MANAGERIAL OVERCONFIDENCE AND BANK LOAN

CONTRACTING

A Dissertation

Presented to

The Faculty of the C.T. Bauer College of Business

University of Houston

In Partial Fulfillment

Of the Requirements for the Degree

Doctor of Philosophy

By

Xiaoou Yu

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MANAGERIAL OVERCONFIDENCE AND BANK LOAN CONTRACTING

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ABSTRACT

I study the effect of managerial overconfidence on bank loan contracting. I find empirical evidence supporting that overconfidence as a personal trait of borrowing firm's manager impacts loan contracting terms. Specifically, loans initiated between banks and firms with overconfident managers have significantly lower interest rates on average. However, I also find that overconfident managers are willing to accept a higher initial interest rate if the loan contract includes a performance pricing provision, and that the likelihood of including a performance pricing provision is greater for overconfident managers. These results are consistent with predictions that performance pricing provisions are a useful mechanism for alleviating the agency conflicts arising from managerial overconfidence. Furthermore, I find that managerial overconfidence is associated with higher covenant intensity, longer maturity, and larger loan amounts. For syndicated loans with overconfident managers, lead banks reduce their risk exposure by inviting more participant lenders, retaining lower shares of the loans, and reducing syndicate concentrations.

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Chapter 1

INTRODUCTION

In this paper I study whether a managerial characteristic, overconfidence, plays a role in the design of bank loan contracts.

Overconfident managers overestimate future returns from their firms' investment projects (Heaton 2002; Malmendier and Tate 2005, 2008, 2011; Ahmed and Duellman 2013).[1] Prior studies find that overconfidence widely exists among high-rank executives (Ben-David, Graham, and Harvey 2007, 2013; Dittrich, Alexis, Guth, and Maciejovsky 2005; Russo and Schoemaker1992). Managerial overconfidence has attracted a great deal of attention recently, since it has been shown to affect a variety of corporate policies including acquisitions, investments, financing, and dividend payouts (Malmendier and Tate 2005, 2008, 2011; Ben-David, Graham, and Harvey 2007, 2013; Hirshleifer, Low, and Teoh 2012).

Prior accounting studies also suggest that managerial overconfidence affects financial reporting quality. Hribar and Yang (2013) find that managerial overconfidence increases the likelihood of issuing earnings forecasts. Moreover, they find that

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[1] A series of studies by Malmendier and Tate (2005, 2008, and 2011) define managerial overconfidence as managers overestimating future returns from their firms' investments. Heaton (2002) use the term "optimism" to refer to managers who systematically overestimate the probability of good firm performance. Following the majority finance and accounting studies, I use the term "overconfidence" and consider it equivalent to "optimism".

overconfident managers are more likely to subsequently miss their forecasts due to ex-ante optimism. Schrand and Zechman (2012) analyze a sample of 49 firms subject to SEC Accounting and Auditing Enforcement Releases (AAERs). They show that approximately 75% of AAERs relate to initial misstatements (primarily premature revenue recognition) by managers with optimistic bias. These optimistically biased misstatements lead to a greater probability of earnings management and the SEC's subsequent issuance of one or more AAERs.

Because of its salient impacts on corporate policies, managerial overconfidence is likely to affect debt contracts. However, our knowledge of the implications of managerial overconfidence on debt contracts is surprisingly limited. To my knowledge, the only study that investigates the relation between managerial overconfidence and debt contracts is Sunder, Sunder, and Tan (2010). They study the influence of overconfidence on bond covenants and find that bondholders impose covenants to restrict overconfident managers' ability to make future investments or acquisitions and to raise additional debt financing. However, they do not find evidence that managerial overconfidence affects bond pricing.

In this study, I examine the effect of managerial overconfidence on private bank loan contracts rather than public bond covenants. I focus on bank loan contracts for two primary reasons. First, bank loans are an important source of corporate financing, especially for firms with overconfident managers. Over the past decade, the amount of net debt security issuances in the U.S. is about 400 times as that of equity issuances. Among debt issues, bank loans comprise about 54% of the total debt amount since 1980 (Graham, Li, and Qiu 2008). The importance of debt as an external source of financing is

even more pronounced for overconfident managers because these managers view equity financing to be unduly costly. Malmendier, Tate and Yan (2011) find overconfident managers issue less equity by 11% compared to their peers and raise roughly 35 cents more debt to meet an additional dollar of external financing needs.

Second, compared to public bonds, bank loans are more flexible in accommodating the needs of multiple parties to the debt contracts through negotiated contractual terms. The reaction of lenders to managerial overconfidence and the debt financing needs of overconfident managers can be observed through the direct cost of debt (interest rate) and the indirect cost of debt (performance pricing provisions, covenant intensity and loan maturity). In addition, loan contracts provide a unique setting to study the effect of managerial overconfidence on the structure of bank loans, such as the number of lenders and lead bank shares.

My primary measure of managerial overconfidence is based on the "revealed beliefs" approach following Malmendier and Tate (2005, 2008, 2011), Campbell et al. (2011), Hirshleifer, Low, and Teoh (2012), and Ahmed and Duellman (2013). The idea is that managers are generally under-diversified and should exercise their stock options to minimize their exposure to firms' idiosyncratic risks. However, overconfident managers believe that firm value will continue to increase and delay exercising in-the-money options beyond the optimal threshold of risk diversification. Following previous studies, I classify a manager as overconfident if the average intrinsic value of her/his exercisable unexercised options exceeds 67% of the average exercise price at least twice during the sample period. Managers that do not meet this criterion are classified as not overconfident. My second measure of overconfidence is based on overinvestment, a

potential consequences of overconfidence. I modify the investment-based overconfidence measure from Schrand and Zechman (2012) and Ahmed and Duellman (2013). Specifically, I use the residual from a regression of total asset growth on sales growth as a proxy for overinvestment. A manager is classified as overconfident if her/his firm's overinvestment level is above the industry median. Managers who do not meet this criterion are classified as not overconfident.

To analyze the effect of managerial overconfidence on bank loan contracting, I begin by examining the effect on interest rates. I measure interest rate as the amount the borrower pays in basis points over LIBOR divided by 100. I find that the interest rates of the loans issued to overconfident managers are 10 to 11 basis points lower, on average. When compared to the full-sample average interest rate of 153 basis points over LIBOR, the reduction in interest rates for overconfident managers is equivalent to a 7% decrease. This result is consistent with the notion that overconfident managers bargain more aggressively in a competitive loan market to obtain lower interest rate spreads. In addition, this finding suggests that bank loans provide overconfident managers with a less expensive alternative to external financing, which is consistent with Malmendier, Tate, and Yan (2011)'s argument regarding overconfident managers' financing preferences of debt over equity.

I then turn my attention to performance pricing provisions. Previous studies show that the initial loan interest rate is closely related to the use of a performance pricing provision (e.g. Asquith, Beatty, and Weber 2005). Performance pricing provisions link interest rates to borrower's performance using accounting ratios (e.g., debt-to-EBITDA), or the borrower's credit rating. Specifically, the loan contract is set ex ante to increase the

interest rate if the borrower's performance deteriorates (interest-increasing provision), or to decrease the interest rate if the borrower's performance improves (interest-decreasing provision). Because of this feature, the performance pricing provision is likely a powerful tool for contracting with overconfident managers. With performance pricing provisions, overconfident managers overestimate the probability of obtaining a lower interest rate and underestimate the probability of obtaining a higher interest rate. Thus, it is easier for lenders to negotiate a higher initial interest rate by including a performance pricing provision in the loan contract. I predict that the use of a performance pricing provision will reduce overconfident managers' demand for lower interest rate. To test this prediction, I examine loan contracts with performance pricing provisions and those without performance pricing provisions separately. I find that for loans without performance pricing provisions, the interest rates offered to overconfident managers are at least 15 basis points lower than those offered to non-overconfident managers. However, when a performance pricing provision is included in the loan contract, the interest rate for overconfident managers is only 7 basis points lower at most[2].

Given the benefits of using performance pricing provisions in loan contracts with overconfident managers, I further conjecture that the probability of including a performance pricing provision is positively associated to managerial overconfidence. I find that the odds of including performance pricing provisions increases by 10% to 21%

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[2] The regression results from the model using an option-holding based overconfidence measure show a 7-basis-point reduction in interest rates for overconfident managers. For the model using an investment-based overconfidence measure, the regression results suggest that the interest rate for overconfident managers is not significantly different from that of non-overconfident managers.

for loans issued to overconfident managers, depending on the overconfidence measure used in the model.

Agency theory suggests that there is a trade-off between the interest rate and the number of covenants (Jensen and Meckling 1976, Myers 1977, Smith and Warner 1979). Lenders may increase the number of covenants to compensate for a lower interest rate and to better monitor overconfident managers ex post. From the perspective of overconfident managers, the cost of financial covenants is low relative to the direct cost of debt, interest rate, because they underestimate the probability of violating financial covenants. Thus, I expect that lenders impose more financial covenants on overconfident managers. Indeed, I find a 3% to 6% increase in the number of financial covenants if the manager is overconfident. I do not find evidence that lenders impose more general covenants on overconfident managers. This is consistent with the conjecture that general covenants are more costly to overconfident managers relative to financial covenants in the sense that they directly restrict managers' operating, investment, and financial activities.

I also examine whether loan maturity and loan size are affected by managerial overconfidence. I find that loans issued to overconfident managers have longer maturities on average. The amount of the loan issued to overconfident managers is only marginally greater than that of non-overconfident managers.

In addition to influencing contract terms, managerial overconfidence may affect the ownership structure of loans. I find evidence that, on average, loans issued to overconfident managers have more lenders and the loan share retained by the lead bank(s) is smaller. This is consistent with less concentrated lending arrangements being

used to diversify the lenders' risk exposure. I also construct the Herfindahl index as a measure of loan ownership concentration with high index value indicating high concentration. The empirical results suggest that managerial overconfidence is associated with a lower Herfindahl index. This provides additional confirming evidence that lenders diversify their risk exposure when contracting with overconfident managers.

My study contributes to the literature in three ways. First, my study extends and complements prior research on debt contracts by documenting a significant relation between managerial overconfidence and bank loan contractual terms. Sunder, Sunder, and Tan (2010) find that bondholders respond to managerial overconfidence by imposing restrictions on investments, but find no evidence that overconfidence affects interest rates. In contrast, my study of bank loan contracts suggests that lenders adjust interest rates, as well as other loan terms, in contracts with overconfident managers. In addition, I explicate the important role of performance pricing provisions in contracting with overconfident managers. The evidence is consistent with performance pricing provisions improving the Pareto efficiency of loan contracts.

Second, I contribute to the literature on syndicate loan structure by establishing that managerial overconfidence reduces ownership concentration. Previous studies show that information asymmetry between lenders and borrowers and lenders' diversification needs affect syndicate structure (Pavel and Phillis 1987; Pennacchi 1988; Gorton and Pennacchi 1995; Demsetz 1999; Sufi 2007). My findings indicate that lenders' diversification needs dominate in determining the syndicate structure of loans issued to overconfident borrowers.

Third, my study extends the growing literature on the consequences of managerial overconfidence. The extant literature focuses on the impact of managerial overconfidence on corporate policies such as firm's investment, merger and acquisition, and financing decisions. However, little has been done on the contracting consequences of managerial overconfidence. This paper fills this gap by documenting the influences of managerial overconfidence on loan contracts. In addition, the finding that managerial overconfidence is negatively related to the cost of debt is consistent with previous findings that overconfident managers prefer debt to equity as an external source of financing.

The rest of the paper proceeds as follows. I develop the hypotheses and discuss the related literature in chapter 2. Chapter 3 describes the research design and the sample. Chapter 4 presents the empirical results. Chapter 5 concludes.

Chapter 2

PRIOR LITERATURE AND HYPOTHESIS DEVELOPMENT

Prior literature indicates that managerial overconfidence leads to suboptimal investment decisions. For example, Malmendier and Tate (2005) find that overconfident managers overinvest when cash is sufficient. Overconfident managers are also more likely to engage in value-destroying mergers and acquisition because they overestimate the value of target firms (Malmendier and Tate 2008). Thus, lending to overconfident manager could be riskier and lenders may require a risk premium in the pricing of the loan. In addition, prior research suggests managerial overconfidence affects firms' financial report quality. Specifically, overconfident managers have been shown to miss their own earnings forecast more frequently, do more earnings management, and exhibit less accounting conservatism (Schrand and Zechman 2012; Hribar and Yang 2013; Ahmed and Duellman 2013). Financial report quality can also affect loan pricing (Graham, Li, and Qiu 2008; Costello and Wittenberg-Moerman 2011) and result in higher risk premiums for overconfident managers. However, given the flexibility of a loan contract, interest rate is not the only method that lenders could use to compensate for their additional risk exposure caused by managerial overconfidence. One of the other options is to increase financial covenant intensity in a loan contract to monitor overconfident managers more closely. In fact, prior studies have documented a trade-off

between interest rate and financial covenant intensity in a loan contract (Jensen and

Meckling 1976; Costello and Wittenberg-Moerman 2011).

From the borrowers' perspective, overconfident managers' demand for lower

interest rates is stronger compared to non-overconfident managers. Malmendier, Tate,

and Yan (2011) find that overconfident managers who overestimate their firms' future

cash flows believe that their firms are undervalued by the market and consider external

financing to be unduly costly. Thus, conditional on the need to raise debt, it is likely that

overconfident managers bargain more aggressively to obtain lower interest rates relative

to non-overconfident managers. If overconfident managers cannot negotiate a lower

interest rate with the lender, they are likely to withdraw from the debt market and rely on

their firms' internal cash to invest (Malmendier and Tate 2005). Compared to interest

rates, overconfident managers are less sensitive to the cost of increased covenant

intensity because they are too confident about their future performance and consider

lenders' monitoring less costly. Therefore, assuming the loan market is competitive,

lenders may satisfy overconfident managers' demand for less expensive financing by

granting a lower interest rate and compensate for the decrease in interest rate by

tightening other non-pricing loan terms, such as covenant intensity.

H1a: Loans issued to overconfident managers have lower interest rates compared

to those issued to non-overconfident managers.

As discussed earlier, there is a mismatch between lenders and overconfident

managers in terms of their prior beliefs of overconfident managers' investment

opportunities. As a result, lenders may demand higher risk premiums at the same time

that overconfident managers view debt financing costly and bargain more aggressively on interest rates. If they cannot reach an agreement, managers likely withdraw from the debt market and rely on internal cash for investments. I conjecture that performance pricing provisions can bridge the gap between overconfident managers and lenders. With performance pricing provisions, the interest rate is pre-specified at the initiation of the loan to increase if borrower's performance deteriorates and to decrease if borrower's performance improves. This feature allows overconfident managers and lenders to agree to disagree at the inception of the loan. On the one hand, overconfident managers overestimate their firms' future performance and overestimate the probability of paying low interest in the future. Thus, loan financing with performance pricing provisions is seemingly less costly and the demand for lower initial interest rates is reduced. On the other hand, lenders are price protected through interest-increasing provisions and avoid costly renegotiations. As Loomis (1991) argues, performance pricing provisions are a powerful tool that gives lenders flexibility to improve overall yields and protect returns. In sum, performance pricing provisions improve the Pareto efficiency of loan contracts with overconfident managers. Thus, I expect that performance pricing provisions reduce overconfident managers' demands for a lower interest rate:

H1b: Overconfident managers' demands for lower initial interest rate are reduced by the use of performance pricing provision.

Given that performance pricing provisions improve the Pareto efficiency of loan contracts with overconfident managers, I also expect that lenders are more likely to use these provisions:

H2: The likelihood of including a performance pricing provision in loan contracts is positively associated with managerial overconfidence.

Financial covenants require borrowers to maintain certain thresholds of financial ratios to ensure their ability to repay the loan. Lenders likely require more financial covenants to monitor the performance of firms with overconfident managers. At the same time, overconfident managers underestimate the probability of violating financial covenants because they believe their firms will perform at high levels. Moreover, higher financial covenant intensity will compensate for the lower interest rate required by overconfident managers. I therefore predict the following:

H3a: Managerial overconfidence is positively associated with the number of financial covenants in bank loan contracts.

Unlike financial covenants, general covenants impose direct restrictions on firms' financing and investment activities. Overconfident managers overestimate future returns from their firms' investment opportunities and view the restrictions imposed by general covenants as too costly. However, anticipating overconfident managers' incentive to overinvest, lenders are more likely to include general covenants. Thus, it is not clear whether the number of general covenants in a loan contract as an outcome of the negotiation process between the overconfident manager and the lender(s) will increase or decrease.

H3b: Managerial overconfidence does not affect the number of general covenants in bank loan contracts.

The loan syndicate literature suggests that the syndication structure can diversify bank's loan portfolio by spreading the credit risk among the participating banks. Therefore, more lenders help diversify credit risk of a loan. Because lead banks face higher risk to lend to overconfident managers, they are more likely to reduce their risk exposure by inviting more lenders and retaining smaller shares of the loans. In fact, Pavel and Phillis (1987), Pennacchi (1988), Gorton and Pennacchi (1995), and Demsetz (1999), showed that credit risk diversification is among the main reasons for loan sales by lead banks. On the other hand, several studies find that syndicate structure is influenced by information quality of the borrower. For example, Sufi (2007) finds that lead banks retain a larger share of the loan and form a more concentrated syndicate when the borrower requires more intense monitoring and due diligence, such as firms with overconfident managers. Thus, there are two opposing effects, risk diversification and asymmetric information. The information asymmetry effect implies a more dispersed syndicate ownership structure with fewer lenders and larger shares retained by the lead banks, while the diversification effect suggests the opposite. Which effect dominates in forming the syndicate structure to lend to overconfident managers remains an empirical question.

H4: The syndicate ownership structure is not affected by managerial overconfidence.

Chapter 3

RESEARCH DESIGN

3.1. The Model

To examine the impact of overconfidence on loan contractual terms, I estimate the following model:

$$Loan\ Terms = \alpha + \beta_1 Overconfidence + \sum_{m=2}^{n} \beta_m\ (ControlVariables) + \varepsilon \quad (1)$$

where *Overconfidence* denotes the overconfidence measures I used in my main tests. I estimate Equation (1) with different loan characteristics as dependent variables. The control variables include loan characteristics other than the dependent variable and firm characteristics.

3.2. Measures of Overconfidence

I use two measures of overconfidence in my main tests. The first measure on manager's option holding behavior. I follow Campbell et al (2011) and Ahmed Duellman (2013) to construct my first overconfidence measure, *Holder67*. compensation packages usually contain large amounts of stock options as an incentivizing device. Unlike diversified outside investors, managers' packages are exposed to higher idiosyncratic risks due to restrictions on

options and selling stock. Managers will trade off the option value of holding stock options against the cost of under-diversification. The optimal schedule of exercising options depends on a manager's wealth level, degree of risk aversion, and diversification (Hall and Murphy 2002). Managers are generally predicted to exercise stock options early to diversify firm idiosyncratic risks. However, if they are unduly confident about their firms' future performance, they tend to hold stock options beyond the optimal diversification level.[3] To construct the first measure *Holder67*, I calculate the percentage of the option in the money by dividing the value of unexercised options that could be exercised by average exercise price. Following prior research, I use 67% in-the-money as a benchmark.[4] Any portion of in-the-money options beyond this level are considered indicative of overconfidence. To ensure the excessive holdings of in-the-money options is due to overconfidence rather than a transitory effect, I consider the subsample of managers who at least twice had options that were valued above the threshold. *Holder67* is set to 1 from the first time the manager fails to exercise such options through the rest of the sample period, and 0 otherwise.

My second measure of overconfidence is based on managers' investment behavior. Previous studies demonstrate that firms' investment decisions are affected by managerial overconfidence (Malmendier and Tate 2005, 2008). Thus, these decisions

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[3] Malmendier and Tate (2005a) rule out the cases where CEOs are too optimistic about exogenous variables or overestimate the precision of their beliefs. In the case where CEOs are overoptimistic about exogenous variables such as the overall economic environment, they do not need to overinvest in their own companies to incur under-diversification costs.

[4] Hall and Murphy (2002)'s model predicts the optimal percentage of in-the-money at or above which CEOs should exercise newly vested options. The 67% threshold corresponds to a risk aversion level 3 in a constant relative risk-aversion (CRRA) utility function and to 66% of CEO wealth in company equity.

may contain information regarding the level of overconfidence (Campbell et al. 2011). I

follow Schrand and Zechman (2012) and Ahmed and Duellman (2013) to construct my

investment-based measure of overconfidence, *Invest*. I regress total asset growth on sales

growth to identify the residual. The residual represents the amount of excess investment

in assets that cannot be explained by sales growth. I then rank the amount of excess

investment by industry for each year. *Invest* is set to 1 if the amount of excess investment

is above the industry median, and 0 otherwise.

3.3. Control Variables

Firm-level control variables include firm size, market-to-book ratio, leverage,

profitability, Z-Score, and tangibility. I use the logarithm of a firm's total assets to

measure firm size. Larger firms have easier access to external financing and are

conjectured to be less risky and have less information asymmetry. Therefore, larger firms

are likely to borrow with better terms. I use market-to-book ratio to control for firm's

growth opportunities. It is defined as the ratio of the market value of assets (market value

of equity plus book value of debt) to the book value of assets. A firm with better growth

opportunities is expected to borrow at a lower cost, all else equal. I control for leverage,

measured as the ratio of long-term debt to total assets. Firms with higher leverage ratios

have higher default risk and, thus, I expect them to have tighter loan terms. I also include

profitability, the ratio of EBITDA to total assets, to control for a firm's ability to repay

the loan. Profitable firms generally are more capable of servicing loans and have lower

default risk. Thus they can borrow at a lower cost. I further control for firm's default risk

by including Altman's (1968) Z-Score. I modify Altman's (1968) Z-Score by excluding

market-to-book ratio from its calculation because I already control for it in my model. A

higher Z-Score indicates lower default risk. Tangibility is defined as the ratio of tangible

assets to total assets. Lenders expect to recover more from borrowers with higher levels

of tangible assets. Thus, firms with more tangible assets should be able to borrow with

better loan terms. All firm-level control variables are measured as of the year prior to the

loan initiation date. All variables are defined in Appendix A.

In the regressions, each observation represents a single loan. I include year fixed

effects to control for time varying effects on loan terms. I also control for industry fixed

effects and loan type. The t-statistics/z-statistics are estimated based on standard errors

clustered at the firm level.

3.4. Sample Selection

Bank loan data is obtained from the DealScan database maintained by the Loan

Pricing Corporation (LPC). DealScan provides detailed loan information for U.S. and

foreign commercial loans made to corporations. The basic unit of my empirical analysis

is a loan, also referred to as a facility or tranche in DealScan. Loans are grouped into

deals. Each deal has one or more loans. Since performance pricing started to become

widely used in early 1990s and DealScan includes comprehensive information about

performance pricing starting in 1994, I restrict my sample period from 1994 to 2012,

which yield a sample of 110,632 loans issued to U.S. firms. I then match DealScan data

to COMPUSTAT, EXECUCOMP and CRSP to obtain financial information, managers'

compensation information, and stock information needed to calculate the overconfidence

measures and firm-level control variables. After removing loans issued to financial

institutions and loans missing necessary information to perform the analysis, my final

sample consists of 13,931 unique loans for 1,991 firms.

Chapter 4

RESULTS OF EMPIRICAL ANALYSES

4.1   Summary Statistics

Panel A of Table 1 reports descriptive statistics for the main variables of interest
and the control variables. All variables are defined in Appendix A. Based on the
overconfidence measures (*Holder67* and *Invest*), 44% and 58% of the loans, respectively,
are with overconfident manager. On average, the loans are priced at 153 basis points
above the LIBOR and 48% of the loans contain performance pricing provisions. A typical
loan in my sample has 1.32 financial covenants and 3.54 general covenant. The average
loan is 504 million and has a mean maturity of 45 months. 70% of the sample loans are
issued by relationship lenders and the average number of lenders is 10.46. Most of my
sample loans (98%) are syndicated loans. Among syndicated loans, lead banks retain an
average of 24% of the syndicate and the average concentration is relatively low (based on
the Herfindahl index).[5]

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[5] The Herfindahl index in my sample varies from a minimum of 0 to a maximum of 10,000. The mean and
median Herfindahl index are 1996 and 1129, respectively, which are relatively low compared to the mean
of 4095 and the median of 2653 in the full sample of DealScan.

Table 1

Descriptive Statistics and Correlation Matrix

Panel A presents the descriptive statistics of variables used in my analyses. Panel B reports the Pearson correlation matrix of selected variables. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels (two-tailed), respectively. All variables are defined in appendix A.

Panel A: Descriptive Statistics

	No. of observations	Mean	Std. Dev	25%	Median	75%
Overconfidence						
Holder67	13,931	0.44				
Invest	13,931	0.58				
Loan Characteristics						
Interest	13,931	1.53	1.29	0.50	1.25	2.25
Performance Pricing	13,931	0.48				
Financial Covenants	13,931	1.32	1.30	0	1	2
General Covenants	13,931	3.54	3.23	0	3	6
Maturity (months)	13,931	45.13	24.58	24	54	60
Loan Size ($M)	13,931	503.58	977.43	100.00	250.00	500.00
Relationship Lending	13,931	0.70				
No. of Lenders	13,931	10.46	9.55	4	8	14
Lead Bank Shares	5,001	24.46	23.26	10	16	27.78
Herfindahl	5,065	1996	2314	701.5	1129	2088
Syndicated	13,931	0.98				
Firm Characteristics						
Firm Size ($M)	13,931	7864	16261	854.5	2416	7918
Leverage	13,931	0.31	0.20	0.19	0.30	0.41
Tangibility	13,931	0.34	0.23	0.15	0.29	0.51
Profitability	13,931	0.13	0.090	0.09	0.12	0.17

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Panel A - Continued: Descriptive Statistics

	No. of observations	Mean	Std. Dev	25%	Median	75%
Market to Book	13,931	1.75	1.19	1.16	1.44	1.94
Z-Score	13,931	1.73	1.37	0.95	1.67	2.42

Panel B: Pearson correlation matrix

		A	B	C	D	E	F	G	H	I	J	K
Holder67	A	1										
Invest	B	0.152***	1									
Interest	C	-0.063***	-0.087***	1								
Performance Pricing	D	0.053***	0.083***	-0.125***	1							
Financial Covenants	E	0.094***	0.079***	0.236***	0.408***	1						
General Covenants	F	0.036***	0.054***	0.238***	0.416***	0.662***	1					
Maturity	G	0.067***	0.034***	0.125***	0.120***	0.163***	0.185***	1				
Loan Size	H	0.011	0.009	-0.146***	0.021**	-0.127***	-0.046***	-0.047***	1			
No. of lenders	I	0.044***	0.027***	-0.171***	0.189***	0.059***	0.141***	0.056***	0.314***	1		
Lead Bank Shares	J	-0.019	-0.014	0.295***	-0.220***	0.071***	-0.018	-0.082***	-0.214***	-0.587***	1	
Herfindahl	K	-0.017	-0.017	0.283***	-0.223***	0.051***	-0.041***	-0.095***	-0.200***	-0.560***	0.982***	1

Panel B reports Pearson pair-wise correlations between selected variables. Consistent with expectations, managerial overconfidence is negatively correlated with interest rate spread and positively correlated with other non-price loan terms with both measures of overconfidence. In addition, all loan contracting terms are highly correlated with each other. This is consistent with prior literature (e.g. Costello and Wittenberg-Moerman 2011) which suggests that a loan contract is a package of contractual terms. Lenders may offer borrowers a trade-off between contractual terms. For overconfident borrowers, lenders are more likely to offer contracts with lower interest rates, longer maturity, higher financial covenant intensity and more performance pricing provisions.

Table 2 presents univariate comparisons of loan characteristics between overconfident managers and non-overconfident managers. Panel A reports the comparison results based on the overconfidence measure, *Holder67*. A total of 6,161 loans are issued to overconfident managers (44%). The average interest spread for these loans is 144 basis points over the LIBOR, which is significantly lower than that of non-overconfident managers (difference=-16.3 t-statistics=-7.40). For non-price loan terms, loans issued to overconfident managers are more likely to include performance pricing provisions, and have higher financial covenant intensity and longer maturities. In terms of lender characteristics, loans to overconfident managers are more likely to be issued by relationship lenders (difference=1.8% t-statistics=2.34). The number of lenders for loans to overconfident managers are also higher, which is consistent with the notion that the lead banks are diversifying their risk exposure. I do not find statistically reliable evidence that the loan size is larger for overconfident managers.

Table 2

Univariate Tests of Differences in Means

This table presents the differences in loan characteristics between overconfidence group and non-overconfidence group. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels (two-tailed), respectively. All variables are defined in Appendix A.

Panel A: Loan Characteristics by Overconfidence: Holder67

	Overconfidence Measure: *Holder67*			
	Overconfidence mean	Non-Overconfidence mean	Difference in means	t-statistics
Interest	1.442	1.604	-0.163***	-7.40
Performance Pricing	0.508	0.455	0.0535***	6.29
Financial Covenants	1.454	1.208	0.246***	11.17
General Covenants	3.668	3.432	0.235***	4.27
Maturity (months)	46.970	43.670	3.302***	7.89
Loan Size ($M)	516.100	493.7000	22.440	1.35
No. of lenders	10.930	10.080	0.845***	5.19
Lead Bank Shares	23.980	24.860	-0.876	-1.33
Herfindahl	1953	2032	-79	-1.21
Relationship Lending	0.707	0.689	0.018**	2.34
No. of observations	6,161	7,770	.	.

Panel B: Loan Characteristics by Overconfidence: Invest

	Overconfidence Measure: *Invest*			
	Overconfidence mean	Non-Overconfidence mean	Difference in means	t-statistics
Interest	1.437	1.664	-0.227***	-10.28
Performance Pricing	0.514	0.430	0.084***	9.79
Financial Covenants	1.404	1.197	0.207***	9.33
General Covenants	3.686	3.331	0.356***	6.42
Maturity (months)	45.850	44.140	1.706***	4.05
Loan Size ($M)	511.000	493.400	17.520	1.04
No. of lenders	10.680	10.150	0.522***	3.19
Lead Bank Shares	24.210	24.850	-0.648	-0.96
Herfindahl	1964	2046	-82	-1.23
Relationship Lending	0.696	0.698	-0.003	-0.32
No. of observations	8,065	5,866	.	.

Panel B presents the comparison results based on the overconfident measure, *Invest*. The results are similar to those of Panel A, except that the difference in relationship lending between the two groups is not statistically different from zero.

4.2   Multivariate Analyses

4.2.1.   The Effect of Managerial Overconfidence on Interest Rate Spread

To test H1a, I regress interest rate spread on the overconfidence measures and control variables. Table 3, column 1 and column 2 report the results of regressing interest rate spread on the two overconfidence measures, *Holder67* and *Invest*, respectively. The results suggest that managerial overconfidence is negatively associated with interest rate. The coefficient of *Holder67* is -0.108 which indicates that, on average, the interest rates of loans issued to overconfident managers are about 11 basis points lower, all else equal. When compared to the full-sample average interest rate of 153 basis points over the LIBOR (Table 1, Panel A), the coefficient -0.108 represents a 7% decrease in interest rates. This evidence is consistent with the argument that overconfident managers bargain aggressively in negotiations to obtain lower interest rates. Similar conclusions can be drawn from the estimation results of the model where the overconfidence measure is *Invest*. The coefficients of the other loan characteristics are all significantly different from zero. This result confirms that specific contractual terms cannot be determined in an isolated manner. The relations between interest rate spread and the firm-level control variables are statistically significant and consistent with predicted signs. Firms with less information asymmetry (larger firm size), lower default risks (lower leverage, higher

profitability, and higher z-score), and better growth opportunities (higher market to book ratio) obtain lower interest rate spreads.

In column 3 and column 4, I examine whether the use of performance pricing provisions influences the relation between managerial overconfidence and interest rates (H1b). I augment the interest rate spread model with the performance pricing indicator variable and interaction terms between this variable and the overconfidence measures:

$$Interest = \alpha + \beta_1 Overconfidence + \beta_2 Overconfidence \times Performance\ Pricing$$

$$+ \beta_3 Performance\ Pricing + \sum_{m=4}^{n} \beta_m \left(ControlVariables_{t-1}\right)$$

$$+ \varepsilon \qquad\qquad\qquad\qquad (2)$$

Figure 1 summarizes the coefficients of variable of interests. $\beta_1 + \beta_2$ represents the difference in interest rate spreads between overconfident managers and non-overconfident managers when performance pricing provisions are included in the loan contract. β_1 represents the difference in interest rate spreads between overconfident managers and non-overconfident managers when the loan contract does not contain performance pricing provisions. In column 3 of Table 3, where the overconfidence measure is *Holder67*, both $\beta_1 + \beta_2$ and β_1 are negative and statistically significant. This implies overconfident managers require lower interest rates whether a performance pricing provision is included or not. However, the magnitude of $\beta_1 + \beta_2$ is much smaller than that of β_1. β_1 equals -0.146, which indicates that overconfident managers require an approximate 15-basis-point reduction in interest rate spreads without a performance pricing provision. When performance pricing provisions are included, the reduction in

Table 3

Effects of Managerial Overconfidence on the Cost of Bank Debt

This table presents the regression results of the impact of managerial overconfidence on the cost of bank debt. In column 1 and column 2, interest rates are regressed on the overconfidence measures, *Holder67* and *Invest*, respectively. In column 3 and column 4, I test whether the effect of managerial overconfidence on the cost of bank debt changes in the presence of performance pricing provisions. Regressions include year and industry fixed effects. The t-statistics reported in parentheses are based on standard errors that are heteroskedasticity robust and clustered at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels (two-tailed), respectively. All variables are defined in Appendix A.

$$Interest = \alpha + \beta_1 Overconfidence + \beta_2 Overconfidence \times Performance\ Pricing$$
$$+ \beta_3 Performance\ Pricing + \sum_{m=4}^{n} \beta_m (ControlVariables_{t-1}) + \varepsilon$$

	(1)	(2)	(3)	(4)
	Interest	Interest	Interest	Interest
Overconfidence				
Holder67	-0.108***		-0.146***	
	(-4.24)		(-3.67)	
Invest		-0.096***		-0.188***
		(-4.32)		(-5.73)
Performance Pricing * Holder67			0.077**	
			(2.03)	
Performance Pricing * Invest				0.196***
				(5.36)
Loan characteristics				
Performance Pricing	-0.208***	-0.206***	-0.243***	-0.321***
	(-9.68)	(-9.61)	(-6.25)	(-8.41)
Maturity	-0.134***	-0.131***	-0.132***	-0.128***
	(-3.80)	(-3.74)	(-3.73)	(-3.64)
Loan Size	-0.131***	-0.128***	-0.132***	-0.128***
	(-9.70)	(-9.39)	(-8.72)	(-8.34)
Syndicated	0.138*	0.136*	0.136	0.137
	(1.86)	(1.84)	(1.60)	(1.55)
Relationship Lending	-0.123***	-0.123***	-0.123***	-0.123***
	(-4.75)	(-4.73)	(-3.34)	(-3.48)
Firm characteristics				
Firm Size	-0.149***	-0.156***	-0.149***	-0.155***
	(-11.30)	(-11.77)	(-11.74)	(-11.79)

Table 3 - Continued

Effects of Managerial Overconfidence on the Cost of Bank Debt

	(1) Interest	(2) Interest	(3) Interest	(4) Interest
Leverage	1.158***	1.127***	1.157***	1.127***
	(12.42)	(12.04)	(10.07)	(9.68)
Tangibility	-0.175*	-0.164*	-0.175*	-0.160*
	(-1.85)	(-1.75)	(-1.93)	(-1.77)
Profitability	-2.002***	-1.987***	-2.005***	-1.970***
	(-6.77)	(-6.73)	(-6.68)	(-6.68)
Market to Book	-0.033**	-0.033**	-0.032**	-0.033**
	(-2.31)	(-2.33)	(-2.03)	(-1.97)
Z-Score	-0.079***	-0.079***	-0.079***	-0.079***
	(-3.76)	(-3.76)	(-4.24)	(-4.26)
Intercept	4.785***	4.802***	4.799***	4.851***
	(15.81)	(15.41)	(12.83)	(12.64)
Controls				
Loan type	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes
No. of observations	13,931	13,931	13,931	13,931
Adj. R^2	0.533	0.533	0.533	0.534
$\beta_1 + \beta_2$			-0.069**	0.008
			(-2.29)	(0.34)
$\beta_2 + \beta_3$			-0.165***	-0.125***
			(-5.31)	(-4.03)

interest rates drops to 7 basis points ($\beta_1 + \beta_2$= -0.069). The difference, represented by the

coefficient of the interaction term, β_2, is significantly positive. This evidence is

consistent with the prediction of H1b that overconfident managers accept higher initial

interest rate spreads when there is a performance pricing provision. Column 4 presents

the regression results where the overconfidence measure is *Invest*. The coefficients are

qualitatively similar to column 3 with the exception that $\beta_1 + \beta_2$ is not significantly

different from zero.

Overconfidence	Performance Pricing	Coefficients
Yes	Yes	$\beta_1 + \beta_2 + \beta_3$
No	Yes	β_3
Yes	No	β_1
No	No	

Figure 1

4.2.2. The Effect of Managerial Overconfidence on the Use of Performance Pricing Provisions

Table 4 presents the results of empirical tests of H2. I estimate a logistic

regression with a performance pricing provision indicator as the dependent variable.

Column 1 presents the results when the overconfidence measure is Holder67, while

column 2 presents the results when the overconfidence measure is Invest. The coefficient

of Holder67 is 0.1 and statistically significant, translating to a 10% increase in the odds

of including a performance pricing provision in loan contracts with overconfident

managers. The magnitude of the coefficient of Invest is even greater (0.214), which

Table 4

Effects of Managerial Overconfidence on the Use of Performance Pricing Provisions

This table presents the results from the logit regressions of the probability that debt contracts include performance pricing provisions when a borrowing firm's manager is overconfident. Regressions include year and industry fixed effects. The z-statistics reported in parentheses are based on standard errors that are heteroskedasticity robust and clustered at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels (two-tailed), respectively. All variables are defined in Appendix A.

	(1) Performance Pricing	(2) Performance Pricing
Overconfidence		
Holder67	0.100*	
	(1.88)	
Invest		0.214***
		(4.71)
Loan characteristics		
Interest	-0.018	-0.014
	(-0.29)	(-0.23)
Maturity	0.490***	0.479***
	(7.27)	(7.09)
Loan Size	0.401***	0.391***
	(10.68)	(10.73)
Syndicated	0.625***	0.626***
	(2.86)	(2.86)
Relationship Lending	0.064	0.059
	(1.01)	(0.94)
Firm characteristics		
Firm Size	-0.360***	-0.343***
	(-6.54)	(-6.36)
Leverage	-0.422**	-0.350*
	(-2.10)	(-1.79)
Tangibility	-0.209	-0.233
	(-1.12)	(-1.25)
Profitability	1.168***	1.087**
	(2.89)	(2.54)
Market to Book	-0.117***	-0.123***
	(-3.22)	(-3.37)
Z-Score	0.013	0.013
	(0.57)	(0.55)
Intercept	-9.762***	-9.777***
	(-15.06)	(-15.37)
Controls		
Loan type	Yes	Yes
Year fixed effects	Yes	Yes

Table 4 - Continued

Effects of Managerial Overconfidence on the Use of Performance Pricing Provisions

	(1) Performance Pricing	(2) Performance Pricing
Industry effects	Yes	Yes
No. of observations	13,931	13,931
Psuedo R^2	0.117	0.118

represents a 21% increase in the odds of including a performance pricing provisions in the presence of managerial overconfidence.

In sum, the empirical results are consistent with the prediction of H2 that the use of performance pricing provisions is positively associated with managerial overconfidence. This is consistent with performance pricing provisions improving the Pareto efficiency of loan contracts with overconfident managers.

4.2.3. The Effect of Managerial Overconfidence on Covenant Intensity

Table 5, column 1 and column 2 present the results from the financial covenant regressions with *Holder67* and *Invest* as overconfidence measures, respectively. Consistent with H3a, the results indicate that managerial overconfidence leads to an increase in the number of financial covenants. When compared to the mean number of financial covenants of 1.32, the coefficient of 0.073 on *Holder67* (0.046 on *Invest*) represents a 6% (3%) increase in the number of financial covenants. This evidence, together with the results on the relation between overconfidence and interest rate spreads, suggests that lenders adjust loan terms to contract with overconfident managers. In particular, lenders lower interest rate spreads to engage with overconfident managers and increase the number of financial covenants to monitor them more closely ex-post. Lenders also use performance pricing provisions to negotiate higher initial interest rates with overconfident managers and better protect themselves in bad states.

I also examine the effect of overconfidence on the number of general covenants. Column 3 and column 4 present the results from the general covenant regressions with

Table 5

Effects of Managerial Overconfidence on Covenant Intensity

This table presents regression results of the effects of managerial overconfidence on covenant intensity. Column 1 and column 2 present the Poisson regression results with number of financial covenants as the dependent variable. Column 3 and column 4 present the Poisson regression results with number of general covenants as the dependent variable. Regressions include year and industry fixed effects. The z-statistics reported in parentheses are based on standard errors that are heteroskedasticity robust and clustered at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels (two-tailed), respectively. All variables are defined in Appendix A.

	Financial covenants		General covenants	
	(1)	(2)	(3)	(4)
Overconfidence				
Holder67	0.073***		0.020	
	(3.22)		(0.99)	
Invest		0.046**		0.031
		(2.18)		(1.58)
Loan characteristics				
Interest	0.394***	0.391***	0.442***	0.441***
	(20.32)	(20.16)	(26.66)	(26.64)
Performance Pricing	0.743***	0.743***	0.716***	0.715***
	(29.18)	(29.01)	(29.21)	(29.06)
Maturity	0.092***	0.093***	0.033**	0.033**
	(5.41)	(5.49)	(2.20)	(2.19)
Loan Size	0.065***	0.063***	0.144***	0.142***
	(5.06)	(4.87)	(11.72)	(11.48)
Syndicated	0.081	0.081	0.550***	0.550***
	(1.18)	(1.19)	(6.82)	(6.82)
Relationship Lending	0.047**	0.046**	-0.002	-0.003
	(2.29)	(2.25)	(-0.11)	(-0.16)
Firm characteristics				
Firm Size	-0.160***	-0.157***	-0.115***	-0.112***
	(-11.14)	(-10.76)	(-8.47)	(-8.12)
Leverage	0.107*	0.125**	0.091	0.102*
	(1.75)	(2.03)	(1.50)	(1.68)
Tangibility	-0.093	-0.099	-0.031	-0.033
	(-1.23)	(-1.32)	(-0.43)	(-0.45)
Profitability	0.432***	0.434***	0.313**	0.303**
	(2.83)	(2.86)	(2.28)	(2.19)
Market to Book	-0.015	-0.015	-0.019*	-0.019*
	(-1.18)	(-1.12)	(-1.66)	(-1.70)
Z-Score	-0.004	-0.003	-0.015*	-0.015*
	(-0.45)	(-0.41)	(-1.85)	(-1.84)

Table 5 - Continued

Effects of Managerial Overconfidence on Covenant Intensity

	Financial covenants		General covenants	
	(1)	(2)	(3)	(4)
Intercept	-5.096***	-5.091***	-3.861***	-3.857***
	(-9.71)	(-9.75)	(-11.93)	(-11.98)
Controls				
Loan type	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes
No. of observations	13,931	13,931	13,931	13,931
Psuedo R^2	0.178	0.177	0.202	0.202

Holder67 and *Invest* as overconfidence measures, respectively. The coefficients of *Holder67* and *Invest* are not reliably different from zero, suggesting that lenders do not use general covenants to compensate for the decrease in interest rates. This might be due to resistance from overconfident managers who view the restrictions imposed by general covenants as costly.

4.2.4.   The Effect of Managerial Overconfidence on Maturity and Loan Size

I also examine whether managerial overconfidence affects other loan characteristics. Table 6, column 1 and column 2 present the results from Poisson regressions of maturity on the overconfidence measures *Holder67* and *Invest*, respectively. The coefficients of *Holder67* and *Invest* are both significantly positive (t-statistics equal 1.85 and 5.33 respectively), suggesting that the maturity of loans for overconfident managers are longer on average.

Column 3 and column 4 present the results from regressions of loan size on overconfidence measures *Holder67* and *Invest*, respectively. I do not find strong evidence that managerial overconfidence affects loan size. The coefficient of *Invest* is positive and statistically significant (t-statistics=6.65), while the coefficient of *Holder67* is not significantly different from zero.

Table 6

Effects of Managerial Overconfidence on Maturity and Loan Size

This table presents the regression results of the effects of managerial overconfidence on bank debt maturity and loan amount. Column 1 and column 2 present Poisson regression results with bank debt maturity in months as the dependent variable. Column 3 and column 4 present OLS regression results with the natural logarithm of the loan amount in dollars as the dependent variable. Regressions include year and industry fixed effects. The z-statistics and t-statistics reported in parentheses are based on standard errors that are heteroskedasticity robust and clustered at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels (two-tailed), respectively. All variables are defined in Appendix A.

	Maturity		Loan Size	
	(1)	(2)	(3)	(4)
Overconfidence				
Holder67	0.017*		0.029	
	(1.85)		(1.48)	
Invest48		0.050***		0.150***
		(5.33)		(6.65)
Loan characteristics				
Interest	-0.026***	-0.025***	-0.201***	-0.196***
	(-2.80)	(-2.70)	(-7.59)	(-7.28)
Performance Pricing	0.053***	0.051***	0.256***	0.249***
	(5.82)	(5.59)	(11.93)	(12.00)
Maturity			0.174***	0.166***
			(4.67)	(4.37)
Loan Size	0.025***	0.022***		
	(2.85)	(2.63)		
Syndicated	0.135**	0.134**	1.042***	1.034***
	(2.44)	(2.41)	(9.08)	(9.24)
Relationship Lending	-0.006	-0.007	0.271***	0.266***
	(-0.61)	(-0.76)	(9.58)	(9.74)
Firm characteristics				
Firm Size	0.009	0.013*	0.533***	0.542***
	(1.22)	(1.78)	(42.24)	(44.42)
Leverage	0.071**	0.089***	0.195***	0.244***
	(2.22)	(2.66)	(2.82)	(3.48)
Tangibility	0.009	0.005	-0.164*	-0.176*
	(0.30)	(0.18)	(-1.83)	(-1.91)
Profitability	0.225***	0.198***	0.643***	0.545***
	(3.23)	(2.86)	(3.83)	(3.19)
Market to Book	-0.007**	-0.008**	0.001	-0.002
	(-2.06)	(-2.36)	(0.23)	(-0.30)
Z-Score	0.004	0.004	0.020**	0.020**
	(0.95)	(0.98)	(2.00)	(1.97)

Table 6 - Continued

Effects of Managerial Overconfidence on Maturity and Loan Size

	Maturity		Loan Size	
	(1)	(2)	(3)	(4)
Intercept	1.750***	1.734***	14.048***	13.928***
	(9.91)	(9.91)	(58.20)	(55.65)
Controls				
Loan type	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes
No. of observations	13,931	13,931	13,931	13,931
Adj. R^2	0.471	0.472	0.610	0.613

4.2.5.   The Effect of Managerial Overconfidence on Syndicate Structure

I examine the effect of overconfidence on syndicated structure, such as the number of lenders, shares of the loan retained by lead banks, and ownership concentration. To measure ownership concentration, I follow Sufi (2007) to construct the Herfindahl index. The Herfindahl index is calculated using each syndicate member's share in the loan. It is the sum of the squared individual shares in the loan, and varies from 0 to 10,000, with 10,000 being the highest Herfindahl index when a lender holds 100% of the loan. Table 7, column 1 and column 2 present the regression results of the number of lenders. The coefficients of Holder67 and Invest are both positive and statistically significant, suggesting that lead banks invite more participant lenders for loans issued to overconfident managers. Column 3 and column 4 present regression results with the logarithm of shares retained by lead banks as the dependent variable. The coefficients of Holder67 and Invest are -0.049 and -0.045 respectively, translating to a 5% decrease in shares of the loan retained by lead banks. The regression results of the Herfindahl index in column 5 and column 6 imply a negative relation between ownership concentration and managerial overconfidence.

In sum, the evidence suggests that lenders' risk diversification needs dominate in determining the syndicate structure. Lead banks reduce their risk exposures caused by managerial overconfidence by inviting more participant lenders and holding smaller portions of the syndicate loan. Thus, the ownership concentration (as measured by the Herfindahl index) is reduced. The coefficients on Leverage are all negative and statistically significant, implying that lenders also decrease ownership concentration to

Table 7

Effects of Managerial Overconfidence on Debt Ownership Structure

This table presents regression results of the effects of managerial overconfidence on the ownership structure of the syndicated loan. Column 1 and column 2 present the Poisson regression results with number of lenders as the dependent variable. Column 3 and column 4 present the OLS regression results with the natural logarithm of lead bank shares as the dependent variable. Column 5 and column 6 report the OLS regression results with the natural logarithm of the Herfindahl index as the dependent variable. Regressions include year and industry fixed effects. The t-statistics and z-statistics reported in parentheses are based on standard errors that are heteroskedasticity robust and clustered at the firm level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels (two-tailed), respectively. All variables are defined in Appendix A.

	Number of lenders		Lead Bank Shares		Herfindahl	
	(1)	(2)	(3)	(4)	(5)	(6)
Overconfidence						
Holder67	0.053***		-0.049**		-0.049**	
	(2.73)		(-2.40)		(-2.16)	
Invest48		0.079***		-0.045**		-0.055***
		(4.22)		(-2.47)		(-2.64)
Loan characteristics						
Interest	0.080***	0.082***	-0.032*	-0.033*	-0.052**	-0.053**
	(4.91)	(5.11)	(-1.67)	(-1.74)	(-2.28)	(-2.34)
Performance Pricing	0.339***	0.336***	-0.116***	-0.115***	-0.138***	-0.137***
	(18.44)	(18.31)	(-5.57)	(-5.50)	(-5.81)	(-5.74)
Maturity	0.183***	0.180***	-0.226***	-0.226***	-0.245***	-0.244***
	(7.56)	(7.45)	(-7.99)	(-7.96)	(-7.09)	(-7.07)
Loan Size	0.302***	0.298***	-0.247***	-0.244***	-0.310***	-0.305***
	(24.82)	(24.19)	(-16.73)	(-16.33)	(-16.70)	(-16.42)
Relationship Lending	0.211***	0.209***	-0.218***	-0.215***	-0.232***	-0.230***
	(9.84)	(9.75)	(-10.34)	(-10.25)	(-9.71)	(-9.65)

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Table 7 - Continued

Effects of Managerial Overconfidence on Debt Ownership Structure

	Number of lenders		Lead Bank Shares		Herfindahl	
	(1)	(2)	(3)	(4)	(5)	(6)
Firm characteristics						
Firm Size	0.093***	0.101***	-0.113***	-0.118***	-0.120***	-0.126***
	(8.16)	(8.69)	(-8.89)	(-9.20)	(-7.65)	(-8.02)
Leverage	0.192***	0.219***	-0.190***	-0.210***	-0.188*	-0.212**
	(2.91)	(3.30)	(-2.72)	(-3.01)	(-1.87)	(-2.13)
Tangibility	-0.084	-0.095	-0.009	-0.007	-0.050	-0.047
	(-1.35)	(-1.51)	(-0.13)	(-0.09)	(-0.60)	(-0.57)
Profitability	0.141	0.117	0.021	0.010	0.002	-0.003
	(0.88)	(0.74)	(0.16)	(0.08)	(0.01)	(-0.02)
Market to Book	-0.013	-0.013	-0.003	-0.004	-0.002	-0.002
	(-1.17)	(-1.23)	(-0.59)	(-0.61)	(-0.26)	(-0.23)
Z-Score	0.016	0.017	-0.011	-0.012	-0.016	-0.016
	(1.35)	(1.41)	(-1.47)	(-1.48)	(-1.64)	(-1.64)
Intercept	-5.130***	-5.134***	9.199***	9.197***	14.796***	14.791***
	(-21.26)	(-21.22)	(28.79)	(28.62)	(36.90)	(36.57)
Controls						
Loan type	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	13,727	13,727	4,858	4,858	4,918	4,918
Adj. R^2	0.278	0.278	0.537	0.537	0.516	0.516

diversify risk when borrower's default risk is high. This result also confirms that risk

diversification is the primary concern of lenders in a syndicate.

4.3   Robustness Tests

4.3.1   Propensity-score Matched Sample Analysis

Although I control for a variety of firm characteristics in my multivariate tests, it

is still possible that the differences between loans issued to overconfident managers and

those issued to non-overconfident managers relate to other firm characteristics, rather

than to the effect of managerial overconfidence. This is because overconfident managers

may self-select into firms with characteristics that also affect loan terms. To further

examine this possibility, I use propensity score matching to identify a non-

overconfidence control sample that is comparable to the overconfidence sample on a

variety of firm characteristics and estimate my main regressions using the overconfidence

sample and the matched non-overconfidence control sample. Specifically, I calculate the

propensity score of having an overconfident manager based on firm size, leverage, and

firms' capital expenditure. These are all firm characteristics that have been found to be

associated with managerial overconfidence in the prior literature. I use firm size as a

proxy for firms' information environment, as firms with overconfident managers have

poorer information environments (Schrand and Zechman 2012; Ahmed and Duellman

2013). Because managerial overconfidence also relates to firms' investment and capital

structures (Malmendier and Tate 2005, 2008; Malmendier, Tate, and Yan 2011), I include

capital expenditure and leverage in the calculation of propensity score. I match (without

 replacement) each loan issued to overconfident managers to the control loan with the closest propensity score within a maximum distance of 0.1 percent. By requiring the maximum distance in propensity score to be 0.1 percent, I am able to obtain a balanced propensity-score matched sample with a reasonable sample size. The propensity matched sample based on overconfidence measure *Holder67* (*Invest*) contains 10,242 (9,106) loans, of which 5,121 (4,553) are issued to overconfident managers and 5,121 (4,553) are issued to non-overconfident managers.

Table 8, Panel A presents the summary statistics of the propensity-score matched sample. Column 1 and column 2 show the mean of loan characteristics and firm characteristics for the treatment group (*Holder67*=1) and for the control group (*Holder67*=0) respectively. Column 3 compares the difference in the means between the treatment group and the control group. Column 4 through column 6 present the same statistics based on the overconfident measure *Invest*. The propensity score model appears to be effective, as all firm characteristics that are related to managerial overconfidence are insignificantly different at the 10% level between the treatment group and the control group.

Table 8, Panel B and Panel C report the regression results of propensity-score matched sample analysis based on *Holder67* and *Invest*, respectively. The results are similar to those from the full sample tests.

Table 8
Propensity-score Matched Sample Analysis

This table presents results using a propensity-score matched sample. The z-statistics or t-statistics reported in parentheses are based on standard errors clustered by firm. Year and industry fixed effects are included. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels (two-tailed), respectively. All variables are defined in Appendix A.

Panel A: Summary Statistics of Propensity-score Matched Sample

	Propensity-score matched sample: *Holder67*			Propensity-score matched sample: *Invest*		
	Overconfidence mean	Non-overconfidence mean	Difference in means	Overconfidence mean	Non-overconfidence mean	Difference in means
	Std. Dev.	Std.Dev.	(t-statistic)	Std. Dev.	Std.Dev.	(t-statistic)
Loan Characteristics						
Interest	1.423	1.539	-0.117***	1.384	1.561	-0.177***
	1.158	1.321	(-4.75)	1.142	1.349	(-6.77)
Performance Pricing	0.513	0.468	0.046***	0.511	0.434	0.077***
	0.500	0.499	(4.63)	0.500	0.496	(7.37)
Financial Covenants	1.450	1.197	0.252***	1.353	1.184	0.168***
	1.305	1.245	(10.02)	1.305	1.245	(6.29)
General Covenants	3.621	3.348	0.273***	3.543	3.228	0.315***
	3.206	3.138	(4.35)	3.223	3.124	(4.73)
Maturity	46.442	43.024	3.419***	45.063	43.520	1.543***
	23.973	23.588	(7.27)	24.963	23.350	(3.05)
Loan Size	512.000	446.000	65.600***	526.000	459.000	67.500***
	887.000	827.000	(3.87)	498.000	435.000	(3.63)

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Panel A - Continued: Summary Statistics of Propensity-score Matched Sample

	Propensity-score matched sample: *Holder67*			Propensity-score matched sample: *Invest*		
	Overconfidence mean	Non-overconfidence mean	Difference in means	Overconfidence mean	Non-overconfidence mean	Difference in means
	Std. Dev.	Std.Dev.	(t-statistic)	Std. Dev.	Std.Dev.	(t-statistic)
No. of Lenders	11.05	9.689	1.366***	11.246	9.835	1.411***
	9.983	8.191	(7.57)	9.854	9.304	(7.02)
Lead Bank Shares	23.285	25.557	-2.272***	22.064	24.898	-2.834***
	22.526	23.972	(-2.98)	20.414	23.626	(-3.65)
Herfindahl	1891.865	2107.319	-215.454***	1759.647	2043.363	-283.716***
	2234.18	2397.671	(-2.85)	2012.381	2363.578	(-3.71)
Firm Characteristics						
Firm Size	5799.245	6127.960	-328.716	6309.622	6582.294	-272.673
	10540.540	10009.890	(-1.61)	10872.550	10180.91	(-1.24)
Leverage	0.275	0.275	0.001	0.285	0.284	0.002
	0.177	0.165	(0.21)	0.163	0.155	(0.51)
Capital Expenditure	0.054	0.055	0.001	0.054	0.054	-0.0001
	0.042	0.040	(1.11)	0.041	0.042	(-0.14)
No. of observations	5,121	5,121		4,553	4,553	

Panel B: Propensity-score Matched Sample Analysis using *Holder67*

	Loan Characteristics					Syndicated Structure		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Interest	Performance pricing	Financial Covenants	Maturity	Loan Size	No. of Lenders	Lead Bank Shares	Herfindahl
Overconfidence								
Holder67	-0.073***	0.080*	0.082***	0.020**	0.043	0.069***	-0.075***	-0.081***
	(-2.66)	(1.68)	(3.59)	(2.29)	(1.45)	(3.40)	(-3.41)	(-3.26)
Loan Characteristics								
Interest		0.100	0.408***	-0.027***	-0.613***	0.044***	0.014	-0.007
		(1.49)	(20.29)	(-2.83)	(-16.88)	(2.98)	(0.70)	(-0.28)
Performance Pricing	-0.159***		0.802***	0.057***	0.152***	0.295***	-0.087***	-0.119***
	(-6.66)		(27.92)	(6.04)	(6.23)	(15.32)	(-3.52)	(-4.28)
Maturity	-0.106***	0.556***	0.016		0.261***	0.213***	-0.229***	-0.260***
	(-2.74)	(7.12)	(0.63)		(5.91)	(7.39)	(-6.69)	(-6.12)
Loan Size	-0.225***	0.152***	-0.045***	0.034***		0.371***	-0.332***	-0.399***
	(-17.38)	(5.93)	(-4.44)	(5.75)		(35.49)	(-25.45)	(-25.37)
Syndicated	0.193**	0.738***	0.129*	0.064	1.436***			
	(2.46)	(3.08)	(1.82)	(1.01)	(10.63)			
Relationship Lending	-0.084***	-0.031	0.023	0.012	0.539***	0.224***	-0.236***	-0.257***
	(-3.22)	(-0.41)	(1.06)	(1.23)	(17.98)	(10.14)	(-9.46)	(-8.82)
Firm Characteristics								
Tangibility	-0.117	-0.408*	-0.205**	0.018	0.064	0.002	-0.021	-0.050
	(-1.02)	(-1.84)	(-2.46)	(0.57)	(0.52)	(0.03)	(-0.24)	(-0.52)
Profitability	-2.271***	2.001***	0.662***	0.294***	-0.055	0.039	0.081	0.008
	(-7.15)	(3.31)	(3.83)	(4.27)	(-0.15)	(0.23)	(0.53)	(0.04)
Market to Book	-0.034**	-0.095**	-0.005	-0.008**	-0.036	-0.016	-0.001	0.004
	(-2.22)	(-1.99)	(-0.40)	(-2.19)	(-1.62)	(-1.22)	(-0.18)	(0.48)
Z-Score	-0.099***	0.036	0.004	-0.005	-0.049**	-0.008	0.011	0.010
	(-3.82)	(1.00)	(0.37)	(-1.25)	(-2.34)	(-0.90)	(1.11)	(0.91)

Panel B - Continued: Propensity-score Matched Sample Analysis using *Holder67*

	Loan Characteristics					Syndicated Structure		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Interest	Performance pricing	Financial Covenants	Maturity	Loan Size	No. of Lenders	Lead Bank Shares	Herfindahl
Intercept	5.809***	-8.440***	-3.999***	1.714***	19.494***	-5.588***	9.783***	15.430***
	(18.93)	(-12.93)	(-7.85)	(9.50)	(73.25)	(-21.34)	(27.91)	(33.88)
Controls								
Loan type	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	10,242	10,242	10,242	10,242	10,242	9987	3592	3631
Psuedo/Adj. R^2	0.513	0.098	0.178	0.478	0.396	0.278	0.520	0.499

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Panel C: Propensity-score Matched Sample Analysis using *Invest*

	Loan Characteristics					Syndicated Structure		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Interest	Performance Pricing	Financial Covenants	Maturity	Loan Size	No. of Lenders	Lead Bank Shares	Herfindahl
Overconfidence								
Invest	-0.047**	0.317***	0.071***	0.044***	0.012	0.060***	-0.022	-0.040
	(-2.04)	(5.83)	(2.93)	(4.77)	(0.42)	(2.85)	(-1.05)	(-1.64)
Loan Characteristics								
Interest		0.153**	0.411***	-0.027***	-0.607***	0.049***	-0.014	-0.031
		(2.27)	(18.80)	(-2.85)	(-16.14)	(3.04)	(-0.65)	(-1.28)
Performance Pricing	-0.133***		0.837***	0.038***	0.158***	0.292***	-0.069***	-0.095***
	(-4.06)		(26.65)	(4.20)	(5.93)	(13.96)	(-2.79)	(-3.37)
Maturity	-0.098*	0.442***	0.026		0.285***	0.211***	-0.213***	-0.259***
	(-1.88)	(5.31)	(0.93)		(7.69)	(7.99)	(-6.23)	(-6.24)
Loan Size	-0.241***	0.161***	-0.052***	0.038***		0.379***	-0.342***	-0.402***
	(-12.93)	(5.92)	(-4.62)	(7.20)		(35.49)	(-24.53)	(-24.89)
Syndicated	0.276***	0.785***	0.209**	0.081	1.441***			
	(2.70)	(3.69)	(2.39)	(1.21)	(10.14)			
Relationship Lending	-0.090***	0.000	0.032	-0.001	0.524***	0.220***	-0.214***	-0.228***
	(-3.28)	(0.00)	(1.34)	(-0.12)	(17.32)	(9.38)	(-8.27)	(-7.74)
Firm Characteristics								
Tangibility	-0.084	-0.465*	-0.074	0.024	0.052	-0.068	0.024	0.034
	(-0.80)	(-1.70)	(-0.80)	(0.66)	(0.47)	(-1.02)	(0.31)	(0.38)
Profitability	-2.434***	2.937***	0.565***	0.296***	0.015	-0.025	0.083	0.095
	(-8.62)	(4.09)	(3.08)	(3.64)	(0.04)	(-0.14)	(0.55)	(0.55)
Market to Book	-0.035*	-0.174***	-0.002	-0.009**	-0.029	-0.006	-0.002	0.000
	(-1.88)	(-3.21)	(-0.12)	(-2.02)	(-1.25)	(-0.56)	(-0.30)	(0.06)

Panel C - Continued: Propensity-score Matched Sample Analysis using *Invest*

	Loan Characteristics					Syndicated Structure		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Interest	Performance Pricing	Financial Covenants	Maturity	Loan Size	No. of Lenders	Lead Bank Shares	Herfindahl
Z-Score	-0.089***	0.011	0.004	-0.006	-0.045**	-0.001	0.006	0.007
	(-3.91)	(0.31)	(0.41)	(-1.47)	(-2.16)	(-0.08)	(0.74)	(0.76)
Intercept	5.974***	-8.491***	-4.385***	1.638***	19.143***	-5.747***	10.052***	15.566***
	(13.70)	(-11.59)	(-7.11)	(10.55)	(68.33)	(-20.98)	(26.84)	(32.19)
Controls								
Loan type	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	9,106	9,106	9,106	9,106	9,106	8,899	3,172	3,207
Psuedo/Adj. R^2	0.517	0.100.	0.182	0.478	0.405	0.273	0.508	0.484

4.3.2   Variations in Overconfidence Measures

To further assure that the effect on loan contracting is due to managers' innate overconfidence, I repeat my empirical tests by using variations in overconfidence measures. Specifically, for *Holder67*, I reclassify managers as being overconfident starting with the second time they exhibit over confident behavior. I also reclassify managers as being overconfident if they exhibit overconfident behavior only once during the sample period. In addition, I re-define overconfident behavior as holding stock options that exceed 100% in the money. For the investment-based overconfidence measure, *Invest*, I reclassify managers as being overconfident if the amount of excess investment is in the top quartile or quintile of the industry for each year. Results by using these alternative overconfidence measures are qualitatively similar to my main results (untabulated).

Chapter 5

CONCLUSIONS

Recent studies in accounting and finance investigate the relation between managerial overconfidence and corporate investment and financing policies, as well as firm's financial reporting quality. I contribute to this literature by providing evidence on the effects of overconfidence on bank loan contracts. Using a sample of 13,931 unique loans issued to non-financial U.S. firms, I show that lenders adjust loan terms in contracting with overconfident managers. In particular, I find that lenders lower interest rates and increase financial covenant intensity in loan contracts with overconfident managers. In addition, I find that performance pricing provisions play an important role in loan contracts with overconfident managers. Performance pricing provisions improve debt contracting efficiency in that they protect lenders' returns and provide overconfident managers with an acceptable method of determining interest rate spreads. I also contribute to the syndicated structure literature by showing that lenders reduce syndicate ownership concentration to diversify risk in the presence of an overconfident manager.

APPENDIX A: DEFINITION OF VARIABLES

Financial Covenants:	The number of financial covenants imposed by the loan agreement.
Firm Size:	The natural logarithm of the borrower's total assets in the year prior to entering into a loan contract.
General Covenants:	The number of general covenants imposed by the loan agreement. This includes equity issuance sweeps, debt issuance sweeps, asset sales sweeps, insurance proceeds sweeps, investment restrictions and dividend restrictions.
Herfindahl:	Herfindahl index calculated as the sum of the squared individual shares of each syndicate member in the loan.
Holder67:	A binary variable which equals 1 from the first time that the percentage of options in the money exceeds 67% and the same manager should do so at least twice during the sample period, and 0 otherwise. To calculate the percentage of options in the money, I first calculate the average exercise price by dividing the value of exercisable unexercised options by the number of exercisable unexercised options and subtracting the per-option value from fiscal-year-end stock price. I then calculate the percentage of options in the money by dividing the per option value of exercisable unexercised options by the average exercise price.
Interest:	The interest rate is the All-in-Drawn-Spread measure reported by DealScan, divided by 100. This measure is equal to the amount the borrower pays in basis points over LIBOR for each dollar drawn down, so it accounts for both the spread of the loan and the annual fee paid to the bank group. LPC uses the LIBOR spread or the LIBOR equivalent spread option to calculate the All-in-Drawn spread.
Invest:	A binary variable which equals 1 if the amount of excess investment is above the industry median for each year, and 0 otherwise. The amount of excess investment is calculated as the residual from the regression of total asset growth on sales growth.
Lead Bank Shares:	The percentage of the loan retained by the lead bank in a syndicate
Leverage:	The ratio of the long-term debt plus debt in current liabilities to total assets, estimated in the year prior to entering into a loan contract.
Loan Size:	The natural logarithm of the loan amount.
Market to Book:	The ratio of market value of equity plus book value of debt to total assets in the year prior to entering into a loan contract.
Maturity:	The number of months between the facility's issue date and the maturity date.
No. of Lenders:	The number of lenders.

Performance Pricing:	An indicator variable taking the value of 1 if the loan contract incorporates a performance pricing provision, 0 otherwise.
Profitability:	The ratio of EBITDA to total assets, estimated in the year prior to entering into a loan contract.
Relationship Lending:	An indicator variable taking the value of 1 if at least one of the lead arrangers was a lead arranger of a previous loan over the prior five-year period, and 0 otherwise.
Syndicated:	A binary variable which equals 1 if the loan is syndicated, and 0 otherwise.
Tangibility:	The ratio of net PPE to total assets in the year prior to entering into a loan contract.
Z-Score:	Modified Altman's (1968) Z-score = (1.2 working capital + 1.4 retained earnings + 3.3 EBIT + 0.999sales) / total assets, estimated in the year prior to entering into a loan contract.
	I use a modified Z-Score, which does not include the ratio of market value of equity to book value of total debt, because a similar term, market-to-book, enters the regressions as a separate variable.

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