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This paper extends our knowledge of corporate debt maturity structure by examining whether and to what extent overconfident CEOs affect maturity decisions. Consistent with a demand side story, we find that firms with overconfident CEOs tend to adopt a shorter debt maturity structure by using a higher proportion of short-term debt (due within 12 months). This behavior of overconfident CEOs is not deterred by the high liquidity risk associated with such a financing strategy. Our demand side explanation remains robust even after considering six possible alternative drivers including a competing supply side explanation (in which creditors are reluctant to extend long-term debt to overconfident CEOs).

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Keywords: Overconfidence; Debt Maturity; Liquidity Risk; Cost of Debt

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Abstract

This paper extends our knowledge of corporate debt maturity structure by examining whether and to what extent overconfident CEOs affect maturity decisions. Consistent with a demand side story, we find that firms with overconfident CEOs tend to adopt a shorter debt maturity structure by using a higher proportion of short-term debt (due within 12 months). This behavior of overconfident CEOs is not deterred by the high liquidity risk associated with such a financing strategy. Our demand side explanation remains robust even after considering six possible alternative drivers including a competing supply side explanation (in which creditors are reluctant to extend long-term debt to overconfident CEOs).

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I. Introduction

Our understanding of the industry- and firm-level determinants of debt maturity structure is well established in terms of traditional finance theory (e.g., Flannery, 1986; Johnson, 2003; Myers, 1977; Stohs & Mauer, 1996). More recently, researchers have focused attention on the agency problem between stockholders and managers by examining how CEOs affect the corporate debt maturity decision at a personal level.[1] While these studies typically maintain the broad framework of "neoclassical" executive rationality, a behavioral finance perspective embracing the concept of overconfidence suggests alternative considerations that potentially offer important new insights.[2] Accordingly, the primary objective of our study is to examine whether and to what extent, the overconfidence of CEOs, affects a firm's debt maturity decisions.

The overconfidence concept examined in this study primarily stems from the notion of a "better-than-average" effect. That is, when individuals self-assess their relative skills or personal traits, most overestimate their own abilities and consider themselves to be above the average at a particular skill or consider themselves more likely to be described by desirable attributes (Alicke, 1985; Svenson, 1981). This "better-than-average" effect also applies to future events for which people express unrealistic optimism (Weinstein, 1980). As shown by

[1] Datta, Iskandar-Datta, and Raman (2005) and Brockman, Martin, and Unlu (2010) examine how CEOs' stock and option ownership affect debt maturity structure.

[2] A large body of psychology literature documents that people are 'biased' in their beliefs. See, for example, Svenson (1981) and Alicke (1985). As rightly cautioned by the anonymous referee, the reader is counselled against interpreting this view to be one of "irrationality". Executives may well be very confident and in some sense even "overconfident", but the fact that they tend to be quite successful and that the evidence suggests they do not systematically destroy firm value (e.g., Hirshleifer, Low and Teoh, 2012), implies that they should not be labeled irrational. Arguably, a superior view is to see this behavioral perspective as meaningfully broadening our conception of rational behavior/decision making.

Camerer and Lovallo (1999), the better-than-average effect also appears in experiments focused on economic decision-making, where participants overestimate their chances of relative success if the payoffs are based solely on their own abilities. Similarly, in the behavioral corporate finance literature, overconfident CEOs are often modeled to overestimate future firm performance (i.e., see Malmendier and Tate, 2005). This is because they generally expect good outcomes or because they overestimate their own efficacy in bringing about success (Hirshleifer, Low, & Teoh, 2012).[3]

Theoretically and empirically, overconfidence has been shown to have a substantial impact on corporate decision-making. For example, Roll (1986) first uses the overconfidence approach to explain the often observed phenomenon of value-destroying mergers and acquisitions. Although the term "overconfidence" is not explicitly mentioned in his work, Roll's managerial hubris is closely allied to the concept of overconfidence that we examine in our study. His "hubris" theory suggests that managers are too confident about the expected benefits emanating from mergers and acquisitions and, thus, they bid excessively for target firms, thereby leading to ex-post losses on "successful" deals.

More recently, Malmendier and Tate (2008) find that overconfident CEOs undertake value-destroying mergers due to overestimating firms' ability to generate returns, especially

[3] The anonymous referee raises the distinction between personal overconfidence regarding the executive's own abilities versus overconfidence regarding their firm's prospects. We acknowledge this is a legitimate concern, not only for our paper, but more generally for this pocket of behavioural finance literature. One means of connecting personal overconfidence with overconfidence in firm performance is to invoke an assumption of "illusion of control", in which overconfident CEOs believe that their abilities can determine firm outcomes. From such a perspective, our analysis is in effect a test of a joint hypothesis.

when they have access to internal funding.[4] Similarly, Heaton (2002) uses a simple model to demonstrate the underinvestment and overinvestment problems for overconfident managers, even in the absence of information asymmetry. Empirically, Malmendier and Tate (2005) use CEOs' propensity to hold deep in-the-money stock options as a proxy for CEO overconfidence and find that such CEOs' investments are more sensitive to cash flow, especially for those in equity-dependent firms.

In terms of the financing decision, Hackbarth (2008) suggests that managers' growth and risk perception biases are important factors in explaining capital structure decisions such as firm leverage and debt issuance. Hackbarth (2008) argues that, compared to "unbiased" managers, "biased" managers tend to use more debt financing as they believe that the firm is more profitable and/or less risky. Malmendier, Tate, and Yan (2011) empirically find that overconfident CEOs are less likely to issue equity than debt when accessing external financing as they believe equity is more undervalued than debt, which (other things being equal) leads to higher leverage observations.[5] Moreover, in a mini-boom of recent research effort, the effect of managerial overconfidence is more widely explored in the context of other areas of corporate decision-making and activity, such as compensation contracts and capital budgeting (Gervais, Heaton, and Odean, 2011), financial misreporting (Schrand & Zechman, 2012); earnings forecasts (Hribar & Yang, 2015), CEO turnover (Campbell, Gallmeyer, Johnson, Rutherford, & Stanley, 2011), and innovation (Hirshleifer et al., 2012).

[4] In more recent work, Kolasinski and Li (2013) and Ferris, Jayaraman, and Sabherwal (2013) confirm that overconfident CEOs are more acquisitive.

[5] Malmendier et al. (2011) argue that the net impact of overconfidence on leverage is an empirical question as it depends on the relation between overestimated investment returns, cash holdings and perceived financing costs. Empirically, they find support for a positive relation between overconfident CEOs and financial leverage.

Despite the large amount of research investigating the concept and impact of overconfidence in financial decision-making, its influence on debt maturity structure remains largely unexplored. The standout exception is Landier and Thesmar (2009). However, they only focus on a sample of small French start-up firms.[6] Our study differs from (and improves upon) theirs in the following three aspects. First, we examine the effect of managerial overconfidence on a representative sample of large US listed firms, whose financing decisions are generally quite different from and economically more important than small start-up firms. Second, our study measures overconfidence based on executive option exercise behavior and includes a comprehensive set of control variables – thereby addressing some of the omitted variables concerns associated with their study.[7] Third, we expand the scope of their study by considering the influence of liquidity risk and explore the channel overconfident CEOs manage their preferred debt maturity.

We argue that overconfident CEOs believe that they can enhance stockholder value by taking on more short-term debt. This is because overconfident CEOs overestimate the probability that they can refinance short-term debt with lower costs when favorable news arrives in the future. Empirically, we follow Malmendier and Tate (2005, 2008) by using revealed beliefs from executives' option exercise behavior to identify overconfident CEOs. We conduct our empirical analysis in the US market with a sample of 4,309 firm-year

[6] The sample of Landier and Thesmar (2009) is typified by very small operations. Specifically, the average number of employees is generally less than 10 and the total annual sales only a few hundred thousand Euros.

[7] Landier and Thesmar (2009) use the difference between forecasted and realised sales and employment figures as a measure of overconfidence. This measure raises the concern that the correlation between overconfidence and short-term debt could just come from omitted variables that affect both firm performance and the use of short-term debt. For example, if risky firms tend to borrow more short-term debt, a negative shock will have a greater impact on the performance of those risky firms which makes the entrepreneurs appear optimistic (when they might not be).

observations from 2006 to 2012. Consistent with our hypothesis, we provide strong evidence that firms with overconfident CEOs tend to have a higher proportion of debt due within a short horizon – namely, one, two or three years.

To further explore the main channel of short-term debt used by overconfident CEOs, we more finely partition our measurement of debt maturity into two components; namely: (1) newly-contracted short-term debt (ST, i.e. debt due in less than 12 months) and (2) the maturing of previously-contracted longer-term debt (excluding ST). This analysis shows that the main driver for the documented overconfidence-short-term debt linkage is ST.

Employing a battery of robustness checks, we rule out the following six alternative explanations for the documented relation between short maturity and CEO overconfidence: (1) insider information; (2) risk tolerance; (3) past performance; (4) taxes and dividends; (5) board pressure; and (6) a supply side story in which lenders are reluctant to extend longer-term loans to overconfident CEOs. Further, extended analysis shows that our results are not solely concentrated in firms with low liquidity risk, suggesting that firms with higher liquidity risk do not seem to materially deter the action of borrowing very short-term debt by overconfident CEOs.

Accordingly, our paper makes three primary contributions to the existing literature. First, it contributes to the literature on debt maturity structure at the individual decision-maker level, rather than at the industry or firm levels. Second, to the best of our knowledge, this is the first study to examine the channel through which overconfident CEOs execute the debt maturity structure decision through a novel method, distinguishing newly-contracted short-term debt from previously-contracted longer-term debt. Third, our study helps further bridge the gap between behavioral finance and corporate financing decisions. We show that the effect of overconfidence is not only related to the choice (debt vs. equity) and level of financing (leverage), but also extends to the choice of maturity.

Our further analysis also shows that overconfident CEOs are not screened out from the longer-term debt market via a higher cost of debt. Furthermore, we show that overconfident CEOs are willing to accept short-term debt, despite the strongly held view that short-term debt is "an extremely powerful tool to monitor management" (Stulz, 2000). Taken together, our findings offer one possible explanation of why firms hire overconfident CEOs despite the concern that they might be value destroying in mergers and acquisitions (Roll, 1986; Malmendier and Tate, 2008).

The remainder of our study is organized as follows. Section II briefly illustrating how overconfident CEOs choose between short-term and long-term debt. Section III details the sample selection along with variable specifications, and our research method. Section IV presents descriptive statistics, our main results and further analyses. Section V concludes the study.

II. Hypothesis Development

Overconfident CEOs overestimate the probability of future success of their firms. That is, overconfident managers *believe* that they have positive private information, which the market does not know yet. When a firm has positive private information about its prospects, all of its securities are mispriced. This mispricing is more severe for long-term debt than for short-term debt and based on this, overconfident CEOs try to issue short-term debt to minimize the impact on perceived mispricing. That is, overconfident CEOs believe they can refinance using short-term debt with lower costs when positive news arrives in the future.

A simple extension of Flannery's (1986) model is included in Appendix A to illustrate the preference for short-term debt by overconfident managers. This prediction is similar to the information asymmetry hypothesis proposed by Flannery (1986), in which managers have

private information and issue short-term debt to signal the market. However, our approach differs from that of Flannery (1986) in one key way. Specifically, in our model overconfident managers believe that they have private information, but in reality, there is no information asymmetry between managers and investors. Therefore, overconfidence is the driver to the preference for short-term debt in our model and hypothesis developments.

The prediction here is also similar to Malmendier et al. (2011), in which the overconfidence of CEOs lead to the belief that equity is more mispriced than debt, and conditional on accessing external financing, overconfident CEOs prefer debt to equity. If we consider equity as a form of perpetuity debt instrument, essentially, we are proposing a monotonic effect across the maturity spectrum: overconfident CEOs prefer short-term debt to long-term debt, and long-term debt to perpetuity debt (equity).

Hypothesis: *All else being equal, overconfident managers prefer a shorter debt maturity structure when compared to non-overconfident managers.*

III. R search Design

A. Sample Selection and Data Sources

We use several databases to construct our main sample. Specifically, we obtain the executives' stock and option holdings from ExecuComp. Financial and accounting information is obtained from Compustat, and monthly stock prices are from CRSP. Yields on long-term government bonds are from the St. Louis Federal Reserve Bank website.[8]

Our main sample period covers 2006 to 2012. We begin in 2006 because this is the year ExecuComp starts to provide executive package-level option holdings due to the change

[8] http://research.stlouisfed.org/fred2/

in reporting requirements by FAS 123R which, as we will see shortly, is essential for us to create our preferred proxy for overconfidence.[9] Furthermore, one of our key control variables, abnormal earnings, requires one-year ahead data which limits our last year to 2012.

We combine the detailed data on executives' option holdings from ExecuComp with monthly stock prices from CRSP to identify overconfident CEOs and compute CEO personal-level control variables. We then merge the dataset with firm-level control variables computed from Compustat and/or CRSP to form our final sample. Following prior literature (e.g., Barclay, Marx, & Smith, 2003; Brockman et al., 2010; Datta et al., 2005), we confine our analysis to industrial firms with SIC codes between 2000 and 5999. Further, in line with a widely accepted convention, financial firms are excluded. Following Brockman et al. (2010), we omit those observations which breach sensible bounds (less than 0% or greater than 100%)[10] and winsorize all variables (except for dummy variables) at 1st and 99th percentiles[11] to eliminate the effect of outliers. The final sample includes 4,309 firm-year observations, representing 944 different firms.

[9]ExecuComp has existed since 1992, but it only provides aggregate option holdings prior to 2006. Unfortunately, it is not possible to extract some critical information from these early data. For example, expiry dates and exercise prices for individual options are not available to construct our overconfidence proxy, which is the main variable of interest.

[10] We reach qualitatively similar results if we replace erroneous debt maturity data with 0% and 100% rather than omitting the observations. Details are available from the authors upon request.

[11] We obtain qualitatively similar results if we do not winsorize – details are available from the authors upon request.

B. Variable Definitions

1. Proxies for Debt Maturity

Prior debt maturity literature generally uses the proportion of debt within certain years as proxy for debt maturity structure. For example, Johnson (2003) and Datta et al. (2005) proxy debt maturity using the proportion of debt due within three years (*ST3*), while Brockman et al. (2010) use both *ST3* and *ST5*. There is no particular reason to believe one is superior to the other. Therefore, we report results using all available measures reported in Compustat. Specifically, we use the proportion of debt due within one year to five years (*ST1* to *ST5*), as proxies for debt maturity. Definitions of all debt maturity proxies are available in Appendix B.

2. Proxy for Overconfidence

Following Malmendier and Tate (2005, 2008), our proxy for overconfidence is based on CEOs' revealed beliefs reflected in their option exercise behavior. CEOs receive large amount of stock and option grants as part of their compensation package, besides, their human capital is invested in the firms. As a result, CEOs are highly exposed to their firms' idiosyncratic risks. In order to diversify, non-overconfident CEOs should exercise those sufficiently in-the-money options early. According to Hall and Murphy (2002), the exact threshold depends on the remaining option duration, individual wealth, risk aversion and diversification. Nevertheless, Malmendier and Tate (2005, 2008) find that given reasonable calibrations of wealth and risk aversion, a subset of CEOs in their sample persistently fail to exercise those deeply in-the-money vested options early. Motivated by the late exercise behaviour of CEOs, Malmendier and Tate (2005, 2008) develop their option-based overconfidence measure.

Malmendier et al. (2011) conclude that *Longholder* in Malmendier and Tate (2005, 2008) is the best candidate to replicate the option-based measure of overconfidence using

more recent data. As a result, we use a dummy variable, *Longholder*, to identify overconfident CEOs, which takes a value of unity if a CEO at least once in his or her tenure, holds an option until its final year of duration and the option is at least 40%[12] in-the-money entering the last year, and zero otherwise. Notably, the particular threshold choice is not overly critical for our analysis – the mean (median) percentage in-the-moneyness for this sample of in-the-money options held into their last year is 192% (67%). Our results remain qualitatively similar for any cut-off point between 30% and 90% (being the full range of reasonable values that we explored).[13,14] The assumed persistence of overconfidence adopted in Malmendier and Tate (2005, 2008) and our study is consistent with the evidence from Landier and Thesmar (2009) and Ben-David et al. (2013)'s finding that optimistic expectation errors made by entrepreneurs/CFOs tend to persist over time.

3. Other control variables

To minimize the possibility that our main results are driven by omitted variables, we use similar set of control variables as Brockman et al. (2010), which are also consistent with the prior debt maturity literature (e.g., Barclay et al., 2003; Datta et al., 2005; Stohs & Mauer, 1996). Control variables for the debt maturity equation include natural logarithm CEO personal option portfolio price sensitivity (*Log(1+delta)*), natural logarithm volatility sensitivity (*Log(1+vega)*),[15] CEO *Stock Ownership*, *Leverage*, natural logarithm firm size

[12] The choice of a 40% threshold is based on the model of Hall and Murphy (2002), under the assumption of constant relative risk aversion coefficient of 3 and 67% of wealth in their own company stock.

[13] Details are available from the authors upon request.

[14] As a further robustness check, if we use a one-year lagged value of overconfidence and require that the firm has the same CEO as the previous year (to allow CEOs some time to implement changes), our results remain qualitatively similar. Details are available from the authors upon request.

[15] We avoid using Log(delta) and Log(vega), because they are undefined when delta and vega take a value of zero.

(*Log(Size)*) and its square term ((*Log(Size)*)^2), *Asset Maturity*, *Earnings Volatility*, *Abnormal Earnings*, *Market-to-Book Ratio*, *Term Structure* of interest rates, Credit *Rating Dummy* and *Z-score Dummy*. We do not include regulation dummy as industry fixed effect has been accounted for in our regressions. The measurements, predicted signs and brief motivation for all variables are summarized in Appendix B.

C. Model Specification and Methods

To test our main hypothesis, a pooled cross-sectional, times-series regression is estimated with firm clustered errors:

(1)

where all variables are defined in Appendix B.

According to Barclay et al. (2003) and Johnson (2003), debt maturity and leverage are endogenous and jointly determined. To control for this endogeneity problem, we use IV-GMM regression that models leverage and debt maturity as jointly determined. Drawing from key studies in the prior literature (e.g., Barclay et al., 2003; Brockman et al., 2010; Datta et al., 2005; Johnson, 2003), we include *Fixed Assets Ratio*, *Return on Assets*, *Net Operating Loss Dummy* and *Investment Tax Credit Dummy* as our instrumental variables. The measurement and motivations of these variables are summarized in Appendix B.

We do not include fixed-firm effects in the panel regression as our measure of overconfidence requires CEOs to have long tenure within a firm to be identified as

overconfident, which leaves insufficient time-series variation to identify the effect of overconfidence.[16] However, we do include Fama-French 12 Industry fixed effect to control for time invariant industry level determinants.[17] We also include year dummies to control for the effects of latent macroeconomic event shock factors.

IV. Empirical Results

A. Sample Distribution and Summary Statistics

1. Firm-level Summary Statistics

Table 1, Panel A, reports the aggregate summary statistics for firm-level characteristics. Our proxies for the dependent variable of short-term debt, namely *ST1*, *ST2*, *ST3*, *ST4* and *ST5*, show that, on average, firms in our sample have 17.4%, 26.6%, 36.9%, 47.9% and 59.4% of their debts due within one, two, three, four and five years, respectively. The debt maturity and most of the control variables in our sample show similar sample values to those reported by Datta et al. (2005) and Brockman et al. (2010) except for *Abnormal Earnings*, which is 1.2% in our sample compared to 0.83% and 0.6% reported in their studies. The average market value of firm is around $15.6 billion, which suggests our sample contains relatively large firms (our sample is the intersection of Compustat and ExecuComp, mainly S&P 1500 firms).

[Table 1 about here]

[16] That is, there are not enough cases of overconfident and non-overconfident CEOs in the same firm (especially because of the short sample period) to draw robust inferences from fixed-firm effect estimations. Another pitfall for including fixed-firm effects is the potential sample selection bias. By including fixed-firm effects, we are effectively examining only those firms with multiple short-tenured CEOs (Malmendier & Tate, 2005).

[17] Our results are qualitatively similar when we use Fama-French 48 Industry fixed effects. For definitions, please see Professor Kenneth French's website http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

Panel B of Table 1 separates the sample into overconfident and non-overconfident subsamples. Consistent with our prediction, in a univariate test, the means of *ST1*, *ST2*, *ST3*, *ST4* and *ST5* for firms with overconfident CEOs are significantly higher than the corresponding values for their non-overconfident counterparts (at the 1% level), suggesting that firms with overconfident CEOs tend to have shorter debt maturity structure. Firms with overconfident CEOs borrow less debt which is consistent with Hirshleifer et al. (2012). Overconfidence subsample also has lower *Asset Maturity*. Furthermore, firms with overconfident CEOs are less likely to be rated, but have higher growth opportunities and higher credit quality (reflected by higher *Z-scores Dummy*).

2. CEO-level Summary Statistics

In Table 2 Panel A, we present the aggregate summary statistics for CEO characteristics. We classify approximately 28.6% of our CEO sample as overconfident which is slightly higher than the 22.2% reported by Malmendier et al. (2011). The mean (median) CEO portfolio price sensitivity is about $577,463 ($221,959), which is slightly lower than that reported by Brockman et al. (2010), while the mean (median) volatility sensitivity is around $171,761 ($78,455) which is higher. Because our sample period includes the recent financial crisis, stock options granted to CEOs are less in-the-money during that period, which causes the price sensitivity to be lower and the volatility sensitivity to be higher. CEOs in our sample hold about 1.1% of the firms' outstanding shares. If CEOs exercise their options and retain the shares, those shares would amount to around 0.7% of outstanding equity. The *Total*

Compensation is about $6.0 million. The majority of CEOs in our sample are male with an average age of 56 and an average tenure of 7 years.[18]

[Table 2 about here]

In Panel B of Table 2, we further separate the CEO sample into the overconfident and non-overconfident subsamples. We observe that, on average, overconfident CEOs are slightly older and have much longer tenure compared to non-overconfident CEOs. Given that our measure of overconfidence requires CEOs to hold onto their options until the last year of their durations, we would expect overconfident CEOs to be older and have longer tenure. The mean CEO portfolio price sensitivity and volatility sensitivity are both higher for the overconfident subsample which is consistent with Hirshleifer et al. (2012). This result is partially due to the higher stock and exercisable option ownership reported for overconfident CEOs. Although gender, age, tenure, exercisable option ownership and total compensation differ significantly between overconfident CEOs and non-overconfident CEOs, we do not include them as control variables in our core analysis as there is no theory suggesting such variables would affect debt maturity structure.[19]

B. Do Overconfident CEOs prefer Shorter Debt Maturity Structure?

Table 3 presents the second-stage IV-GMM regression results using *ST1*, *ST2*, *ST3*, *ST4* and *ST5* as the dependent variable, respectively. According to our main hypothesis, we expect a positive relation between short-term debt and CEO overconfidence (proxied by *Longholder*).

[18] The numbers of observations for age, tenure and total compensation are slightly lower than for the other variables. This is due to missing or erroneous data (e.g., negative tenure) reported by ExecuComp for age, tenure and total compensation.

[19] As a robustness check, we also include gender, age, tenure, exercisable option ownership and total compensation in our main models, and our results remain qualitatively similar. Details are available from the authors upon request.

In line with our hypothesis, the estimated coefficient on *Longholder* is positive and significant when we use *ST1*, *ST2* or *ST3* as the dependent variable, but insignificant when using *ST4* and *ST5*. The results suggest firms with overconfident CEOs are associated with a higher proportion of debt due within one to three years. Our results are also highly economically significant. Specifically, the estimated coefficients indicate that firms with overconfident CEOs increase the proportion of debt maturing within one, two or three years by 3.6%, 4.0% and 3.7%, respectively. Given that the average proportions of debt maturing within one, two or three years in our sample are 17.4%, 26.6% and 36.9%, this represents an increase in the use of debt over these timeframes by 20.7%, 15.0% and 10.0%, relative to the average.

[Table 3 about here]

The estimated coefficients for the control variables are generally in line with extant theory and our predictions, although the significance of some variables depends on the proxy choice for the dependent variable. Generally, we find CEOs with higher option portfolio volatility sensitivity and stock ownership use a higher proportion of short-term debt, while CEOs with high option portfolio price sensitivity prefer to use less short-term debt, which is consistent with results from Datta et al. (2005) and Brockman et al. (2010).

The negative coefficient on *Leverage* (although only significant when *ST1* is used as dependent variable) suggests that firms use a lower proportion of short-term debt when leverage is high, most likely to avoid suboptimal liquidation (Diamond, 1991; Alcock, Finn, & Tan, 2012). We also find supporting evidence for the nonlinear relation between debt maturity and credit quality predicted by Diamond (1991). Our results generally support the matching hypothesis (Myers, 1977), that is, firms tend to match their debt maturity with asset maturity. We also find that firms with higher growth opportunities tend to have more short-

term debt to alleviate the underinvestment problem (Myers, 1977). The negative estimated coefficient on *Term Structure* (although only significant when *ST1* and *ST2* are used as dependent variables) suggests that firms take more long-term debt to accelerate tax benefit (Brick & Ravid, 1985). Consistent with Johnson (2003), rated firms are more capable of borrowing long-term debt.

However, we do not find strong evidence that firms choose a shorter debt maturity structure to signal the market (Flannery, 1986). *Earnings Volatility* is not significant across all different debt maturity proxies, and the positive coefficient is consistent with Datta et al. (2005), which suggests that firms with high asset volatility are screened out of the long-term debt market (especially for debt maturing beyond five years).

C. How do Overconfident CEOs alter Debt Maturity Structure?

Our previous results document a strong positive relation between CEO overconfidence and the proportion of debt due within one, two or three years. To further explore the main driver of the positive relation between CEO overconfidence and shorter-term debt, we separate our measurement of short-term debt (ST1) into two parts, the proportion attributable to the use of short-term debt (i.e. debt with less than 12-months to maturity, "NP") and the remaining component which represents the current proportion of long-term debt (DD1).[20] We denote these two components as ST (short-term debt [NP] divided by total debt) and LT1 (long-term debt due within one year divided by total debt), respectively.

We also extract the ST (NP/total debt) component out of ST2 to ST5, and denote the remaining parts as *LT2* to *LT5*, respectively. Table B2 in Appendix B summarizes the relations between the various alternative debt maturity measures. This classification helps us

[20] Short-term debt with less than 12-month maturity generally includes commercial paper, used bank line of credit, notes payable. The Compustat item name for this type of short-term debt is "NP".

to better identify the mechanism by which overconfident CEOs might alter debt maturity structure. To be more specific, we ask whether overconfident CEOs use short-term debt (i.e. debt due in less than one year) more extensively or do they simply have a higher proportion of long-term debt due within one, two, …. five years?

[Table 4 about here]

Table 4 reports regression outcomes using *ST*, *LT1*, *LT2*, *LT3*, *LT4* and *LT5* as alternative dependent variables, respectively. Our findings present a stark result – *Longholder* is only statistically and positively related to *ST* (at any conventional significance level). As such, our results suggest that the positive relation between overconfident CEOs and shorter-term debt as documented in Section IV.B is mainly driven by the higher proportion of short-term debt due in less than one year. That is, overconfident CEOs achieve shorter debt maturity structure mainly through the use of a higher proportion of short-term debt. Notably, the effect of overconfidence is also highly economically significant. Given that an average firm in our sample has 7.9% of debt financed by short-term debt, being overconfident increases this figure to 10.4%, which represents a 31.6% increase in the short-term debt used.

D. Alternative Explanations for the Documented Relation between Short-term Debt/CEO Overconfidence

Since our proxy for overconfidence is an option-based measure, there might be concern that this metric is also correlated with other omitted variables. That is, such delayed exercise behavior could be driven by alternative forces than overconfidence. Therefore, we challenge our main result – the positive relation between overconfident CEOs and short-term debt (*ST*) – with the following five alternative interpretations, namely: (1) insider information (signaling); (2) risk tolerance; (3) past performance; (4) personal tax and dividends; and (5) board pressure. Our main result is resilient to these five alternative interpretations.

1. Insider Information (Signaling)

A possible alternative explanation for the late option exercise behavior could be that CEOs have private information about the firm's future performance. Under this scenario, CEOs hold on to the deeply in-the-money options to potentially profit from their private information and/or to signal the market. Such favorable information could also induce CEOs to take short-term debt to signal to the market the high quality of the firm (Flannery, 1986).

One major distinction between the concept of overconfidence applied in our paper and private information is persistence. Private information is generally short-lived and somewhat random, whereas our concept of overconfidence is a fixed effect.[21] We would not expect CEOs to have positive information repeatedly. Therefore, the option-based measure should not reliably capture their private information. Furthermore, as one of our control variables we include *Abnormal Earnings* to proxy for firm quality. To some extent, *Abnormal Earnings* should also capture part of any favorable private information. Therefore, if our measure of overconfidence also captures the effect of private information, we would expect the relevant estimated coefficient to be larger and more significant if we remove *Abnormal Earnings* from our main regression. However, as shown in Table 5 Column (2), when *Abnormal Earnings* is excluded the estimated coefficient on *Longholder* is negligibly impacted when compared to our core findings (the core results are repeated in the column (1) for convenience). Thus, taking all of the above on board, we dismiss the private information alternative explanation.

[Table 5 about here]

[21] We classify a CEO as overconfident for the whole sample period once he/she is shown to hold deeply in-the-money options.

2. Risk Tolerance

In applying the 40% in-the-money threshold for the option exercise, we assume a constant relative risk aversion coefficient of 3 for all CEOs (Hall & Murphy, 2002). An alternative explanation for our results could be that those CEOs who we classify as overconfident are in fact more risk tolerant rather than overconfident. Under this interpretation, they hold options beyond the threshold simply because they are less risk averse and therefore, less affected by concerns of under-diversification. Under this scenario, consistent with their high risk tolerance, they are more inclined to take short-term debt and increase the risk.

However, one of our control variables (volatility sensitivity, *Log(1+vega)*) should at least partially proxy for risk-taking, as the higher the volatility sensitivity becomes, the more incentive there is for CEOs to increase the risk of the firm. Therefore, if our measure of overconfidence captures high risk tolerance, we should get a larger and more significant estimated coefficient on *Longholder* if *Log(1+vega)* is removed from the regression. However, as shown in Table 5 Column (3), when this alternative specification is used, the relevant coefficient is again negligibly impacted when compared to our core findings. Furthermore, as shown by Malmendier and Tate (2005), overconfident CEOs (identified by option-based proxy) are less willing to invest when the firm is financially constrained, which is also inconsistent with the risk tolerance hypothesis. If a CEO is less risk averse, he/she should be more willing to tap into the external market to finance new projects. As such, we dismiss the concern relating to the risk tolerance interpretation.

3. Past Performance

The extent to which good past performance reflects profitable future opportunities, CEOs in firms with strong past stock returns might retain their option holdings and also engage in issuing short-term debt to alleviate the underinvestment problem (Myers, 1977). However,

the correlation between our measure of overconfidence and past stock returns is generally small. In Table 5 Column (4), we also control for past three-year (five-year, unreported) returns and obtain a similar estimated coefficient for *Longholder*. Therefore, past performance cannot explain our findings.

4. Taxes and Dividends

CEOs might choose to delay exercising their options to postpone the payment of personal taxes on the realized profits. However, CEOs' personal taxes provide no prediction for the debt maturity decision for the firm. Similarly, CEOs can accelerate the exercise of options to capture dividend payments. Therefore, such late option exercise behavior could be concentrated in those firms with fewer dividend payments. Firms with high growth opportunities pay less dividends. Thus, our measure of overconfidence could capture the effect of growth opportunities rather than overconfidence which also predicts a positive relation. Indeed, we find a positive sample correlation between *Market-to-Book Ratio* and *Longholder*. However, as shown in Table 5 Column (5), when we include a dividend yield variable (namely, the average dividend yield during the past three years)[22] in the regression, our results remain qualitatively unchanged. Therefore, taxes or dividends are not driving our results.

5. Board Pressure

The Board of directors might require the CEO to hold on to the deeply in-the-money options to keep incentives high even when those options are vested. Therefore, our so–called "overconfident" CEOs might just have stronger incentives and are more willing to accept more frequent monitoring with short-term debt. The *Stock Ownership* variable included in our regression captures this effect as well. CEOs with higher stock ownership have stronger

[22] We also tried the average dividend yield for the past two years and one year, and the results remain qualitatively similar across either of these cases. Details are available from the authors upon request.

incentives and are more willing to take short-term debt (Datta et al., 2005). Therefore, if our proxy of overconfidence simply measures the incentive level, we should observe a more positive and significant coefficient when we exclude *Stock Ownership* from the regression. However, as shown in Table 5 Column (6), the results for this alternative specification show the opposite outcome. Thus, we dismiss this alternative interpretation of our results.

In summary, the above analysis shows the robustness of our results to five different alternative explanations. It appears that overconfidence interpretation is most consistent with the observed late exercise behavior.

E. Can a Supply Side Story Explain our Overconfidence-short-maturity Result? No

To this point, we have ignored an underlying "tension" related to our chosen research question. That is, our "overconfidence-short-maturity" finding is consistent with two competing stories, namely: (1) a demand side story and (2) a supply side story. So far, we have been leaning on the *demand side* (i.e. CEO's propensity) only. More specifically, based on the demand side perspective we argue that overconfident CEOs prefer a shorter debt maturity structure because these managers believe that short-term debt is less mispriced than longer-term debt. However, an equally plausible *supply side* view poses the "reluctant-creditor" scenario in which, other things equal, lenders are reluctant to provide such overconfident CEOs with longer-term debt. For example, this reluctance could be driven by the concern that such overconfidence, in effect, scales up the lender's risk exposure – appreciably above the "on paper" creditor risk.

To explore the validity of this competing supply side story, we focus on how banks contract with overconfident CEOs in terms of the financing costs for syndicated bank loans.[23]

[23] We thank an anonymous referee for suggesting the method to disengtangle the demand side story from the supply side story using the cost of debt.

More specifically, if lenders are reluctant to provide overconfident CEOs with longer-term debt, then we would expect them to charge a higher cost of debt when extending longer-term debt to overconfident CEOs (compared to non-overconfident CEOs). In contrast, if creditors are either unaware of or unconcerned about CEO overconfidence, then there will not be any differential treatment of overconfident and non-overconfident CEOs when extending debt into the longer term. Such a finding would be consistent with an overconfident CEO's propensity for short-term debt (our demand side) story and inconsistent with a reluctant-creditor (supply side) explanation.

To formally test the impact of CEO overconfidence on the cost of debt, we obtain data on individual loan facilities from the Dealscan database between 2007 and 2014. We then merge the loan facility information with our existing debt maturity sample using the linking table provided by Chava and Roberts (2008). We follow Bharath, Dahiya, Saunders and Srinivasan (2011) and match the loan facility data with previous fiscal year-end accounting information if the loan activation date is 6 months or later than the last fiscal year end,[24] to ensure that we only use publicly available information when the loan is made. As a result of this matching method, to accurately attribute the effect of CEO overconfidence, we further require that the same CEO is in place when the loan is contracted.[25] Additionally, we only retain LIBOR-based loans to have a comparable base rate. After deleting observations with missing control variables, the final sample consists of 944 syndicated loans, comprising 266 syndicated term loans and 678 revolving credit facilities. All variables (except for dummy variables) are winsorized at the 1st and 99th percentiles, to reduce the effect of extreme outliers.

[24] If the loan activation date is less than 6 months from the last fiscal year end, then we match it with the previous fiscal year.

[25] Our findings are qualitatively the same if we do not implement this filter.

To control for the impact of firm characteristics and loan specific features on the pricing of syndicated loans, we follow Bharath et al. (2011), and run the following regression:[26]

(2)

Cost of Debt takes two alternative forms: AISD and AISU, the "all-in-spread-drawn" and "all-in-spread-undrawn" items reported in Dealscan, respectively. As before, *Longholder* is a dummy variable taking a value of one for overconfident CEOs, and zero otherwise. *Log(LoanMaturity)* is the natural logarithm of the difference between loan facility start date and maturity date. Our main variable of interest is the interaction term between *Longholder* and *Log(LoanMaturity)* that represents the incremental cost of long-term debt borne by overconfident CEOs. Therefore, if the associated coefficient (α_1) is positive and statistically significant, then it suggests that the "overconfidence-short-maturity" result is mainly driven by the supply side story. Conversely, an insignificant coefficient on the interaction term preserves our demand side interpretation. All other variables are defined in Table 6.

[Table 6 about here]

The results of this regression are presented in Table 6. Columns (1) and (2) use AISD and AISU as the dependent variable, respectively. The coefficient (α_1) on the interaction

[26] In addition to variables reported below, we further follow Bharath et al (2011) to control for calendar year fixed effects, Fama-French 12 Industry fixed effects, loan purpose fixed effects, loan type fixed effects, and rating fixed effects with not-rated firms considered as a separate group.

term between *Longholder* and *Log(LoanMaturity)* is not statistically significant in either case. Further, in Columns (3) and (4), we document qualitatively similar results (i.e. insignificant α) if we omit all other CEO personal-level determinants (i.e., *Log(1+delta)*, *Log(1+vega)* and *stock ownership*). Thus, our key finding suggests that, other things equal, creditors are either unaware of or unconcerned about CEO overconfidence, and so do not charge a higher cost of debt when extending longer-term debt to overconfident CEOs. Therefore, this result does not support the supply side "reluctant lender" story. As such, it appears that the demand side is the most consistent story for the observed positive relation between short-term debt and CEO overconfidence.

F. Further Robustness Checks

Our dependent variable *ST* is naturally bounded between 0 and 1, with 2,477 observations (about 57.5% of the sample) taking a value of zero, which suggests that a censored model might be more appropriate. Accordingly, we re-estimate our model using IV Tobit regression and the unreported results on *Longholder* are qualitatively similar to our main IV-GMM results. We also use an IV Probit model, in which we define the response variable as one if the firm has short-term debt financing, and 0 otherwise. The unreported results show that *Longholder* is positive and marginally significant with a p-value of 0.106. The average marginal effect is 14.4%.

To this point, we have applied the *Longholder* measure as a fixed effect. To allow for time variation and eliminate forward-looking information for the classification, we follow Malmendier and Tate (2008) to separate *Longholder* into two mutually exclusive components: *Pre-* and *Post-Longholder*. *Post-Longholder* is a dummy variable taking a value of one from the year that the CEO is classified as a *Longholder*, and zero otherwise. *Pre-Longholder* takes a value of one when *Longholder* is one and *Post-Longholder* is zero. We then re-estimate our

baseline regression (shown in Column 1 of Table 4) replacing *Longholder* with its two parts, *Pre-Longholder* and *Post-Longholder*. Our unreported results show even stronger evidence for *Post-Longholder* relative to *Longholder*, which suggests some time variation of overconfidence. Specifically, we find statistically significant positive coefficients for *Post-Longholder* (p-value of 0.01).

As discussed above, the positive relation between CEO overconfidence and short-term debt is highly robust. A full list of robustness checks for this main result is summarized in Table 7.

[Table 7 about here]

G. Overconfident CEOs are Not Deterred by Liquidity Risk

Thus far, we have established a strong relation between CEO overconfidence and the use of very short-term debt (*ST*). However, the reliance on this extremely short-term debt can potentially expose firms to a high level of liquidity risk. Although overconfident CEOs believe they can enhance firm value through the borrowing of short-term debt, they need to trade off the perceived benefits with the associated costs of borrowing short-term debt, which primarily is higher liquidity risk.

There are two opposing ways that overconfident CEOs can respond to the higher liquidity risk associated with short-term borrowing. First, if overconfident CEOs do seriously pay attention to the costs associated with higher liquidity risk, they might not act (by borrowing short-term debt) solely on their belief that short–term debt will enhance firm value. If this is the case we would expect that the positive relation between overconfidence and the use of short-term debt to be concentrated in firms with low liquidity risk. Second, highly overconfident CEOs might even disregard or underestimate the costs associated with higher

liquidity risk, and so still choose to use high levels of short-term debt even when the firms' liquidity risks are already high.

To empirically test the impact of liquidity risk on the relation between overconfidence and the use of short-term debt, we augment our baseline model with an interactive term between overconfidence and liquidity risk. We use four different proxies for liquidity risk, namely *Leverage* (Diamond, 1991), *Earnings Volatility* (Johnson, 2003), *Non-Investment Grade Dummy* (Datta et al., 2005) and *Non-Commercial Paper Program Dummy* (Diamond, 1991).[27]

[Table 8 about here]

Table 8 presents the regression results with an interactive term representing overconfident CEOs and high liquidity risk (details of the alternative measures of liquidity risk are provided therein). If the action of borrowing short-term debt by overconfident CEOs is counteracted by liquidity risk, then we should observe a significant and negative coefficient for the interactive term. However, regardless of the proxy that we use for liquidity risk, none of the interactive terms are significant, which suggests that the action of borrowing short-term debt by overconfident CEOs is not affected by the level of liquidity risk associated with short-term debt borrowing. As such, our evidence suggests that hiring overconfident CEOs might be more detrimental to firms with high liquidity risk, where the extensive use of short-term debt by these CEOs could result in even higher repayment or rollover difficulties.

[27] We use a *Non-Investment Grade Dummy* and *Non-Commercial Paper Program Dummy* to allow a consistent sign prediction for the interaction term, as the other two proxies.

V. Summary and Conclusion

In this study, we extend the existing debt maturity literature to incorporate managerial overconfidence by examining how an overconfident CEO affects the corporate debt maturity decision. In our simple model, overconfident CEOs believe that they have "private information" regarding the firm's future performance. Therefore, overconfident CEOs choose shorter debt to minimize perceived mispricing of their securities to "enhance" stockholder value.

Empirically, we exploit CEOs' revealed beliefs from option exercise behavior to measure overconfidence and further test our predictions in the US market with a sample of 4,309 firm-year observations over the period 2006 to 2012. We find that firms with overconfident CEOs have a higher proportion of debt due within one, two and three years. By further partitioning our debt maturity measure into short-term debt and the current proportion of long-term debt, we find that the positive relation between CEO overconfidence and debt maturity is mainly driven by the use of a higher proportion of very short-term debt (debt with a maturity less than 12 months). That is, overconfident CEOs alter debt maturity structure through the use of a higher proportion of very short-term debt. Our core results are remarkably robust to a battery of checks: alternative explanations, alternative overconfidence proxies, as well as different estimation methods. We further show that the action of borrowing short-term debt by overconfident CEOs is not deterred by the existing liquidity risk of the firms when taking short-term debt.

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Appendix A. A Simple Model on Overconfidence and Debt Maturity

Extending the approach developed by Flannery (1986), we build a simple model to illustrate how overconfident managers choose debt maturity, even in the absence of information asymmetry. In the basic Flannery framework, the following core assumptions hold: all managers and capital market participants operate in a risk-neutral world; for simplicity the risk-free rate is assumed to be 0%; there are no transaction costs associated with debt issuance; and there is no information asymmetry between managers and investors.

[Figure A1 about here]

The essence of the Flannery model is captured neatly in Figure A1 (reproduced from Flannery, 1986, p. 21). It is a two-period model, with three points in time at which valuation consequences are assessed. As shown in the figure, at time zero, the manager faces an indivisible, non-transferable real investment opportunity (M_0). The project has positive NPV but the required initial investment exceeds the firm's current free cash flow capability. Therefore, the manager needs to borrow D dollars from a competitive debt market to take on the project. In this simple model, all project cash flows occur at the end of period 2. Nevertheless, the value of this project is characterized as following a binomial process to period 2 as illustrated by Figure A1. There is a probability, P, that the project will increase in value during each period and a probability of (1-P) that the value will decrease. As there is no information asymmetry between insiders and the capital market, all market participants know the true probabilities. However, as managers are overconfident in this model, their perception of the probability of success will be P_m which by definition is greater than the true probability (P).[28]

Working along each branch of the tree, we can make the following assessment of value. At time 0, market participants know the project's liquidating value will be M_3 with a probability of P^2, M_4 with a probability of 2P(1-P) and M_5 with a probability of$(1-P)^2$ (1-P)^2. Except in the case of M_5, all other stages of the project including M_2, are non-default nodes (i.e., only $M_5 < D$). That is, the firm will only default if the project reaches stage M_5.

A. Manager's Valuation of the Firm under Alternative Borrowing Plans

We now enhance the Flannery (1986, p. 22-23) default premium with full information framework to derive basic theoretical insights regarding the impact of overconfident managers on the corporate debt maturity decision. A manager can take up the project at t=0 by either locking in long-term debt or issuing short-term debt and committing to an uncertain refinancing cost. The choice between the two alternatives depends on the manager's estimation of the probability of reaching different stages at t=1. If the manager is non-overconfident (i.e., his/her estimation of P is the same as the lenders), the manager will be indifferent between these two choices as illustrated by Flannery (1986). However, according to Malmendier and Tate (2005), overconfident managers systematically overestimate the probability of good outcomes (i.e., they overestimate P), denoted as P_m. Their perception of the costs associated with these two corporate debt maturity alternatives will be different from non-overconfident managers.

From an overconfident manager's perspective, for a levered firm that chooses to structure all its debt as *long-term debt*, the value of equity (E_L) is given by:

[28] We follow Malmendier and Tate's (2005 & 2008) definition of overconfidence: overconfident managers overestimate the probability of future success.

(A1)

where P_m is the manager's perception of the probability that the project's value will increase over any given period (> P). DR is the present value of expected payoff from a risky bond. Following Flannery's (1988, p. 22-23) derivation, DR_1 and DR_2 are defined as follows:

Alternatively, again from an overconfident manager's perspective, for a levered firm that chooses to structure all its debt as rolled over *short-term debt*, the value of equity (E_{S0+S1}) is given by:

(A2)

Subtracting (A2) from (A1) and substituting DR_2 and DR_1, upon rearranging we obtain the perceived equity value differential between (otherwise equivalent) long-term versus short-term levered versions of a firm:

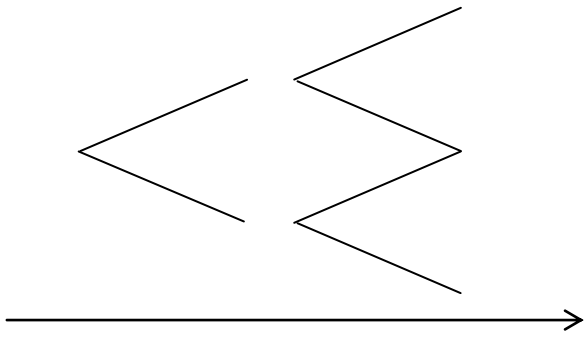
(A3)

If managers are non-overconfident (i.e. $P_m = P$), the quantity defined in equation (A3) equals zero which indicates managerial indifference between these two alternatives. However, for overconfident managers, $0 \leqslant P < P_m \leqslant 1$ and $M_5 < D$, the quantity in equation (A3) is less than zero, which implies that overconfident managers perceive the equity value to be higher when pursuing a short-term debt maturity structure. That is, such managers perceive that it is optimal to borrow short-term debt at t=0 and to roll over short-term debt at t=1. The driver for this view is their overestimation of the probability that the project will reach stage M_1 at t=1.

Figure A1

Project Value at Different Points in Time

Figure A1 presents the changes in project value at different points in time. At t=0, the manager faces an indivisible, non-transferable real investment opportunity (M_0). The manager needs to borrow D dollars to take on the positive NPV project as the firm's current free cash flow is insufficient. All project cash flows occur at t=2. However, project value follows a binomial process, with probability (p) to increase in value and probability (1-p) to decrease in value for each time period. All project values except for M_5 are greater than the amount of money borrowed (D).



Appendix B. Variable Definitions

Table B1
Variable Measurement, Motivation and Prediction

This table summarizes the motivations and measurement of dependent, independent, control variables and instrumental variables used in our main debt maturity regressions and their predicted signs. Panel A summarizes all debt maturity proxies and the key independent variable, *Longholder*. The relations between different debt maturity proxies (dependent variables) are provided in Table B2. Panel B and C summarize control variables and instrumental variables used, respectively.

Variable	Predicted Sign	Brief Motivation and Measurement
Panel A: Key Dependent and Independent Variables		
ST	(Dependent Variable) na	Short-term debt (debt with less than 12-month maturity) divided by total debt (the sum of debt in the form of current liabilities and long term debt).
ST1	na	The proportion of debt maturing within one year divided by total debt.
LT1	na	Current proportion of long-term debt (exclude short-term debt) divided by total debt.
ST2	na	The proportion of debt maturing within two years divided by total debt.
LT2	na	The proportion of long-term debt maturing within two years (exclude short-term debt) divided by total debt.
ST3	na	The proportion of debt maturing within three years divided by total debt.
LT3	na	The proportion of long-term debt maturing within three years (exclude short-term debt) divided by total debt.
ST4	na	The proportion of debt maturing within four years divided by total debt.
LT4	na	The proportion of long-term debt maturing within four years (exclude short-term debt) divided by total debt.
ST5	na	The proportion of debt maturing within five years divided by total debt.
LT5	na	The proportion of long-term debt maturing within five years (exclude short-term debt) divided by total debt.
Longholder	+ (Independent Variable)	Overconfident CEOs believe they can enhance stockholder value by taking short-term debt. Proxied by a dummy variable taking a value of unity if the CEO ever held an option to the final year of duration and the option is at least 40% in-the-money entering its last year, zero otherwise.
Panel B: Debt Maturity Control Variables		
Log(1+delta)	- (Brockman et al., 2010)	Option holdings influence CEOs' risk preferences through their portfolios' sensitivities to changes in share prices (delta) and stock return volatility (vega). High delta will discourage managerial risk taking. Therefore, we would expect a positive relation between debt maturity and delta. This variable is proxied by the natural logarithm of one plus CEO's portfolio price sensitivity. Delta is defined as the change in the value of the executive's stock and option portfolio in response to 1% increase in the price of the firm's common stock.
Log(1+vega)	+ (Brockman et al., 2010)	Option holdings influence CEOs' risk preferences through their portfolios' sensitivities to changes in share prices (delta) and stock return volatility (vega). High vega will encourage managerial risk taking. Therefore, we would expect a negative relation between debt maturity and vega. This variable is proxied by the natural logarithm of one plus CEO's

		portfolio volatility sensitivity. Vega is defined as the change in the value of the executive's stock and option portfolio in response to 1% increase in the annualized standard deviation of the firm's stock return.
Stock Ownership	+ (Datta et al., 2005)	Self-interested managers prefer less monitoring associated with long-term debt. Therefore, without stock ownership to align executives' interests with stockholders, managers can issue long-term debt to avoid frequent monitoring. This variable is proxied by the number of shares (excluding options) owned by the CEO divided by common shares outstanding at the end of the fiscal year.
Leverage	- (Diamond, 1991)	Firms with high leverage face higher default risk. As a result, they should choose long-term debt to avoid/minimize suboptimal liquidation. This variable is proxied by total long-term debt divided by market value of the firm. Market value of the firm is defined as market value of equity plus the book value of total assets minus the book value of equity.
Log(Firm Size)	- (Diamond, 1991)	Firms with positive private information will prefer short-term debt. However, short-term debt will also increase liquidation risk, which is not important for firms with high credit quality but will be important for medium-quality firms. Therefore, firms with high credit quality will choose to issue short-term debt to separate themselves from medium-quality firms. On the other hand, firms with low credit quality are forced to issue short-term debt as they are screened out of the long-term debt market. This variable is proxied by the natural logarithm of market value of the firm.
$(\text{Log(Firm Size)})^2$	+ (Diamond, 1991)	Motivation is explained in Log(Firm Size). This variable is proxied by the square of Log(Firm Size).
Rating Dummy	- (Johnson, 2003)	Unrated firms are more likely to have lower credit quality than rated firms, and they are more likely to find it difficult to borrow long-term debt. This variable is proxied by a dummy variable taking a value of unity if the firm has an S&P credit rating on long-term debt, and zero otherwise.
Z-Score Dummy	- (Brockman et al., 2010)	Firms with high Z-scores usually have high credit quality and therefore are able to borrow long-term debt. This variable is proxied by a dummy variable taking a value of unity if the Z-score is greater than 1.81, and zero otherwise.
Earnings volatility	+/– (Johnson, 2003) (Kane, Marcus, & Mcdonald, 1985)	The probability of having difficulty repaying debt is high when cash flows are highly volatile. Therefore, firms with highly volatile cash flows might prefer long-term debt to short-term debt. However, a firm with high volatility may need to rebalance its capital structure often to reduce expected financial distress costs, which means it could prefer short-term debt. Therefore, the relation between firm value volatility and debt maturity is ambiguous. This variable is proxied by the standard deviation of first differences in EBITDA over the past five years, scaled by average assets for that period.
Abnormal Earnings	+ (Flannery, 1986)	When information asymmetry exists between insiders and investors, investors will not be able to distinguish high-quality firms from low-quality counterparts. Therefore, investors would place an 'average' default premium on all firms, which means that the market overestimates (underestimates) the default probability of high- (low-) quality firms. Thus, high-quality firms will issue shorter-term debt to signal their quality to the market and avoid wealth transfer. This variable is proxied by the difference between next year's and this year's earnings per share, scaled by the fiscal year-end stock price.
Asset Maturity	- (Myers, 1977)	If debt matures before assets do, there might not be enough cash generated by the assets to repay the debt. On the other hand, if debt matures after assets do, cash flow from assets cease, and might have been expended before debt repayments fall due. Therefore, maturity matching can alleviate the risk of financial distress. This variable is proxied by book value-weighted average of the maturity of current assets and long-term assets, where the maturity of current assets is defined as the value of current assets divided by cost of goods sold, while the maturity of long-term assets is defined as gross property, plant and equipment divided by annual depreciation expense.

Market-to-Book Ratio	+ (Myers, 1977)	Risky debt financing can lead to suboptimal investment as disproportionate benefits go to debt-holders. This underinvestment problem could be mitigated by issuing short-term debt that matures before the exercise of growth options. Therefore, we would expect a positive relation between the market-to-book ratio and short-term debt. This variable is proxied by the market value of the firm divided by the book value of total assets.
Term Structure	- (Brick & Ravid, 1985)	When the term structure of interest rates is upward-sloping, a firm can issue longer-term debt to accelerate tax benefits. This variable is proxied by the difference between the fiscal year-end yield on 10-year and 6-month government bonds.
Panel C: GMM Instrumental Variables		
Fixed Assets Ratio	+ (Colla, et al, 2012) (Hall, 2012) (D'Mello & Gruskin, 2014)	Firms with more tangible assets in place are able to increase their leverage as asset substitution (risk shifting) is more difficult for them. At the same time, these firms have a higher liquidation value, which can increase the optimal leverage due to the reduced inefficient liquidation cost. This variable is proxied by the ratio of net property, plant, and equipment to the book value of total assets.
Return On Asset	– (Myers & Majluf, 1984) (Cho et al., 2014) (Woods, Tan, & Faff, 2015)	Firms prefer internally generated funds to external financing sources, as information asymmetry increases. Pecking order theory implies that more profitable firms utilize less debt and have lower leverage. This variable is proxied by the ratio of operating income before depreciation to total assets.
Net Operating Loss Dummy	– (Deangelo & Masulis, 1980)	All else being equal, firms with higher marginal tax rates should have higher leverage to take advantage of the tax shield. Therefore, firms with alternative tax shields should find higher leverage less valuable. This variable is proxied by a dummy variable that takes the value unity if the firm has net operating loss carry forwards and zero otherwise.
Investment Tax Credit Dummy	– (Deangelo & Masulis, 1980)	Same motivation as Net Operating Loss dummy. This variable is proxied by a dummy variable that takes the value unity if the firm has a non-zero investment tax credit and zero otherwise.

Table B2
Relations between Alternative Debt Maturity Proxies (Dependent Variables)

This table summarizes the relations between different debt maturities proxies used for our dependent variables. NP represents the amount of short-term borrowing (debt with less than 12-month maturity). DD1, DD2, DD3, DD4, DD5 and DD5+ represent the amount of long-term debt due in 1st, 2nd, 3rd, 4th, 5th and after 5th year. ST1 to ST5 are the ratios of respective proportion of debt maturing within one to five years (including ST) to total debt. LT1 to LT5 are the ratios of respective proportion of long-term debt maturing within one to five years (excluding ST) to total debt. A numerical example is also given in the table, and we assume the value of the total debt is 100. Values of respective debt components and calculation of debt maturity proxies are in parentheses.

	Compustat Item Names (except for DD5+)						
Debt Maturity Proxy	**NP (8)**	**DD1 (10)**	**DD2 (12)**	**DD3 (14)**	**DD4 (16)**	**DD5 (18)**	**DD5+ (22)**
(— —) ST1 =	ST (—) +	LT1 (—)					
(— ——) ST2 =	ST (—) +	LT2 (——)					
(— ———) ST3 =	ST (—) +	LT3 (———)					
(— ————) ST4 =	ST (—) +	LT4 (————)					
(— ————————) ST5 =	ST (—) +	LT5 (————————)					

Table 1
Firm Characteristics Summary Statistics

This table shows the summary statistics for our dependent variables and firm-level control variables. Panel A summarizes the entire sample while Panel B further partitions the sample into overconfident CEO and non-overconfident CEO subsamples. A CEO is deemed overconfident if he/she ever held an option to the final year of duration and the option is at least 40% in-the-money entering its last year. *ST1*, *ST2*, *ST3*, *ST4* and *ST5* are five alternative measures of debt maturity. Details of all variable measurements are provided in Appendix B. t-tests are conducted to test for differences between the means for the overconfident and non-overconfident subsamples. *, **, *** indicate significance at the 10%, 5%, and 1% level, respectively.

Panel A: Pooled sample (N=3,291 observations)

	Mean	Std. Dev.	Min.	Median	Max.
ST1	0.174	0.256	0.000	0.072	1.000
ST2	0.266	0.293	0.000	0.170	1.000
ST3	0.369	0.319	0.000	0.284	1.000
ST4	0.479	0.330	0.000	0.418	1.000
ST5	0.594	0.320	0.000	0.566	1.000
Leverage	0.157	0.121	0.000	0.136	0.543
Firm Size ($m)	15609.2	32102.0	156.5	4369.6	222249.0
Asset Maturity	11.128	10.072	0.607	7.535	44.175
Earnings Volatility	0.036	0.036	0.003	0.025	0.207
Abnormal Earnings	0.012	0.168	-0.583	0.005	1.037
Market-to-Book Ratio	1.689	0.795	0.740	1.446	5.110
Term Structure	1.781	1.270	-0.640	1.830	3.650
Rating Dummy	0.637	0.481	0.000	1.000	1.000
Z-Score Dummy	0.864	0.343	0.000	1.000	1.000

Panel B: Overconfident versus Non-overconfident Subsamples

	Non-overconfident CEOs (927 CEOs) N=2,946 observations			Overconfident CEOs (371 CEOs) N=1,363 observations		
Variables	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
ST1	0.164	0.067	0.246	0.195***	0.086	0.273
ST2	0.254	0.161	0.286	0.293***	0.193	0.306
ST3	0.354	0.269	0.314	0.400***	0.321	0.329
ST4	0.466	0.400	0.328	0.508***	0.461	0.332
ST5	0.580	0.542	0.322	0.622***	0.609	0.314
Leverage	0.162	0.141	0.120	0.147***	0.124	0.122
Size ($m)	15847.7	4468.2	34081.5	17964.2	4130.7	49599.9
Asset Maturity	11.812	8.166	10.549	9.649***	6.342	8.777
Earnings Volatility	0.036	0.025	0.034	0.037	0.024	0.038
Abnormal Earnings	0.014	0.005	0.179	0.009	0.004	0.141
Market-to-Book Ratio	1.646	1.399	0.764	1.781***	1.551	0.852
Term Structure	1.753	1.830	1.280	1.842**	1.860	1.246
Rating Dummy	0.662	1.000	0.473	0.583***	1.000	0.493
Z-Score Dummy	0.846	1.000	0.361	0.903***	1.000	0.296

Table 2
CEO Characteristics Summary Statistics

This table shows the summary statistics for the CEO-level variables. Panel A summarizes the entire sample, while Panel B further partitions the sample into overconfident CEO and CEO non-overconfident subsamples. *Longholder* is the proxy for CEO overconfidence. Longholder is a dummy variable taking a value of one if the CEO ever held an option to the final year of duration and the option is at least 40% in-the-money entering its last year. *Male* is a dummy variable taking a value of one if the CEO is male, and zero otherwise. *Age* is the age of CEO. *Option Ownership* is CEO's exercisable option ownership which is defined as number of exercisable options divided by common shares outstanding. *Tenure* is CEO's tenure. *Total Compensation* is CEO's total compensation during the year, as defined in Compustat (item TDC1). Details of the measurements of all other variables are given in Appendix B. t-tests are conducted to test for univariate differences between the means for the overconfident and non-overconfident subsamples. *, **, *** indicate significance at the 10%, 5%, and 1% level, respectively.

Panel A: Pooled sample

	N	Mean	Std. Dev.	Min.	50%	Max.
Longholder	4309	0.316	0.465	0.000	0.000	1.000
Male	4309	0.970	0.172	0.000	1.000	1.000
Age	4273	55.908	6.366	29.000	56.000	85.000
Tenure	4228	7.350	6.568	0.005	5.655	50.118
Delta ($,000) Price Sensitivity	4309	577.463	1185.761	5.038	221.959	9078.523
Vega ($,000) Volatility Sensitivity	4309	171.761	237.175	0.158	78.455	1249.419
Stock Ownership	4309	0.011	0.029	0.000	0.003	0.197
Option Ownership	4309	0.007	0.008	0.000	0.004	0.048
Total Compensation ($,000)	4298	5985.912	5318.663	459.922	4400.208	27328.320

Panel B: Overconfident versus Non-overconfident CEOs

	Non-overconfident CEOs (927 CEOs)				Overconfident CEOs (371 CEOs)			
	N	Mean	Median	Std. Dev.	N	Mean	Median	Std. Dev.
Male	2946	0.966	1.000	0.180	1363	0.977*	1.000	0.151
Age	2917	55.712	56.000	6.098	1356	56.328***	56.000	6.890
Tenure	2888	6.358	5.000	5.558	1340	9.489***	7.500	7.930
Delta ($,000)	2946	448.555	180.330	957.133	1363	856.086***	345.214	1533.877
Vega ($,000)	2946	159.075	71.096	222.474	1363	199.179***	100.448	264.206
Stock Ownership	2946	0.009	0.002	0.024	1363	0.017***	0.004	0.036
Option Ownership	2946	0.006	0.003	0.007	1363	0.010***	0.007	0.010
Total Compensation ($,000)	2940	5871.646	4376.426	5172.981	1358	6233.291**	4462.999	5615.141

Table 3
Relation between Debt Maturity and CEO Overconfidence

This table presents the regression results from IV-GMM regression (second-stage equation presented only). The models estimated are discussed in Section III.C. The sample contains 4,309 observations and covers 2006 to 2012. The dependent variables of short-term debt are proxied by *ST1*, *ST2*, *ST3*, *ST4* and *ST5*, respectively. *Longholder*, our CEO overconfidence proxy, is a dummy variable taking a value of one if the CEO ever held an option to the final year of duration and the option is at least 40% in-the-money entering its last year. All variables are measured at fiscal year-end and details of their measurement are presented in Appendix B. Industry effects are based on the Fama-French 12 Industry Groups. Standard errors are clustered at firm level. The p-value is reported in parentheses and ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively. [a] In IV regression, $R^2_{adjusted}$ is no longer bounded in the range 0 and 1.

Independent Variables	Predicted Sign	Dependent Variable Proxies – Proportion of Short-term Debt				
		ST1	ST2	ST3	ST4	ST5
Longholder	+	0.036***	0.040***	0.037**	0.016	0.004
		(0.006)	(0.005)	(0.023)	(0.377)	(0.843)
Log(1+delta)	-	-0.040***	-0.040***	-0.038***	-0.021	0.003
		(0.000)	(0.000)	(0.001)	(0.118)	(0.857)
Log(1+vega)	+	0.012***	0.014***	0.013**	0.008	-0.001
		(0.006)	(0.003)	(0.024)	(0.248)	(0.880)
Stock Ownership	+	1.261***	1.228***	1.231***	0.963**	0.312
		(0.000)	(0.000)	(0.000)	(0.012)	(0.457)
Leverage	-	-0.891*	-0.771	0.030	0.988	1.696
		(0.062)	(0.168)	(0.966)	(0.258)	(0.103)
Log(Firm Size)	-	-0.077	-0.164**	-0.232***	-0.288***	-0.311***
		(0.221)	(0.019)	(0.005)	(0.004)	(0.007)
$(\text{Log(Firm Size)})^2$	+	0.005	0.009**	0.013***	0.016***	0.017**
		(0.204)	(0.021)	(0.005)	(0.004)	(0.011)
Asset Maturity	-	-0.002**	-0.002***	-0.004***	-0.005***	-0.005***
		(0.025)	(0.003)	(0.000)	(0.000)	(0.000)
Earnings Volatility	+/-	0.006	0.066	0.071	0.188	0.273
		(0.978)	(0.763)	(0.771)	(0.492)	(0.369)
Abnormal Earnings	+	0.030	0.006	-0.000	-0.011	-0.008
		(0.133)	(0.813)	(1.000)	(0.744)	(0.830)
Market-to-Book Ratio	+	0.008	0.016	0.052*	0.084**	0.110**
		(0.731)	(0.545)	(0.087)	(0.023)	(0.011)
Term Structure	-	-0.025**	-0.025*	-0.004	-0.012	-0.005
		(0.036)	(0.080)	(0.783)	(0.522)	(0.819)
Rating Dummy	-	-0.047	-0.081**	-0.151***	-0.207***	-0.241***
		(0.105)	(0.015)	(0.000)	(0.000)	(0.000)
Z-Score Dummy	-	-0.079	-0.071	0.040	0.182	0.271*
		(0.271)	(0.398)	(0.703)	(0.167)	(0.084)
Year Fixed Effect		Yes	Yes	Yes	Yes	Yes
Industry Fixed Effect		Yes	Yes	Yes	Yes	Yes
Observations		4,309	4,309	4,309	4,309	4,309
$R^2_{adjusted}$		0.244	0.232	0.135	-0.047	-0.236[a]

Table 4
Short-term Debt and CEO Overconfidence

This table presents the regression results from IV-GMM regression (second-stage equation presented only). The models estimated are discussed in Section III.C. The sample contains 4,309 observations and covers 2006 to 2012. The dependent variables of short-term debt are proxied by *ST, LT1, LT2, LT3, LT4* and *LT5*, respectively. ST is very short-term debt (debt with less than 12-month maturity) divided by total debt (the sum of debt in the form of current liabilities and long term debt). LT1 to LT5 are the ratios of respective proportion of long-term debt mature within one to five years (excluding ST) to total debt. *Longholder*, our CEO overconfidence proxy, is a dummy variable taking a value of one if the CEO ever held an option to the final year of duration and the option is at least 40% in-the-money entering its last year. All variables are measured at fiscal year-end and details of their measurement are presented in Appendix B. Industry effects are based on the Fama-French 12 Industry Groups. Standard errors are clustered at firm level. The p-value is reported in parentheses and ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Independent Variables	Predicted Sign	Dependent Variables Proxies – Proportion of Short-term Debt					
		ST	LT1	LT2	LT3	LT4	LT5
Longholder	+	0.025**	0.010	0.015	0.012	-0.008	-0.021
		(0.033)	(0.246)	(0.197)	(0.397)	(0.644)	(0.319)
Log(1+delta)	-	-0.029***	-0.010*	-0.010	-0.008	0.010	0.034**
		(0.000)	(0.085)	(0.179)	(0.391)	(0.405)	(0.023)
Log(1+vega)	+	0.007**	0.004	0.006	0.005	-0.001	-0.010
		(0.043)	(0.160)	(0.102)	(0.352)	(0.901)	(0.210)
Stock Ownership	+	0.608***	0.520**	0.519*	0.554*	0.262	-0.399
		(0.005)	(0.048)	(0.058)	(0.083)	(0.494)	(0.342)
Other Debt Maturity Control Variables		Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effect		Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effect		Yes	Yes	Yes	Yes	Yes	Yes
Observations		4,309	4,309	4,309	4,309	4,309	4,309
$R^2_{adjusted}$		0.112	0.109	0.100	0.026	-0.135	-0.269

Table 5
Short-term Debt and CEO Overconfidence – Exploring Alternative Explanations

This table presents the results from IV-GMM regression (second-stage equation presented only). The models estimated are discussed in Section III.C. The full sample contains 4,309 observations and covers 2006 to 2012. Column (1) is the full specification of the model while Column (2) excludes *Abnormal Earnings*, Column (3) excludes *Log(1+vega)*, Column (4) includes natural logarithm of one plus annual stock return over past 3 years, Column (5) includes average past 3-year dividend yield, and Column (6) excludes *Stock Ownership* from the model. The dependent variable is ST, which is defined as short-term debt that matures in less than 12 months divided by total debt. *Longholder* is the CEO overconfidence proxy and is measured by a dummy variable taking a value of one if a CEO ever held an option to the final year of duration and the option is at least 40% in-the-money entering its last year. All variables are measured at fiscal year-end and details of their measurement are presented in Appendix B. Industry effects are based on the Fama-French 12 Industry Groups. Standard errors are clustered at firm level. The p-value is reported in parentheses and ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

			Alternative Explanation				
Variables	Predicted Sign	(1) Core Results	(2) Insider Information	(3) Risk Tolerance	(4) Past Performance	(5) Dividends	(6) Board Pressure
Longholder	+	0.025**	0.025**	0.023**	0.025**	0.024**	0.023**
		(0.033)	(0.036)	(0.045)	(0.032)	(0.037)	(0.048)
Log(1+delta)	-	-0.029***	-0.028***	-0.023***	-0.021***	-0.027***	-0.015***
		(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.004)
Log(1+vega)	+	0.007**	0.007**		0.003	0.007*	0.002
		(0.043)	(0.044)		(0.548)	(0.057)	(0.550)
Stock Ownership	+	0.608***	0.603***	0.483**	0.492**	0.574***	
		(0.005)	(0.006)	(0.025)	(0.010)	(0.008)	
Other Control Variables		Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effect		Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effect		Yes	Yes	Yes	Yes	Yes	Yes
Past 3-year Return		No	No	No	Yes	No	No
Past 3-year Dividends		No	No	No	No	Yes	No
Observations		4,309	4,309	4,309	4,295	4,309	4,309
$R^2_{adjusted}$		0.119	0.117	0.117	0.132	0.117	0.110

Table 6
Modeling the Cost of Syndicated Bank Loans – Exploring the Supply Side Story

This table presents the OLS regression results for the model discussed in Section IV.E. The sample contains 944 syndicated loans and covers 2007 to 2014. The dependent variable is *AISD* for columns (1) and (3), which is the "all-in-spread-drawn" item reported in Dealscan and is the sum of spread over LIBOR and the annual fee. The dependent variable for columns (2) and (4) is *AISU*, which is the "all-in-spread-undrawn" item reported in Dealscan and is the sum of commitment fee and the annual fee. Columns (3) and (4) omit the CEO personal-level determinants. *Longholder*, our CEO overconfidence proxy, is a dummy variable taking a value of one if the CEO ever held an option to the final year of duration and the option is at least 40% in-the-money entering its last year. *Log(Loan Maturity)* is the natural logarithm of the difference between loan facility start date and maturity date. *Relation* is a dummy variable taking a value of one if at least one of the lead banks has provided a syndicated loan to the same borrower in the past five years. *Loan Size* is the dollar amount of loan facility. *Collateral Dummy* takes a value of one if loan facility is secured, zero otherwise. *Book Assets* is the total book value of assets, adjusted for inflation in year 2006 dollars. *Interest Coverage Ratio* is the ratio of EBITDA to interest expenses. *Book Leverage* is the book value of total debt to book value of total assets. *Profitability* is the ratio of EBITDA to total sales. *Fixed Assets Ratio* is the ratio of net property, plant and equipment to total assets. *Current Ratio* is the ratio of current assets to current liabilities. *Market-to-Book Ratio* is the ratio of market value of the firm to book value of total assets. *Log(1+delta)*, *Log(1+vega)*, and *Stock Ownership* are measured at fiscal year-end and details of their measurement are presented in Appendix B. In addition to variables reported, the regression also controls for calendar year fixed effects, Fama-French 12 Industry fixed effects, loan purpose fixed effects, loan type fixed effects, and rating fixed effects with not-rated firms considered as a separate group. Standard errors are clustered at firm level. The p-value is reported in parentheses and ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)
Dependent Variable➔	AISD	AISU	AISD	AISU
Longholder * Log(Loan Maturity)	4.575	-0.744	2.191	-0.882
	(0.726)	(0.700)	(0.872)	(0.647)
Longholder	-32.025	0.559	-22.581	1.182
	(0.533)	(0.944)	(0.676)	(0.881)
Log(Loan Maturity)	2.977	-0.287	2.105	-0.341
	(0.766)	(0.921)	(0.839)	(0.906)
Relation	-0.904	-0.477	-1.613	-0.555
	(0.882)	(0.683)	(0.789)	(0.638)
Log(Loan Size)	-12.089***	-0.626	-12.785***	-0.686
	(0.003)	(0.434)	(0.002)	(0.386)
Collateral Dummy	37.329***	9.738***	39.170***	9.768***
	(0.000)	(0.000)	(0.000)	(0.000)
Log(Book Asset)	7.172*	0.786	2.477	0.861
	(0.083)	(0.268)	(0.493)	(0.133)
Log(1+Interest Coverage Ratio)	-9.025*	-1.533*	-8.708	-1.488*
	(0.097)	(0.074)	(0.113)	(0.083)
Book Leverage	15.271	5.719	23.402	5.727
	(0.651)	(0.259)	(0.500)	(0.262)
Profitability	5.731	-14.126	4.089	-13.740
	(0.892)	(0.143)	(0.926)	(0.137)
Fixed Assets Ratio	-36.128**	-4.212	-29.142	-4.139
	(0.043)	(0.194)	(0.128)	(0.196)
Current Ratio	1.266	1.248	0.651	1.233
	(0.734)	(0.121)	(0.866)	(0.129)
Market-to-Book Ratio	-7.298	-2.324**	-16.331**	-2.552***
	(0.298)	(0.011)	(0.021)	(0.002)
Log(1+delta)	-12.461***	-0.528		
	(0.006)	(0.560)		
Log(1+vega)	5.183*	0.646		
	(0.055)	(0.275)		
Stock Ownership	507.488***	15.520		
	(0.000)	(0.543)		
Constant	195.051***	26.029**	212.797***	25.774**
	(0.000)	(0.013)	(0.000)	(0.016)
Year Fixed Effect	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effect	Yes	Yes	Yes	Yes
Loan Type Fixed Effect	Yes	Yes	Yes	Yes
Rating Fixed Effect	Yes	Yes	Yes	Yes
Observations	944	691	944	691
$R^2_{adjusted}$	0.702	0.661	0.696	0.661

Table 7
Summary of Robustness Checks

This table provides a summary of the battery of robustness checks conducted in this study for our main result regarding the positive relation between CEO overconfidence and short-term debt. The broad issue of concern is identified in column one. Column two cites relevant subsections in which, mostly by way of footnote, the robustness elements are identified within the natural development of the study. The final column presents some brief details of the robustness exercise.

Broad Issue of Concern	Relevant Section/Subsection	Brief Details/Commentary
(I) Data and Sampling	Section III.A	Replace erroneous debt maturity data with 0% and 100% rather than omitting the observations
	Section III.A	No winsorization employed
(II) Overconfidence Proxy	Section III.B.2	Allow in-the-moneyness cutoff to vary from 30% to 90%
	Section III.B.2	Use of 1-year lagged overconfidence and require the same CEO the year before
	Section IV.F	Allow for time variation and eliminate forward-looking information using Pre- and Post-Longholder
(III) Industry Effects	Section III.C	Use Fama-French 48 Industry Classification
(IV) Omitted Variables	Section IV.A.2	Inclusion of atheoretic CEO demographic variables (e.g. age, gender, …)
(V) Alternative Explanations	Section IV.D	Robust to five alternative explanations, such as insider information, risk tolerance, past performance, personal tax and dividends, and board pressure
	Section IV.E.	Robust to the supply side alternative explanation
(VI) Estimation Method	Section IV.F	Use IV Tobit and IV Probit

Table 8
Are Overconfident CEOs Deterred by Liquidity Risk?

This table presents the regression results from IV-GMM regression (second-stage equation presented only). The models estimated are discussed in Section III.C. The sample contains 4,039 observations and covers 2006 to 2012. The dependent variable is short-term debt, which is proxied by *ST*. The main variables of interest are the interaction terms between *Longholder* and each of the four alternative proxies for high liquidity risk, namely (1) *Leverage*, (2) *Earnings Volatility*, (3) *Non-Investment Grade Dummy*, and (4) Non-*Commercial Paper Program Dummy*. *Longholder*, our CEO overconfidence proxy, is a dummy variable taking a value of one if the CEO ever held an option to the final year of duration and the option is at least 40% in-the-money entering its last year. *Leverage* is market leverage, defined as total long-term debt divided by market value of equity. *Earnings Volatility* is the standard deviation of first differences in EBITDA over the past five years, scaled by average assets for that period. *Non-Investment Grade Dummy* takes a value of one if rating is sub-investment grade. *Non-Commercial Paper Program Dummy* takes value of one if the firm does not have commercial paper program. All variables are measured at fiscal year-end. Industry effects are based on the Fama-French 12 Industry Groups. Standard errors are clustered at firm level. The p-value is reported in parentheses and ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable: ST	Predicted Sign	Proxies for High Liquidity Risk			
Independent Variable		Leverage	Earnings Volatility	Non-Investment Grade Dummy	Non-CP Dummy
Longholder	+	0.034	0.014	0.022*	0.025*
		(0.239)	(0.329)	(0.060)	(0.092)
*Longholder * Leverage*	-	-0.088			
		(0.581)			
*Longholder * Earnings Volatility*	-		0.303		
			(0.386)		
*Longholder * Non-Investment Grade Dummy*	-			0.006	
				(0.753)	
*Longholder * Non-CP Dummy*	-				-0.001
					(0.959)
Leverage	-	-0.266	-0.427	-0.501	-0.425
		(0.484)	(0.273)	(0.224)	(0.286)
Earnings Volatility	+/-	-0.353**	-0.468***	-0.372**	-0.324**
		(0.021)	(0.003)	(0.028)	(0.040)
Non-Investment Grade Dummy	+/-			0.003	
				(0.910)	
Non-CP Dummy	-				-0.027*
					(0.082)
Other Debt Maturity Control Variables		Yes	Yes	Yes	Yes
Year Fixed Effect		Yes	Yes	Yes	Yes
Industry Fixed Effect		Yes	Yes	Yes	Yes
Observations		4,309	4,309	4,309	4,309
$R^2_{adjusted}$		0.098	0.112	0.115	0.113

Highlights:

- **We examine the relation between overconfident CEOs and corporate debt maturity.**
- **Consistent with a demand side story, overconfident CEOs prefer shorter-term debt.**
- **Overconfident CEOs use more short-term debt due within 12 months.**
- **We reject six possible alternative drivers including a supply side explanation.**
- **The behaviour of overconfident CEOs is not deterred by the liquidity risk that firms face.**