Dennis, Nandy, and Sharpe, 2000; Bradley and Roberts, 2004; Demiroglu and James, 2007), in each case showing how loan pricing varies with these factors. Studies also document how the relationship between these factors and loan pricing is moderated by other aspects of the loan transaction, including the distance between borrower and lender (Degryse and Ongena, 2006), where the loan is syndicated (Carey and Nini, 2007), characteristics of the lender (Coleman, Esho, and Sharpe, 2002; Hao, 2004; Ross, 2008), and how the loan principal is allotted among lenders (Ivashina, Forthcoming).

The literature has paid less attention to those who frequently have the most accurate information about their firm's business prospects and the greatest influence on their firm's future 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 strategic management, economics, and finance (e.g., Finkelstein and Hambrick, 1996; Bertrand and Schoar, 2003; Huson, Malatesta, and Parrino, 2004), and

¹ Hard information about borrowers is usually studied implicitly in the empirical loan pricing literature through the various control variables derived from borrowers' financial statements.

that senior managers would seem to be the ultimate source of much “soft” information about the borrower through their interaction with a lender’s own loan officers.

The present work aims to address this gap in the literature. This immediately raises the question of how one can obtain a signal of what senior managers know or intend to do that is relevant for credit quality. Our answer is by studying how these managers tend to something they likely care a great deal about, namely their personal wealth tied up in investments in their firms. To our knowledge, the present work is the first to make this connection.

Our starting point is the observation that even without direct investment in their firms, managers’ future wealth is to a large extent linked to their firms’ future performance, rendering managers significantly under diversified. As a result, one would expect that managers would often monetize their in-the-money options soon after those options vest in order to diversify their portfolios (Lambert, Larcker, and Verrecchia, 1991; Hall and Murphy, 2002). Yet, many managers do not do so, leaving themselves with a highly-levered long position in their firms and making managers’ personal wealth even more susceptible to their firms’ fortunes than would holding shares of equivalent value. Thus, holdings of vested in-the-money options (in relation to personal wealth) may serve as both a credit statistic vis-à-vis adverse selection (with regard to managers’ private information about exogenous influences on their firms’ future cash flows) and vis-à-vis moral hazard (to the extent that managers can influence those cash flows).

On the one hand, by maintaining a highly-levered position, a manager may be aligning *with* equity holders and *against* debt holders and therefore have a preference for the higher-risk, higher-return cash flows preferred by equity investors, as opposed to the

lower-risk, lower-return cash flows preferred by debt investors (Jensen and Meckling, 1976; John and John, 1993; Parrino and Weisbach, 1999). This suggests a *positive* relationship between (a) the value of a manager's holdings of vested in-the-money options in relation to personal wealth and (b) the firm's cost of borrowing.

On the other hand, however, authors have shown 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). Moreover, a positive shock that raises the mean but not the other moments of a firm's expected cash flows would presumably be welcomed by all classes of "long" investors; and the greater the sensitivity of a manager's personal investment in a firm to the firm's fortunes, the greater the manager's disincentive for "negligence and profusion" à la Smith (1776) in the management of the firm's affairs. These arguments suggest a *negative* relationship between (a) the value of a manager's holdings of vested in-the-money options in relation to personal wealth and (b) the firm's cost of borrowing. In this paper, we investigate these contrasting hypotheses in the private debt market.

Since we cannot directly observe managers' personal wealth, we use three different proxies for it. Two proxies are based on a manager's ongoing compensation, which has been recommended for this purpose (Carpenter, Stanton, and Wallace, 2006, pg. 8), and one proxy is based on a manager's total equity investment in the employing firm. Using these proxies, we then create three distinct measures of the value of a manager's holdings of vested in-the-money options in relation to personal wealth. The idea is that instead of claiming there is one "best" measure, we use several and let the data determine whether the results are consistent.

In our base case analysis, we calculate each measure for each member of a borrower's top management team and then take the average thereof as our independent variable of interest. In separate regressions with borrower fixed effects, we obtain our main result: Each measure of the value of managerial holdings of vested in-the-money options in relation to personal wealth has a negative and highly statistically significant relationship with the cost of borrowing. We then consider a number of potential explanations for this finding.

One possibility is that our measures are capturing growth prospects and overall firm quality, i.e., factors that make the firm "better" to all classes of investors. We could observe this either because managers tend to retain more in-the-money options in "high quality" firms or are slow to rebalance their personal portfolios in response to share price changes. Intriguingly, our results are not qualitatively affected when we control for either of these possibilities, suggesting there may indeed be something special in managers' holdings of vested in-the-money options as relates to credit quality.

Another class of explanations concerns the composition of a borrower's top management team. Yet, when we use the option holdings of Chief Executive Officers (CEOs) alone and fixed effects at the level of the borrower-CEO match, we continue to find a negative and highly statistically significant relationship between holdings of vested options and the cost of borrowing, even when controlling for the CEO's tenure with the borrower. (The coefficients are not quite as large in magnitude as in the base case analysis; this is intuitive, as it implies that the private information and behavior of a borrower's entire top management team are important, not just those of the CEO.)

We then more specifically test whether managerial holdings of vested in-the-money options function as a credit signal by investigating how the relationship between our measures and interest rates grows stronger or weaker as the marginal value of credit signals varies. In particular, we conduct two follow-on analyses. In the first, we examine how the relationship between our measures and interest rates differs between commercial paper backup facilities and loans for other purposes. As commercial paper backup facilities are generally intended for borrowers with well-established reputations in the credit markets, the marginal value of signals of borrower credit quality should be lower for such loans than for other loans. We find that the relationship between managerial holdings of vested in-the-money options and interest rates is much weaker for commercial paper backup facilities. In a similar spirit, we compare the relationship between our measures and loan pricing for investment grade borrowers, “junk” borrowers, and unrated borrowers, the average credit quality of which probably lies somewhere in-between investment grade and junk. We find that our measures have the strongest negative association with interest rates for junk borrowers and the weakest for investment grade borrowers. Both these sets of results are consistent with the view that managerial holdings of vested in-the-money options serve as a credit statistic and bonding device in the loan market.

These results may also be of interest to the literature on managerial “confidence,” i.e., a form of optimism either about the state of nature or a manager’s own ability. On the one hand, theory suggests that confident managers may believe their efforts are more likely to produce good outcomes; if so, confident managers would require less high-powered incentives, to the benefit of investors (Goel and Thakor, 2008; Gervais, Heaton,

and Odean, 2009). On the other hand, there is empirical evidence that managerial confidence may become excessive, leading to suboptimal decision making in capital allocation and the market for corporate control, to the detriment of investors (Hayward and Hambrick, 1997; Malmendier and Tate, 2005, 2008).

Confidence is a complex psychological construct that we do not purport to measure directly or in all its nuances. Nonetheless, the somewhat conflicting perspectives in the managerial confidence literature raise a practical question, which this paper addresses: Is it good news for lenders (or other investors) that a firm's managers have a positive view of their firm's future prospects? The results of our paper suggest that when a borrower's manager is more confident and optimistic about the borrower's future prospects, the lender to that borrower is more confident and optimistic about the borrower's credit quality, even when controlling for observable and unobservable borrower (and even manager) heterogeneity.

Given that this result is qualitatively different from those of the empirical work on managerial confidence cited above, it is worth noting that, in our research design, we do not seek to measure a manager's confidence relative to an absolute benchmark or relate managerial attitudes and behaviors to media attention or compensation. Rather, our econometric specification is designed to benchmark managers with themselves (in particular, the specifications with fixed effects at the level of the borrower-CEO match). We propose that when a manager's holdings of vested in-the-money options in relation to personal wealth are particularly large (small) *in comparison to the average for that manager*, the manager has a relatively more (less) favorable view about the firm's prospects vis-à-vis the manager's own natural tendencies. Thus, other legacy factors

affecting a manager's equity position, including the manager's own baseline level of confidence and personal financial situation, as well as the decision by the firm to hire the manager in the first place, are implicitly controlled for. Our results do not speak to whether a manager's baseline level of confidence is good or bad for lenders.

In addition to the literature cited above, the present work also builds upon, and contributes to, two other literature streams. There is mixed evidence from the stock market on whether there is information content in managers' decision to exercise their options. Studying long-term abnormal returns following option exercises, Carpenter and Remmers (2001) find no evidence that managers use inside information in timing their exercises. By contrast, Aboody, Hughes, Liu and Su (2008) do find such evidence by highlighting the fact that while managers usually convert their options into cash upon exercise (resulting in negative abnormal returns), managers sometimes retain the shares (resulting in positive abnormal returns). While a conversion of in-the-money options into cash clearly reduces a manager's long position, converting the options into shares, which also reduces the manager's cash position by the amount of the exercise price, is more ambiguous. Thus, interpreting every decision to exercise options as a reduction in a manager's net long position probably introduces noise into the data.²

With regard to managers' equity investments in their firms and debt pricing, Ortiz-Molina (2006) and Shaw (2008) find a positive relationship between at-issue yield spreads of corporate bonds and the percentage of company shares and options held by the

² 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 this, we do control for recent stock price changes and unobservable borrower (and manager) heterogeneity. To the extent that these controls do not fully account for optimal dividend capture, our econometric tests should be biased *against* finding evidence that managers' option holdings have information content for lenders.

issuer's top 5 executives (for the former) and CEO (for the latter), providing support for the hypothesis that bondholders anticipate future managerial risk choices and regard managerial long positions in issuer equity as a signal of conflicting preferences for risk. Shaw (2008) also finds that the cost of debt is inversely related to the sensitivity of the CEO's option and share portfolio to the issuer's share price.

In addition to studying the private debt market, where banks, as "inside lenders," may use different lending criteria than bond investors, our approach complements this work and departs from it in two important ways. First, we make a distinction between exercisable (i.e., vested) and unexercisable options in the portfolios of top executives. This distinction is crucial, for it is only the former that, by definition, could be monetized in response to a manager's changing view of the firm's prospects or intentions with regard to future behavior. Second, we control for the unobservable time invariant characteristics of borrowers and their managers, thereby mitigating the problems of codetermination in cross-sectional data, which would otherwise make it difficult to draw reasonable inferences about causation.

A further virtue of our approach is that we construct a variety of proxies for managers' overall wealth and investment portfolio, one of which, like Shaw (2008), explicitly includes managers' holdings of firm equity, thereby making a more direct link between managers' vested in-the-money option holdings and managers' net long position in the firm. Another virtue is that by focusing on holders of senior private debt, we study a group whose preferences for risk should be, according to the traditional view, as different from those of a shareholder-manager as possible. This brings the different

preferences of the various investor classes and potential conflicts among them into sharper focus.

The rest of the paper proceeds as follows. Section II discusses the empirical setting and estimation strategy. Section III presents the main results and follow-on analyses. Section IV concludes.

II. Data, Variables, & Empirical Specification

The data on loans and borrower credit ratings come from Loan Pricing Corporation's DealScan. Borrower financial information comes from Standard and Poor (S&P)'s CompuStat. Information on borrowers' senior executives as well as their compensation and stock 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, including age, title, and compensation. The sample period is 1992-2006.

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 behavioral intentions with respect thereto. We cannot directly observe managers' personal wealth and future earnings potential, so we use proxies that should be correlated with them.

One proxy is a manager's annual compensation (Carpenter, Stanton, and Wallace, 2006, pg. 8), which we measure in two ways. The first is a manager's salary and bonus as reported in ExecuComp in the "tcc" field. Though bonuses typically contain an incentive component, and may increase slowly over time with seniority, these payments also tend

not to fluctuate from one year to the next as much as other forms of compensation. A variant of total compensation – the “tdc1” field in ExecuComp – is a more comprehensive measure that includes, inter alia, the total value of restricted stock granted, the total value of stock options granted (using Black-Scholes), and long-term incentive payouts. While tdc1 is the most comprehensive measure of managerial compensation and has been used before as a measure thereof (Bebchuk, Cremers, and Peyer, 2007), tdc1 also fluctuates much more from year to year than the sum of salary and bonus. Since it is not obvious which measure of annual compensation is superior for our purposes, we use both; namely, we define VESTOPT-SB 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 VESTOPT-TC as the corresponding measure with the variable tdc1 in the denominator. The log transformation is used to reduce skewness.

Another proxy for wealth is the manager’s total holdings of firm equity and options thereon. Therefore, we define VESTOPT-SHR OWN as the ratio of the value of a manager’s holdings of vested in-the-money options to the sum of this plus the value of a manager’s holdings of firm equity. (The number of shares held by a manager is from ExecuComp’s “shrown_excl_opts.”) A virtue of this measure is that it is by construction limited to $[0,1]$ and thus does not suffer from extreme skewness.

Everyone on the top management team should be in a position to form an informed view of the firm’s future prospects and, to a greater or lesser degree, influence firm actions. So, in our basic analysis, we calculate VESTOPT-SB, VESTOPT-TC, and

VESTOPT-SHR OWN for each of a borrower's top managers and use the straight arithmetic average for the top management team as the measure for that borrower in the ensuing fiscal year.³ Generally speaking, firms are required to report compensation and stock ownership data for the firm's CEO and the other top four most highly-paid executives, although some firms voluntarily report more. For consistency, we take the five highest paid executives for each firm to be the firm's top management team.

Table I presents summary statistics for VESTOPT-SB, VESTOPT-TC, and VESTOPT-SHR OWN for the average of borrowers' top management teams and borrowers' CEOs alone. With medians slightly lower than the means, the measures are skewed somewhat to the right. The effect of this should be largely eliminated through the use of fixed effects at either the level of the borrower or borrower-CEO match, as described below. The values of the measures are similar for the average of the top management team and the CEO alone, with VESTOPT-SB and VESTOPT-TC being somewhat higher for the CEO and VESTOPT-SHR OWN being somewhat lower, perhaps because CEO's often retain significant equity stakes in their firms as a visible signal of commitment or to maintain a measure of voting influence.

The three measures of managerial holdings of vested in-the-money options also exhibit some time trends, perhaps reflecting changing norms in executive compensation or, alternatively, changes to the composition of the S&P 1,500 over the course of the

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

sample. As depicted in Figure 1, which uses 1993 as the base year,⁴ vested in-the-money options grew as a share of managerial wealth using all three measures in the first half of the 1990s, then dropped towards the latter half of the decade, before subsequently rising again in the first half of the 2000s. VESTOPT-SHR OWN is the most stable measure of the three, perhaps because all of its components are equity instruments, creating a “hedge” against underlying trends in the equity markets. Regardless, due to the trends evident in Figure 1, we include year fixed effects in all of our regressions, as described below.

For vested in-the-money options to be relevant for credit quality, managerial holdings thereof must exhibit meaningful variance over time. If the only source of variation in holdings of vested in-the-money options is between firms, we will not be able to separate the effect of these option holdings on credit quality from other unobservable borrower characteristics.

In fact, our measures of managers’ option holdings do exhibit significant within-borrower variation over time. Table II shows the summary statistics for the sample standard deviation of VESTOPT-SB, VESTOPT-TC, and VESTOPT-SHR OWN across firms. (In other words, the mean represents the mean of the within-borrower standard deviation among firms.) For each of the measures of managers’ option holdings relative to personal wealth, the sample standard deviation of the within-borrower standard deviation is 58-69% of the sample mean, suggesting that there is a reasonable amount of

⁴ For 1993-2006, we have over 500 and usually over 1,000 observations (i.e., loans and executive compensation data) for each year for each of VESTOPT-SB, VESTOPT-TC, and VESTOPT-SHR OWN. 1992, by contrast, has 30 or fewer observations for each of these measures, reflecting missing compensation data in ExecuComp as well as more limited coverage of the loan market by DealScan in earlier years. As 30 is too few to produce a meaningful sample average in this context, we exclude 1992 from Figure 1.

within-borrower variation. To ensure that the variation is not merely a function of underlying economy-wide trends in compensation practices or changes in equity prices, we also regressed each measure of managerial option holdings against borrower and year fixed effects. As shown in Table II, the R^2 for these regressions ranges from 0.58 to 0.63. This again suggests that while there are important (and probably unobservable) time-invariant borrower and manager characteristics as well as economy-wide trends driving managers' option holdings, a significant amount of within-borrower variation remains even after controlling for these factors.

We use a wide range of control variables derived from recent research on loan pricing. Borrower financial attributes are FIRMSIZE, 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 LOANSIZE, the natural log of the loan principal amount. Summary statistics for these control variables are presented in Table I. We also include (untabulated) fixed effects (i.e., dummy variables) for the borrower's S&P senior debt rating at the closing of the loan as reported in DealScan, the loan purpose as reported in DealScan, and the year the loan is made.⁵

We cannot observe managers' risk preferences. Therefore, our empirical strategy is to use borrower fixed effects to control for this unobservable factor implicitly. By implicitly demeaning the data for each borrower, borrower fixed effects measure how the

⁵ 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.

interest rate a borrower pays on its loans varies as the vested option holdings of the borrower's top management team varies, in each case about the average for the borrower. Borrower fixed effects also control for other borrower attributes that affect creditworthiness and are known to market participants but are not observable to the econometrician. Since the personnel composing a borrower's top management team may change over time, we also run our regressions using the vested option holdings of the CEO alone, allowing us to calculate fixed effects at the level of the match between CEO and borrower; this is equivalent to having different dummy variables for the tenure of each CEO a borrower has during the sample period.

To ensure consistency and comparability across observations, we limit the analysis to US\$ LIBOR-based loans of "senior" status. (Non-US borrowers are implicitly excluded, as ExecuComp only reports information on US companies.) Finally, as some loans are part of multiple-loan deals, we cluster standard errors by deal.

III. Results

Base Case Analysis

Table III analyzes the relationship between loan pricing and the average holdings of vested in-the-money options of a borrower's top management team, with columns (1), (2), and (3) using VESTOPT-SB, VESTOPT-TC, and VESTOPT-SHR OWN, respectively, as the measure thereof. In each regression, the coefficient on the measure of vested in-the-money option holdings is negative and highly statistically significant. The results support the hypothesis that a manager's decision not to exercise vested options is a signal of the manager's private information and future behavior, and that this signal is

associated with “good news” for lenders. The coefficients are also economically meaningful. For example, the coefficient on VESTOPT-SHR OWN is -46.06, meaning that a 20% increase in the average proportion of top managers’ investments in their firm accounted for by vested options results in a 9.2 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 loans of longer maturity, and the negative coefficient on LNSIZE is indicative of modest economies of scale in borrowing. Neither firm size nor asset composition (TANGIBILITY) is significant. At 0.71, the R^2 is relatively high in each of the regressions, reflecting the explanatory power of borrower fixed effects as well as the many (untabulated) variables for year, loan purpose, and borrower credit rating (if any).

Firm Quality & Growth Prospects

The base case analysis raises the question of whether managerial holdings of vested in-the-money options have specific information content about a borrower’s creditworthiness or more generally capture firm quality or recent performance. Managers may be more inclined to retain vested in-the-money options when the firm is generally doing well or is expected to do well by the financial markets, and the equity markets may be similarly attuned to managers’ option holdings, giving firms whose managers hold more options a higher valuation. If overall firm quality and growth prospects are driving our results, then controlling for them should substantially weaken or even reverse our

results. To test this, we use the standard proxy for firm quality and growth prospects, Tobin's Q (TOBINQ), 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; we apply a log transformation to reduce skewness. We then repeat the regressions from Table III, Columns (1)-(3) in Columns (4)-(6). The coefficients on our measures of managers' holdings of vested in-the-money options do not materially change, and TOBINQ is only statistically significant in one of the regressions. This result provides indicative evidence that managerial holdings of vested in-the-money options have information content specific to credit quality.

Lazy Rebalancing

There is a more dynamic version of the foregoing firm quality and growth prospects story. Managers may be slow to rebalance their personal investment portfolios when the value of their investments in their firms changes quickly due to share price movements or for other reasons. If so, then the association we find between managerial holdings of vested in-the-money options and loan pricing may reflect an underlying improvement in the firm's overall prospects that affects both share prices and credit quality in the same way. As noted, one might also expect that TOBINQ would largely encompass this alternative explanation; however, TOBINQ is a "level" measure that does not capture the dynamic changes in share prices that could be driving changes in managers' vested option holdings. Therefore, as a more direct test of the lazy rebalancing hypothesis, we repeat the regressions from Table III, Columns (1)-(3) in Columns (7)-(9), this time including year-on-year changes in a firm's (split adjusted) stock price (Δ STOCK PRICE) from CRSP. The coefficients on the three measures of managers' vested

option holdings are again negative and highly statistically significant, and Δ STOCK PRICE is never significant. We thus reject the lazy rebalancing explanation.

Managerial Heterogeneity

Although turnover in top management teams is infrequent, it does occur. Changes in personnel could account simultaneously for changes in managerial holdings of vested options and changes in a borrower's creditworthiness. In particular, while we are not aware of an economic or psychological theory that would prompt firms, in anticipation of performance improvements, to hire managers more disposed to retain vested in-the-money options, from a strictly econometric point of view, such a phenomenon could account for our results.

To control for and thereby rule out this possibility, it would be desirable to control for unobservable attributes at the level of the match between borrower and manager. Therefore, we repeat the regressions from Table III, Columns (1)-(3) in Table IV, Columns (1)-(3), this time using the values of VESTOPT-SB, VESTOPT-TC, and VESTOPT-SHR OWN for the CEO alone and calculating fixed effects at the level of the match between borrower and CEO; in other words, the regression implicitly includes a dummy variable for the tenure of each CEO a borrower has during the sample period. This raises the number of fixed effect categories from 1518-1556 (borrower) in Table III to 2225-2325 (borrower-CEO match) in Table IV.

The results in Table IV, Columns (1)-(3) are consistent with those in Table III. For each measure of managerial holdings of vested in-the-money options, the coefficient is negative and highly statistically significant. Interestingly, the magnitude of the coefficients are between $1/5^{\text{th}}$ to $1/3^{\text{rd}}$ smaller vis-à-vis the comparable figures in Table

III, indicating that there is information content in the managerial option holdings of the entire top management team, not just those of the CEO. At 0.77, the values of R^2 in Table IV are 0.06 higher than the comparable values in Table III, probably as a result of the 50% increase in fixed effect categories. The coefficients on the control variables are also qualitatively the same as those in Table III, except that *FIRMSIZE* is now positive and statistically significant. It may be that options play a greater role in the compensation of senior managers below the CEO level in larger firms. Not including these managers in the calculation of our measures of managerial option holdings may make firm size a proxy for their attitudes in a non-obvious way, raising the question of how many of the control variables used to capture hard information in typical loan pricing regressions may in fact be proxies for soft information.

Managerial Tenure

It is possible that banks become more familiar with senior managers over time, improving the borrower's perceived creditworthiness or improving 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 borrower-CEO match, which are time invariant. Therefore, we create the variable *CEO TENURE*, which is a log transformation of a CEO's tenure with a borrower in months, and repeat the regressions with borrower-CEO fixed effects in Table IV, Columns (4)-(6). The coefficients on the measures of managers' holdings of vested in-the-money options 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.

Loan Purpose

As noted, a question of interest to the study of financial intermediation is whether managers' holdings of vested in-the-money options reflect information specifically relevant to the borrower's creditworthiness. Thus far, we have not directly tested this hypothesis, only providing indicative evidence by ruling out other candidate explanations for our main finding. We now tackle this issue by making use of the structure of the US loan market.

A significant minority of the loans made to the largest US corporations are to provide liquidity support for ongoing commercial paper programs. Such loans, which account for about 18.5% of the loans used in the regressions in this paper, are never intended to be drawn down except in the case of emergency. Borrowers who issue commercial paper have already established their creditworthiness in the public credit markets à la Diamond (1991). In consequence, the normal empirical determinants of loan pricing may be of little importance on such loans, as the market already "knows" how to price the credit risk thereon. However, one would expect that size, profitability, bargaining power, and other determinants of a firm's current and future standing would play a role in determining the interest rates such borrowers receive. Therefore, to the extent that managers' holdings of vested in-the-money options reflect managers' expectations for their firm's fortunes generally defined, such holdings should be equally relevant for commercial paper backup loans and for loans for other purposes. By contrast, to the extent that holdings of vested options have information content about a borrower's creditworthiness, i.e., future cash flows available for loan repayment and risk of bankruptcy, as well as managers' intended behavior with respect thereto, we would

expect the coefficients on VESTOPT-SB, VESTOPT-TC, and VESTOPT-SHR OWN to be larger (in absolute value) for non-commercial paper backup loans.

To test this, we perform a series of Chow Tests on our three measures of vested in-the-money options (Greene, 2003: pg. 130). This involves partitioning each variable into two versions, one that takes the value of the measure if the loan is a commercial paper back facility and is otherwise zero, and the other which takes the value of the measure if the loan is not a commercial paper backup facility and is otherwise zero. We then repeat the analysis of Table III, Columns (1)-(3), this time replacing each unpartitioned variable with the corresponding pair of partitioned variables.

Table V presents the coefficients of the partitioned measures of managers' holdings of vested in-the-money options. The coefficient on the version of each measure that applies to non-commercial paper backup facilities is always highly statistically significant and 2.6-5.0 times larger in absolute value than the version that applies to commercial paper backup loans, which is not consistently significant. Moreover, an F-test rejects the null hypothesis that the two versions of the measures are equal in all three regressions at the 1%-level of significance. These results provide strong support for the hypothesis that vested options have information content for a borrower's credit quality over and above a borrower's general business prospects.

A Priori Borrower Credit Quality

Using logic similar to that of the preceding section, one would expect that, to the extent that managers' holdings of vested options reflect credit quality and not general trends in the borrower's fortunes, vested options would have greater information content for borrowers of *a priori* lower credit quality than of *a priori* higher credit quality. We

accordingly partition VESTOPT-SB, VESTOPT-TC, and VESTOPT-SHR OWN into three versions, one that applies to investment grade borrowers (rated BBB- or higher by S&P at the time of the loan, approximately 46% of the loans in the regression sample), “junk” borrowers (rated CCC+ or lower, approximately 25% of the loans), and unrated borrowers, which span the credit spectrum.

If the signaling value of vested in-the-money options is negatively associated with *a priori* credit quality, the coefficients on our measures should be greatest (in absolute value) for junk borrowers, the coefficients for investment grade borrowers should be smallest, and the coefficients for unrated borrowers, which, conditional on obtaining a rating, would be a mix of investment grade and junk borrowers, should be somewhere in between, perhaps weighted somewhat more heavily toward the junk rating categories.

As an alternative hypothesis, if banks rely on credit ratings as part of the credit evaluation process, the coefficients on the unrated version of our measures should be the greatest in absolute value. 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 III, Columns (1)-(3), this time with the partition by credit rating for each measure of managers’ holdings of vested in-the-money options, and report the coefficients and Chow tests in Table VI. 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 unrated versions and between the unrated and junk versions at the 1% level in all of the six comparisons. Thus, the results strongly support the hypothesis

that managerial holdings of vested in-the-money options are more informative for borrowers of *a priori* poorer credit quality and thus have information content as a signal of credit quality over and above a borrower's general business prospects.

IV. Conclusion

This paper documents that there is a strong negative association between (a) the value of borrowers' managers' holdings of vested in-the-money options in relation to personal wealth and (b) the interest rate a borrower receives on loans in the private debt market. This association is strongest when the option holdings of a borrower's entire top management team are considered, but is also strong using just CEOs and employing fixed effects at the level of the borrower-CEO match. The association is not materially affected by controlling for firm quality and growth prospects, or for recent share price changes or managerial tenure. We also find that the association is weaker for commercial paper backup facilities than for loans for other purposes and stronger for "junk" borrowers than for investment grade borrowers.

These results are consistent with the hypothesis that managers' holdings of vested in-the-money options have information content that is specifically relevant to credit quality as opposed to merely reflecting a firm's good fortunes, generally defined. This has implications not only for the literature on loan pricing, but also for the study of managerial confidence and conflicts between investor classes.

Our results give rise to a number of interesting questions. Do lenders make inferences from managers' option holdings or do lenders and managers observe a common signal of borrower prospects? Do managers forgo exercise as a form of costly signaling to outside investors and, if so, are they compensated for it? Are some managers

dispositionally inclined to retain significantly more vested in-the-money options than other managers? These and other questions merit further investigation.

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Table I
Summary Statistics

Summary statistics for a selection of the variables used in this study. Statistics are calculated using the 15,643 loan observations for which at least one of VESTOPT-SB, VESTOPT-TC, or VESTOPT-SHR OWN is available.

| | <u>Median</u> | <u>Mean</u> | <u>Standard Deviation</u> |
|-----------------------------|---------------|-------------|-------------------------------|
| VESTOPT-SB | 0.77 | 0.94 | 0.87 |
| VESTOPT-TC | 0.44 | 0.60 | 0.61 |
| VESTOPT-SHR OWN | 0.28 | 0.32 | 0.26 |
| VESTOPT-SB (CEO Alone) | 0.88 | 1.11 | 1.17 |
| VESTOPT-TC (CEO Alone) | 0.46 | 0.69 | 0.80 |
| VESTOPT-SHR OWN (CEO Alone) | 0.17 | 0.28 | 0.30 |
| FIRM SIZE | 8.05 | 8.28 | 2.10 |
| LEVERAGE | 0.31 | 0.31 | 0.19 |
| OIBD | 0.12 | 0.13 | 0.09 |
| TANGIBILITY | 0.29 | 0.33 | 0.24 |
| TERM | 36.00 | 43.21 | 31.47 |
| LOANSIZE | 5.30 | 5.31 | 1.38 |
| TOBINQ | 0.29 | 0.40 | 0.44 |
| Δ SHARE PRICE | 0.05 | 0.11 | 0.44 |
| CEO TENURE | 5.31 | 5.04 | 1.00 |

Table II
Within-Borrower Variation in Managers’
Holdings of Vested In-the-money Options

The first three columns present summary statistics for the sample within-borrower standard deviation in respect of VESTOPT-SB, VESTOPT-TC, and VESTOPT-SHR OWN. The last column on the right shows the R^2 from a regression of each of VESTOPT-SB, VESTOPT-TC, and VESTOPT-SHR OWN against borrower and year fixed effects.

| | Within Borrower Standard Deviation | | | R^2 : Borrower & Year Fixed Effects |
|-----------------|------------------------------------|------|-----------------------|--|
| | Median | Mean | Standard Deviation | |
| VESTOPT-SB | 0.45 | 0.48 | 0.31 | 0.63 |
| VESTOPT-TC | 0.31 | 0.35 | 0.24 | 0.58 |
| VESTOPT-SHR OWN | 0.14 | 0.15 | 0.09 | 0.60 |

Table III
Holdings of Vested In-the-money Options and Loan Pricing
Top Management Team Average

Regressions of interest rate on average holdings of vested in-the-money options of members of borrowers' top management teams. Variables are defined in the text. Regressions also include untabulated fixed effects for year, borrower, loan purpose, and borrower 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) | (7) | (8) | (9) |
|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| VESTOPT-SB | -13.05 *** (1.58) | | | -12.36 *** (2.00) | | | -11.03 *** (1.54) | | |
| VESTOPT-TC | | -14.65 *** (2.04) | | | -12.93 *** (2.48) | | | -12.32 *** (2.10) | |
| VESTOPT-SHR OWN | | | -46.06 *** (4.99) | | | -45.20 *** (5.87) | | | -41.23 *** (5.27) |
| FIRM SIZE | -0.02 (2.73) | -0.16 (2.75) | 0.12 (2.89) | -1.12 (3.07) | -1.83 (3.07) | -1.25 (3.22) | 1.75 (2.77) | 1.76 (2.80) | 1.59 (2.84) |
| LEVERAGE | 60.28 *** (10.53) | 62.74 *** (10.61) | 65.01 *** (10.40) | 54.32 *** (11.24) | 56.97 *** (11.31) | 59.59 *** (11.01) | 61.68 *** (10.82) | 64.27 *** (10.86) | 64.65 *** (10.99) |
| OIBD | -156.20 *** (20.65) | -161.25 *** (20.57) | -158.48 *** (20.55) | -136.53 *** (25.31) | -131.19 *** (25.22) | -126.66 *** (25.01) | -144.07 *** (20.64) | -148.27 *** (20.47) | -141.79 *** (20.54) |
| TANGIBILITY | 8.59 (17.07) | 9.59 (17.02) | 7.75 (17.66) | 14.52 (18.35) | 13.55 (18.48) | 13.80 (18.91) | 0.69 (17.83) | 0.07 (17.71) | -3.16 (18.33) |
| TERM | 0.18 *** (0.05) | 0.18 *** (0.05) | 0.20 *** (0.05) | 0.17 *** (0.05) | 0.16 *** (0.05) | 0.19 *** (0.05) | 0.20 *** (0.05) | 0.20 *** (0.05) | 0.21 *** (0.05) |
| LOAN SIZE | -13.66 *** (1.24) | -13.70 *** (1.24) | -13.51 *** (1.25) | -12.27 *** (1.28) | -12.36 *** (1.28) | -12.21 *** (1.28) | -13.58 *** (1.26) | -13.63 *** (1.26) | -13.51 *** (1.27) |
| TOBINQ | | | | -6.37 (6.19) | -11.89 ** (5.91) | -9.45 (5.85) | | | |
| Δ SHARE PRICE | | | | | | | -3.02 (2.10) | -3.35 (2.13) | -2.25 (2.18) |
| <i>Fixed Effects</i> | | | | | | | | | |
| Year | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Borrower | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Loan Purpose | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Borrower Credit Rating | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Observations | 10,488 | 10,430 | 10,026 | 9,165 | 9,109 | 8,804 | 10,023 | 9,972 | 9,647 |
| R ² | 0.71 | 0.71 | 0.71 | 0.71 | 0.71 | 0.72 | 0.71 | 0.71 | 0.72 |

Table IV
Holdings of Vested In-the-money Options and Loan Pricing
Chief Executive Officers Alone

Regressions of interest rate on holdings of vested in-the-money options of borrowers' chief executive officers. Variables are defined in the text. Regressions also include untabulated fixed effects for year, borrower, loan purpose, and borrower 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) |
|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| VESTOPT-SB | -8.69 *** (1.63) | | | -7.90 *** (2.00) | | |
| VESTOPT-TC | | -11.60 *** (2.00) | | | -12.04 *** (2.71) | |
| VESTOPT-SHR OWN | | | -33.83 *** (6.01) | | | -39.82 *** (7.63) |
| FIRM SIZE | 11.46 *** (3.42) | 11.03 *** (3.84) | 12.35 *** (3.48) | 11.52 ** (4.55) | 11.29 ** (5.45) | 12.07 *** (4.55) |
| LEVERAGE | 72.51 *** (14.13) | 73.67 *** (14.06) | 70.74 *** (14.76) | 86.46 *** (19.72) | 85.61 *** (20.32) | 81.13 *** (20.53) |
| OIBD | -143.62 *** (25.85) | -150.13 *** (25.69) | -145.34 *** (26.98) | -127.94 *** (35.98) | -123.40 *** (36.64) | -133.24 *** (36.98) |
| TANGIBILITY | 5.62 (20.08) | 10.00 (20.64) | -0.31 (20.89) | 9.40 (26.44) | 19.41 (28.24) | 5.19 (27.01) |
| TERM | 0.26 *** (0.05) | 0.25 *** (0.05) | 0.26 *** (0.05) | 0.20 *** (0.06) | 0.19 *** (0.06) | 0.21 *** (0.06) |
| LOANSIZE | -13.80 *** (1.36) | -13.41 *** (1.37) | -13.33 *** (1.38) | -13.90 *** (1.77) | -12.85 *** (1.86) | -13.70 *** (1.77) |
| CEO TENURE | | | | -2.35 (5.33) | 2.03 (5.52) | -0.48 (5.46) |
| <i>Fixed Effects</i> | | | | | | |
| Year | Y | Y | Y | Y | Y | Y |
| Borrower - CEO | Y | Y | Y | Y | Y | Y |
| Loan Purpose | Y | Y | Y | Y | Y | Y |
| Borrower Credit Rating | Y | Y | Y | Y | Y | Y |
| Observations | 9,879 | 9,882 | 9,354 | 5,431 | 5,410 | 5,172 |
| R ² | 0.77 | 0.77 | 0.77 | 0.78 | 0.78 | 0.79 |

Table V
Chow Tests for Holdings of Vested In-the-money Options
Commercial Paper Backup Facilities vs. Other loans

The coefficients reported in this table are from regressions that repeat the analysis in Table III, Columns (1)-(3) but partition each measure of managerial holdings of vested in-the-money options into a version that applies to commercial paper backup loans and one that applies to other loans. For each measure, a Chow Test of equality is performed on the partitioned variables using the F-statistic. 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.

| Measure | Coefficient/F-Stat |
|--|----------------------|
| VESTOPT-SB | |
| Commercial Paper Backup | -4.51 *** (1.72) |
| Other Loans | -15.36 *** (1.82) |
| Commercial Paper Backup vs. Other Loans | 37.15 *** |
| VESTOPT-TC | |
| Commercial Paper Backup | -3.46 (2.53) |
| Other Loans | -17.15 *** (2.25) |
| Commercial Paper Backup vs. Other Loans | 25.32 *** |
| VESTOPT-SHR OWN | |
| Commercial Paper Backup | -17.98 *** (6.12) |
| Other Loans | -52.39 *** (5.38) |
| Commercial Paper Backup vs. Other Loans | 30.83 *** |

Table VI
Chow Tests for Holdings of Vested In-the-money Options
Comparison of Effects by Rating Category

The coefficients reported in this table are from regressions that repeat the analysis in Table III, Columns (1)-(3) but partition each measure of managerial holdings of vested in-the-money options into three versions according to the borrower's rating category: a. investment grade (BBB- or higher), b. Unrated, and c. Junk (CCC+ or lower). For each measure, a Chow Test of equality is performed between the unrated category and each of the investment grade and junk categories using the F-statistic. 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.

| Measure | Coefficient/F-Stat |
|------------------------------|-----------------------|
| VESTOPT-SB | |
| Investment Grade | -5.08 *** (1.44) |
| Unrated | -14.77 *** (2.69) |
| Junk | -30.20 *** (4.06) |
| Investment Grade vs. Unrated | 11.11 *** |
| Unrated vs. Junk | 11.30 *** |
| VESTOPT-TC | |
| Investment Grade | -2.15 (2.36) |
| Unrated | -14.56 *** (3.29) |
| Junk | -39.45 *** (4.88) |
| Investment Grade vs. Unrated | 10.30 *** |
| Unrated vs. Junk | 19.60 *** |
| VESTOPT-SHR OWN | |
| Investment Grade | -13.74 *** (5.34) |
| Unrated | -40.97 *** (9.09) |
| Junk | -94.15 *** (10.08) |
| Investment Grade vs. Unrated | 7.29 *** |
| Unrated vs. Junk | 16.40 *** |

Figure 1
Managerial Holdings of Vested In-The-Money Options
Relative Changes over Time

