Managerial Optimism and Debt Contract Design: The Case of Syndicated Loans

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July 15, 2014

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We examine the impact of managerial optimism on the inclusion of performance-pricing provisions in syndicated loan contracts (PSD). Given their upwardly biased expectations about the firm's future cash flow, optimistic managers may view PSD as a relatively cheap form of financing. Indeed, we find that optimistic managers are more likely to issue PSD, and choose contracts with greater risk-compensation than rational managers. Consistent with their biased expectations, firms with optimistic managers perform worse than firms with rational managers after issuing PSD. Our results indicate that behavioral aspects can affect contract design in the market for syndicated loans.

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JEL-Classification: G02, G30, G31, G32

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Abstract

We examine the impact of managerial optimism on the inclusion of performance-pricing provisions in syndicated loan contracts (PSD). Given their upwardly biased expectations about the firm's future cash flow, optimistic managers may view PSD as a relatively cheap form of financing. Indeed, we find that optimistic managers are more likely to issue PSD, and choose contracts with greater risk-compensation than rational managers. Consistent with their biased expectations, firms with optimistic managers perform worse than firms with rational managers after issuing PSD. Our results indicate that behavioral aspects can affect contract design in the market for syndicated loans.

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> *"The market was giving us a reduction in basis points on the coupon, and we felt there was no probability of violating the covenants [i.e., the performance-pricing thresholds]."*–John Bowen, Morton International Inc., Investment Dealers' Digest, June 1990.

In 1990, Morton International issued performance-sensitive debt (PSD), which stipulated that the spread would rise if Morton's credit rating were to deteriorate. In return, Morton received a lower initial spread than without this performance-pricing provision. The justification by the CFO of Morton International, John Bowen, indicates that at the time of the debt issue he considered it to be highly improbable that Morton would be downgraded. Unfortunately, he was wrong. During the life of this debt contract, Morton was downgraded several times, from AA to BBB. From this one episode, we cannot tell whether this was bad luck, or whether management had biased expectations about the future performance of their company. But this episode raises the possibility that behavioral biases affect debt contract design. This paper therefore aims to explore this issue by analyzing whether managerial optimism impacts the use of performance pricing provisions in syndicated loan contracts.

Manso et al. (2010) hypothesize that performance-sensitive debt (PSD) can be used to signal a firm's unobservable information about its credit quality to potential lenders. Lenders, who cannot distinguish between high and low quality firms, offer borrowers a menu of contracts, which includes fixed-rate debt and risk-compensating PSD. High quality firms choose PSD because the initial coupon rate is lower compared to fixed-rate debt. Low quality firms, on the other hand, will not mimic high quality firms as low quality firms expect their credit qualities to deteriorate in the future, which would trigger coupon rate increases and thus higher borrowing costs compared to straight debt contracts. In the resulting separating equilibrium high quality firms issue PSD,

while low quality firms issue straight debt.

We argue that optimistic managers, who persistently overestimate their firms' future expected cash flow, may (irrationally) decide to mimic high quality firms and issue PSD in order to benefit from the relatively low initial coupon rate offered by lenders on PSD. This possibility gives rise to a number of new testable hypotheses, which we evaluate in this paper. First, optimistic managers should exhibit a greater likelihood of using PSD than rational managers as they overestimate their firms' credit quality. Second, extending the Manso et al. (2010) framework to continua of credit qualities and performance-pricing provisions predicts that optimistic managers choose PSD contracts with more risk-compensation, that is, contracts with a higher sensitivity of the coupon rate to performance changes, than rational managers on average. This is because contracts with more risk-compensation offer lower initial coupon rates. Finally, the post-issue performance of PSD-issuing firms led by optimistic managers should be worse than the post-issue performance of PSD-issuing firms led by rational managers.

We examine these hypotheses using a sample of syndicated and non-syndicated loan tranches issued between 1992 and 2010, obtained from the LPC Dealscan database. Asquith et al. (2005) report that the use of performance-pricing provisions has become widespread since the early 1990s. In Adam and Streitz (2014) 47% of loans reported in Dealscan contain performance-pricing provisions.

The terms managerial optimism and overconfidence have been used inconsistently in the literature. We define managerial optimism to mean that the executive persistently overestimates the firm's future expected cash flow. Of course, future cash flow

expectations are not observable. We therefore follow the methodology discussed in Malmendier and Tate (2005a) and classify CEOs as optimistic if they ever hold an option until maturity, which is at least 40% in-the-money at the year-end prior to maturity. The rationale behind this measure is that CEOs who typically have a large fraction of personal wealth tied to their companies and only limited diversification abilities across alternative investments should rationally exercise an option once it is in-the-money and exercisable. Only executives who are overly optimistic about their firm's future return would decide not to exercise their stock options in these situations. In addition, we construct the Holder67, Pre-/Post-Optimistic and the optimism variable proposed by Sen and Tumarkin (2009) to test for robustness of our results.

Our results are consistent with the above empirical predictions. Optimistic CEOs are 6% more likely to issue PSD than rational CEOs.[1] This is economically significant given an overall mean of about 50%. Optimistic managers also sell more risk-compensation to lenders than rational managers. Finally, we find that the performance of firms with optimistic managers is more likely to deteriorate after the issuance of PSD compared to firms led by rational managers. This result rules out the possibility that the managers, which we classify as optimistic, possess positive inside information about their company's future performance. If this were true, issuing PSD could be a rational choice driven by different information sets and not by differences in opinions. In fact, our result suggests that the issuance of PSD may have been harmful for firms run by optimistic managers.

[1] One potential concern is that CEOs are not involved in the specific design of debt contracts. However, we argue that the loans in our analysis are fundamental financing decisions that are most likely to be approved by the top management. The average loan in our sample has a size of 30% of existing debt. Further, the decision to include performance-pricing provisions is important as they have a large impact on future coupon payments and the riskiness of a firm (Manso et al. (2010)). Finally, CEO optimism is likely to further have an indirect effect on the corporate culture and hence on the willingness to bear risks (Hambrick and Mason (1984)).

A potential concern with our analysis is that a firm's choice to hire an optimistic CEO is endogenous. This decision might be correlated with the same variables that also affect the decision to issue PSD. We address this issue in two ways. First, we model the firm's choice to hire an optimistic CEO using a propensity score matching approach, that is, we match one firm that is managed by an optimistic CEO to a firm that is equally likely to be managed by an optimistic CEO but is indeed managed by a rational CEO. Our results are qualitatively unaffected. The main drawback of this procedure is that we can only match based on observable characteristics. In a second step, we therefore control for unobservable (time-invariant) firm characteristics by testing whether the policy to issue PSD changes after CEO turnover with optimistic successors. We find that optimistic CEOs increase the issuance of PSD after being hired while incoming rational CEOs decrease the fraction of PSD issues. The difference between these two groups is highly significant.

In summary, we show that (i) optimistic managers are more likely to issue PSD than rational managers, (ii) optimistic managers issue PSD with more risk-compensation than rational managers, and (iii) firms with optimistic managers perform worse after issuing PSD than firms with rational managers. These results are robust to controlling for the endogenous choice of employing an optimistic manager.

We contribute to three strands of the literature. First, our results extend the existing literature on the impact of managerial biases on corporate financing decisions. For example, Malmendier et al. (2011) and Graham et al. (2013)) show that managerial optimism affects firms' capital structure decisions.[2] Landier and Thesmar (2009)

[2] See also Ben-David et al. (2013), Campbell et al. (2011), Deshmukh et al. (2013), Ferris et al. (2013), Galasso and Simcoe (2011), Gervais et al. (2011), Goel and Thakor (2008), Hirshleifer et al. (2012), Lowe and Ziedonis (2006), Malmendier and Zheng (2012) and Otto (2014). Baker et al. (2004) provide an excellent survey on behavioral corporate finance.

analyze the debt capital structure of small entrepreneurial firms. In particular, the authors analyze whether the choice between lines of credit and longer term bank debt is influenced by entrepreneurial optimism. We add to this literature by showing that managerial optimism can also affect debt contract design.

Second, to the best of our knowledge, our study is the first to show that managerial traits can have a significant impact on the structure of syndicated loans. The prior literature has focused solely on neoclassical theories. For example, information asymmetries or conflicts of interest between contracting parties (Bharath et al. (2011); Ivashina and Kovner (2011); Prilmeier (2011); Dass et al. (2011); Demiroglu and James (2010)) or macroeconomic conditions and laws and institutions (Erel et al. (2012); Qian and Strahan (2007)).[3]

Third, we contribute to the literature on performance-pricing provisions in corporate debt contracts. Asquith et al. (2005) argue that PSD is used to reduce debt renegotiation costs, while Manso et al. (2010) show that PSD can be used as a signaling device for a firm's credit quality. Other studies document a link between PSD and earnings management (Beatty and Weber (2003)), manager equity incentives (Tchistyi et al. (2011)), and relationship lending (Adam and Streitz (2014)). Our paper is the first to establish a link between the use and design of PSD and managerial optimism.

The remainder of the paper proceeds as follows. Section 1 presents our hypotheses, while Section 2 describes the sample. Section 3 contains the empirical analysis of the impact of managerial optimism on PSD contract terms. In Section 4 we test the robustness of our results, and Section 5 concludes.

[3] Note that this list is not intended to be exhaustive.

1 Hypothesis Development

In performance-sensitive debt (PSD) the coupon rate is a deterministic function of the issuer's performance. The coupon rises if the borrower's performance deteriorates and/or falls if the borrower's performance improves. Manso et al. (2010) show that PSD can be used as a screening device in a setting with asymmetric information between borrower and lender. In their model, the growth rate of the cash-flow process of a firm is private information and depends on the firm's quality. The lender, who cannot observe the true quality (cash-flow growth rate) of a potential borrower, offers a menu of contracts, which includes fixed-rate debt and risk-compensating PSD. In the resulting separating equilibrium low-growth firms choose to issue fixed-rate debt while high-growth firms choose to issue risk-compensating PSD. The low-growth firm has no incentive to deviate from this equilibrium because despite the initially low coupon rate offered on PSD, PSD subjects the low-growth firm to coupon rate increases in the future when its true type is revealed. Thus, low-growth firms would face higher borrowing costs overall if they were to issue PSD rather than regular debt.

In their model, Manso et al. (2010) assume that the manager of a firm correctly assesses the cash-flow growth rate of his firm and chooses the debt contract according to this expectation. However, the recent literature questions this assumption (e.g., Malmendier and Tate (2005a)). In particular, *optimistic* managers could persistently overestimate the firms' cash-flow growth rate, while *rational* managers correctly assess the firms' cash-flow growth rate on average. As a result, optimistic managers of low-growth firms may now decide to pool with rational managers of high-growth firms.[4]

[4] The pooling of optimistic managers with rational managers of high-growth firms preserves the equilibrium as long as the coupon rate increases of PSD adequately compensate the lender for the increase in credit risk due to the presence of some low-growth borrowers.

This implies that optimistic managers are more likely to issue PSD than rational managers.

Hypothesis 1: *Optimistic managers are more likely to issue risk-compensating PSD than rational managers.*

Note that for *Hypothesis 1* to hold, we do not require the assumption that the average quality of the firms managed by optimistic managers is less than the quality of firms managed by rational managers. We only require that there are firms for which it is optimal to issue PSD and firms for which it is optimal to issue fixed-rate debt in both groups. Then some low-growth firms that are managed by optimistic managers will issue PSD, as the optimistic manager overestimates the firms' cash-flow growth rate. Firms with a comparable quality that are managed by rational managers will choose fixed-rate debt instead.

Manso et al. (2010) assume for simplicity that there are only two types of firms: low-growth firms and high-growth firms. This assumption can be relaxed without affecting the separating equilibrium. Under the assumption that a continuous distribution of cash-flow growth rates exists, PSD screens different types through different levels of risk-compensation. Fixed-rate debt can simply be considered as a PSD contract with a pricing grid that is flat.

Consider, for example, a setting with three different types of firms: low-growth, medium-growth, and high-growth. In this situation a separating equilibrium can still be achieved: Low-growth firms choose PSD contracts with no (or low) rate-increase potential, medium growth firms choose PSD contracts with some rate-increase potential, and high-growth firms choose PSD contracts with the highest rate-increase potential.

This implies that there must be cross-sectional variation *within* PSD contracts if one allows for a range of different firm types. If optimistic managers generally overestimate the cash-flow growth rate of their firms, this implies that — conditional on choosing PSD — optimistic managers will choose PSD with a higher risk-compensation than rational managers within the same group.

Hypothesis 2: *Optimistic managers choose PSD with more risk-compensation than rational managers.*

Our theory builds on the fact that optimistic managers mimic firms with higher quality by using PSD. If this is the case, then the post-issue firm performance of optimistic managers is expected to be worse than the post-issue firm performance of rational managers using PSD. *Hypothesis 1* stipulates that some low-growth firms with optimistic managers choose PSD contracts and pool with high-growth firms that have a rational manager. Therefore, the set of firms with rational managers that have issued PSD contracts solely consists of high-growth firms, while the set of firms with optimistic managers that have issued PSD contracts consists of both high-growth and low growth firms. This gives rise to our third hypothesis.

Hypothesis 3: *The performance following a PSD issue is worse for firms managed by optimistic managers than for firms managed by rational managers.*

2 Data Description

2.1 Managerial Optimism

We start by classifying CEOs as either rational or optimistic following Malmendier and Tate (2005a), that is, we measure optimism based on executive option holdings. We use ExecuComp to obtain information on executive stock option grants, exercised options, and option holdings. We restrict our sample to the 1992 to 2010 period and exclude financial firms (SIC codes 6000-6999). As ExecuComp contains option exercises only in an aggregated form and not on the grant level, we follow Hall and Liebman (1998) and apply a FIFO-algorithm to construct the option portfolios in a given year.[5] Thereby executives are classified as optimistic if they ever hold an option until maturity, which is at least 40% in-the-money at the year-end prior to maturity.[6] Thus, optimism is considered as an inherent, time-invariant personal characteristic of an executive.

The intuition for relying on the executives' option exercise behavior as a means of classification into rational or optimistic managers is the following: Executives face a trade-off between exercising their options or keeping the options for later exercise. By keeping the options, they maintain the right to purchase company stock at potentially more favorable conditions in the future. The downside of this strategy is that it involves substantial costs for the executive in terms of exposure to idiosyncratic risk. Executive stock options typically have a maturity of ten years and become vested after two to four years. Furthermore, diversifying this exposure is problematic as executives are

[5] See Appendix 1 in Hall and Liebman (1998) for further details.

[6] The threshold is derived according to Hall and Murphy (2002) by using a constant risk aversion parameter of 3 and 67% of wealth in company stock. The original Malmendier and Tate (2005b) classification does not require a minimum threshold for in-the-moneyness and solely requires option holding until maturity.

legally prohibited from short-selling their company's stock. Given the large fraction of personal wealth tied to their company, diversification abilities across alternative investments are also limited. Lastly, besides the financial exposure, also a substantial fraction of the executive's human capital is tied to the company (Malmendier and Tate (2008)). Consequently executives can be considered as under-diversified investors, who have a large exposure to their company's risk. Thus, rational executives should divest as soon as the option is sufficiently in-the-money because the cost of delayed exercise typically exceeds its option value. In contrast, executives who are optimistic and therefore overestimate the firm's future return may fail to exercise their stock options in these situations.

2.2 Loan Sample

We obtain loan contract information from LPC Dealscan for all companies for which the CEO of the borrowing firm can be classified as optimistic or rational.[7] We additionally merge our loan deal panel to COMPUSTAT to obtain financial information on the borrowers.[8] We refer to the Appendix for a detailed description of the control variables used.

Dealscan reports information on performance pricing provisions included in loan contracts. In particular, Dealscan reports the pricing grid, that is, a step function schedule linking the interest payments to a measure of financial performance.[9]

[7] As common in the literature the loan panel is created on the facility (tranche) level (e.g., Berg et al. (2013), and Bharath et al. (2007)).

[8] We use the link provided by Michael Roberts to merge Dealscan with COMPUSTAT (see Chava and Roberts (2008) for details). We obtain borrower information from the last available fiscal year before the loan issue.

[9] The most common financial measure used in PSD contracts reported in Dealscan is the debt-to-EBITDA ratio ($\sim$ 50% of all PSD loans issued by US borrowers) followed by the senior debt rating ($\sim$ 25%). Other less commonly used measures are the interest coverage ratio, the fixed charge ratio or leverage. A minority of PSD deals uses multiple performance criteria.

We define a dummy variable, PSD, which equals one if a loan contract includes a performance-pricing provision and zero otherwise. We further distinguish between interest-increasing PSD, that is, contracts in which the coupon rate on the loan increases if the borrower's creditworthiness declines, and interest-decreasing PSD, that is, contracts in which the coupon rate on the loan decreases if the borrower's creditworthiness improves. In particular, we define the following ratio:

$$Rate\ De\text{-}/Increase = \frac{(S_{Initial} - S_{Min})}{(S_{Max} - S_{Min})}. \tag{1}$$

$S_{Initial}$ is the interest rate paid at contract inception and S_{Max} (S_{Min}) is the highest (lowest) interest rate defined in the pricing grid. *Rate De-/Increase* is zero (one) if the pricing grid allows for interest increases (decreases) only. Contracts with a ratio between zero and one allow for both interest rate increases and interest rate decreases. We define indicator variables for terciles of this ratio to categorize PSD contracts into (mainly) rate-increasing, mixed, and (mainly) rate-decreasing.[10] Disentangling rate-increasing and rate-decreasing PSD is important as our main hypotheses are derived for rate-increasing PSD.[11]

Figure 1 shows the pricing grid of a loan issued by IBM in March 2004 as an example. In this contract, the interest rate changes with IBM's senior debt rating. Since IBM's senior debt rating at the time of the issue was A+, this loan is an example

[10] For robustness we replicated all our specifications defining only contracts as rate-increasing (rate-decreasing) if *Rate De-/Increase* is exactly equal to zero (one). The remaining PSD contracts, that is, contracts with *Rate De-/Increase* between zero an one, are defined as mixed. All our results remain qualitatively unchanged if we use this alternative definition.

[11] The use of rate-decreasing PSD can be motivated by other reasons. For example, Asquith et al. (2005) argue that rate-decreasing PSD is a prepayment option for the borrower, which does not require renegotiation. The interest rate is automatically reduced if there are unanticipated improvements in the borrower's performance, thereby lowering renegotiation costs.

of a mixed PSD contract.

[Figure 1 here]

2.3 Descriptive Statistics

We provide descriptive statistics for borrower and loan characteristics in Table 1. We divide the sample into firms managed by optimistic and rational managers. Panel A reports descriptives for borrower characteristics. Unsurprisingly, the companies in our sample are large. By relying on information from the ExecuComp database, which covers all companies listed in the S&P 1,500, we effectively restrict our sample to large public US companies. Borrowers with CEOs that are classified as optimistic are on average smaller compared to borrowers with CEOs that are classified as rational. The mean/median size is \$7,452/\$2,225 million USD for rational borrowers and \$6,502/\$2,136 million USD for optimistic borrowers. The other borrower characteristics are similar. Panel B.1 provides descriptive statistics for general loan characteristics. Consistent with *Hypothesis 1*, we find that the fraction of PSD contracts is four % higher in the sample of loans issued by borrowers with optimistic CEOs when compared with loans issued by borrowers with rational CEOs (57% vs. 53%). The median loan amount is \$250 for both groups and also the median maturity is similar (about 5 years). Panel B.2 provides descriptive statistics for the subset of performance-sensitive loans. Within PSD contracts firms managed by optimistic managers in particular issue more rate-increasing PSD if compared to firms managed by rational managers.

[Table 1 here]

3 Managerial Optimism & Performance-Sensitive Debt

3.1 Performance-Sensitive vs. Straight Debt

In this section, we analyze the relationship between managerial optimism and the use of PSD. We begin by estimating the following Probit regression specification:

$$PSD_{it} = \alpha + \beta * Optimistic_{it} + \gamma * X'_{it-1} + \delta * Y'_{it} + \epsilon_{it}. \quad (2)$$

The dependent variable, PSD, is a dummy variable, which equals one if the loan contract includes a performance-pricing provision and zero otherwise. *Optimistic* indicates whether the borrowing firm is managed by an optimistic CEO. X is a set of borrower characteristics and Y a set of loan characteristics.[12] We also include industry, time, and rating fixed effects.

[Table 2 here]

The results reported in Table 2 indicate that managerial traits may significantly impact the firms' decision to issue PSD. Loans issued by optimistic CEOs are about six % more likely to contain performance-pricing provisions than loans issued by rational CEOs. Smaller firms are also more likely to issue PSD than larger firms. Furthermore, larger loans and loans that have a longer maturity are more likely to contain performance-pricing provisions. These findings are consistent with the existing literature, which argues that PSD can be used to overcome asymmetric information

[12] As noted in the data section, we obtain borrower information from the last available fiscal year *before* the loan issue $(t-1)$.

problems (see Asquith et al. (2005), Manso et al. (2010)), which are more significant in larger loans and loans of longer maturities.

Next, we examine whether the higher likelihood of using PSD by optimistic managers is driven by rate-increasing or rate-decreasing PSD. To do so, we estimate a multinomial logit model, in which the dependent variable can take on four values: 0 for straight debt, 1 for (mainly) rate-increasing PSD, 2 for mixed PSD, and 3 for (mainly) rate-decreasing PSD.

[Table 3 here]

Table 3 shows that the effect reported in Table 2 is solely driven by a preference of optimistic managers for rate-increasing PSD contracts. Optimistic managers are about five % more likely to use rate-increasing PSD, while we find no significant correlation between optimism and mixed or rate-decreasing PSD. Overall, these findings are consistent with *Hypothesis 1*.

3.2 PSD Pricing-Grid Structure

Hypothesis 2 stipulates that optimistic managers choose PSD with more risk-compensation than rational managers. To test this hypothesis we analyze the structure of the PSD pricing grids in more detail. Figure 2, shows the average pricing grid for firms with optimistic and rational CEOs. The graph indicates that the difference between the maximum and the minimum interest rate is on average higher if the CEO of the PSD-issuing firm is optimistic than if the CEO is rational.[13] Of course, the

[13] The median credit rating at the time of the loan issue is BBB+ for both optimistic and rational CEOs, suggesting that the differences in the pricing grids are not driven by differences in the riskiness of the issuing firms.

graphical evidence serves as a first indication only, as borrowers with optimistic CEOs and borrowers with rational CEOs are not unconditionally comparable as borrower and loan characteristics may differ.

[Figure 2 here]

To test *Hypothesis 2* in a more refined way, we follow Tchistyi et al. (2011) and calculate slope measures to proxy for the risk of a PSD contract. These slope measures relate interest rate changes that result from a credit rating change (as defined in the pricing grid) to the difference in market interest rates over the same rating notches.[14] A slope of one implies that the pricing grid simply reflects the market interest rate structure at the time of the loan issue. A slope measure greater than one indicates that the borrower "overpays" for downgrades and/or receives a larger interest rate reduction compared to the market for upgrades. To disentangle the up- and downgrade effects we further calculate the slope measure separately over the rate-increasing and the rate-decreasing regions of the pricing grid. Similar to Tchistyi et al. (2011), we also calculate the slope measures "locally" (pricing steps directly adjacent to the initial interest rate) and as averages (average over the entire pricing grid). The local slope measure is formally defined as:

$$LocalSlope = 0.5 * \left(\frac{(S_{i+1} - S_i)}{(Bond_{i+1} - Bond_i)} + \frac{(S_i - S_{i-1})}{(Bond_i - Bond_{i-1})} \right), \tag{3}$$

where S_i is the coupon rate that the borrower pays at the initial rating i. S_{i+1} (S_{i-1}) is the coupon rate, which the borrower has to pay if the company is downgraded

[14] Note that we can only calculate the slope measures for the subset of PSD contracts that relate interest rate changes to the borrower's credit rating.

(upgraded) and the next pricing step at the rating $i+1$ $(i-1)$ is reached.[15] $Bond_i$, $Bond_{i+1}$, and $Bond_{i-1}$ are the levels of the bond market index for the respective rating notches at the time of the loan issue. We use the level of the Bloomberg Bond Market Index for each rating notch at the time of loan issue. As noted above the average slope is calculated similarly by using all interest rate changes defined in the pricing grid. Figure 3 illustrates this procedure.

[Figure 3 here]

The OLS regression results relating the slope of rating-based PSD contracts to managerial optimism are reported in Table 4. We follow Tchistyi et al. (2011) and define the slope of fixed rate debt to be zero.[16] We address skewness in the slope measure by using $ln(Slope)$ in the regressions.

[Table 4 here]

As shown in Table 4, we find — consistent with *Hypothesis 2* — that loans issued by optimistic CEOs have significantly larger local slopes over regions of rating downgrades. This means that optimistic CEOs choose pricing provisions that allow for larger interest rate increases (relative to the market yield) than PSD contracts chosen by rational CEOs. Results for the average slope measures are similar to those for the local slope measures. To summarize, consistent with our hypotheses, optimistic CEOs choose pricing grids with steeper slopes compared with the slopes of the pricing grids chosen by rational CEOs.

[15] Note that we are interested in the risk arising from interest rate changes. For the majority of the PSD contracts the next pricing step is at the next rating notch but this does not have to be the case. Sometimes the same interest rate is defined for more than one rating notch. We only relate actual interest rate changes to changes in the bond market index.

[16] We obtain qualitatively the same results if we use a Tobit specification with zero as the lower bound.

3.3 Post-Issue Performance

In this subsection, we test whether firms with optimistic managers perform worse after issuing rate-increasing PSD relative to firms with rational managers (*Hypothesis 3*). In particular, we estimate the following model:

$$\Delta Performance_{it+k} = \alpha + \beta_1 * Optimistic_{it} + \gamma * X'_{it-1} + \delta * Y'_{it} + \epsilon_{it}. \quad (4)$$

$\Delta Performance_{it+k}$ is the change in financial performance of the borrower between the year of the loan issue (t) and k years after the issue ($k = 1, 2$).[17] We use two different measures of firm performance: the debt-to-EBITDA ratio and the firm's credit rating. These two measures are the two most commonly used performance measures in PSD contracts.[18] The regression includes rate-increasing PSD contracts only.[19] We focus on rate-increasing PSD because as shown in Table 3, managerial optimism is related to the use of rate-increasing PSD only. Table 5 presents the regression results.

[Table 5 here]

The results in Columns 1 and 2 show that the debt-to-EBITDA ratio of firms with optimistic CEOs increases in the years following a PSD issue relative to firms with rational CEOs. This effect is economically large. A change of 0.4 (Column 1) represents about one half of the standard deviation of the debt-to-EBITDA ratio. This

[17] Note that, as we are interested in the post-issue performance, we ensure that we measure the firm performance relative to the first financial statement *after* the loan issue to ensure that we do not simply capture the effect of the loan issue itself. $t + 1$ ($t + 2$) therefore refers to the 2nd (3rd) financial statement after the loan issue, that is, to a point in time that is on average more than one (two) calendar year(s) after the loan issue.

[18] More than 75% of all PSD contracts are written on either the issuer's credit rating or the issuer's debt-to-EBITDA ratio.

[19] Using both PSD and straight debt contracts and interacting *Optimistic* with a PSD indicator variable yields qualitatively similar results.

suggests that the performance (here: leverage) of these firms deteriorates significantly after the loan issue, leading to higher interest payments. In Columns 3 and 4, the dependent variable is a dummy variable, which equals one if the issuer is downgraded following the loan issue and zero otherwise. The results show that the credit rating of firms with optimistic CEOs is about five % more likely to be downgraded following a PSD issue than the credit rating of firms managed by rational CEOs. Again, this result is consistent with the hypothesis that following PSD issues, the performance of firms with optimistic CEOs is worse than the performance of firms with rational CEOs.

Note that the results in Table 5 also rule out a possible alternative explanation of our results. Delaying the exercise of an in-the-money option can be a rational strategy if the manager possesses positive inside information. Therefore, being *optimistic* may capture positive inside information of a manager and not only irrational over-optimism. In this case, "optimistic" managers may issue PSD simply because they possess positive inside information about the firm's future performance. However, if this were the case, we would expect firm performance to be better than that of rational managers following a PSD issue. Our findings show that the opposite is the case.

3.4 Endogeneity

A potential concern with our analysis is that managerial optimism may be an endogenous choice by the firm's owners when selecting a CEO. The same factors that drive the choice of the CEO could in principle also determine the use of PSD. In order to address this problem we use a propensity score matching approach and estimate the probability that a firm is managed by an optimistic CEO. For example, Hirshleifer et al. (2012)

argue that a reason for hiring optimistic CEOs might be that optimistic managers are more likely to invest in more innovative and riskier projects and can thereby benefit shareholders. We explicitly control for firm age in the first stage regression because innovations are more important in younger firms.[20] Furthermore, we use several firm characteristics, such as total assets, leverage, market-to-book, asset tangibility, interest coverage, profitability, current ratio, and industry-, year- and credit rating (notch level) fixed effects as additional explanatory variables. In untabulated results we find that firms with lower leverage ratios, higher market-to-book ratios, lower interest coverage ratios, and younger firms are more likely to be managed by optimistic CEOs. In the next step we match firms based on the probability to be managed by an optimistic CEO, that is, we match one firm that is managed by an optimistic CEO to a firm that is predicted to be managed by an optimistic CEO but is indeed managed by a rational CEO.

[Table 6 here]

In Table 6 we report results of a probit regression specification as in Table 2 for the matched sample. We find that optimistic CEOs are eight to nine % more likely to issue performance-sensitive debt contracts (compared to rational CEOs). Thus, our results are even stronger after accounting for a possibly endogenous selection of optimistic CEOs.

A drawback of the propensity score matching technique is that the choice to hire an optimistic CEO can only be modeled based on observable firm characteristics. To

[20] We compute firm age based on the data provided by Laura Field and Jay Ritter available on http://bear.warrington.ufl.edu/ritter/foundingdates.htm. The data is described in detail in Loughran and Ritter (2004). Firm founding dates are only available for roughly 50% of our sample, which leads to a sample reduction in Table 6.

control for unobservable time-invariant firm characteristics that might be correlated with the use of PSD and managerial optimism, we examine PSD issuance after CEO turnover.

In particular, we compare the use of PSD of incoming optimistic CEOs with the use of PSD of incoming rational CEOs three years before and three years after the turnover event.[21] We are forced to disregard the type of the outgoing CEOs due to sample size restrictions. Since we can only classify a fraction of all CEOs as either optimistic or rational,[22] further conditioning our analysis on the type of outgoing CEO would render the sample size to be too small for statistical inference. Not conditioning on the type of the outgoing CEO, however, is conservative as it biases our tests against finding a statistically significant relationship.

We estimate two separate linear probability models with a dummy variable equal to one if the company issues a loan with a performance-pricing provision and zero otherwise as dependent variable. The first column includes only observations where the incoming CEO is optimistic, the second column only observations where the incoming CEO is rational. Both regressions include the same control variables as in Table 2. To see whether optimistic CEOs pursue a different policy with respect to the use of PSD we estimate a difference-in-differences model. The first difference is calculated as the difference between the fraction of loans with a performance-pricing feature before and after the CEO turnover, represented by the coefficient *Post Turnover*. The second difference is the difference in the coefficient *Post Turnover* between optimistic and rational CEOs.

[21] The results are qualitatively similar if we vary the event window and use, for example, five years before and after the turnover.
[22] Cf. section 2.1.

[Table 7 here]

Our results are presented in Table 7. We find that optimistic CEOs significantly increase the fraction of loans with a performance-pricing provision while rational CEOs seem to decrease the fraction of PSD (although not significantly). The difference between both coefficients is significantly different from zero suggesting that optimistic CEOs are more likely to issue PSD relative to rational CEOs even after controlling for unobservable, time-invariant firm effects.

4 Robustness

4.1 Other Optimism Measures

In this section, we analyze whether our results are robust to alternative methods to identify optimistic managers. In particular, we consider different moneyness thresholds for the original optimism classification, distinguish between Pre- and Post-Optimistic, and consider alternative methods to identify optimism.

[Table 8 here]

Table 8 replicates Table 2 but uses alternative optimism measures. In Columns 1 and 2 we use more conservative moneyness thresholds than in our original optimism classification. In particular, we identify executives as optimistic if they ever hold an option until one year prior to expiration, which is at least 70% in-the-money (Column 1) or at least 100% in-the-money (Column 2). The original classification uses a moneyness threshold of 40%. The results in Table 8 confirm our previous findings. Firms

managed by optimistic CEOs are significantly more likely to include a performance-pricing provision in their loan contracts than firms managed by rational CEOs. Thus, our results are not sensitive to the choice of the moneyness parameter, which is also consistent with the robustness checks in Malmendier and Tate (2008).

Next, we follow Malmendier and Tate (2008) and distinguish between the time before and after an optimistic manager has ever shown evidence of being optimistic. The motivation for this separation is to justify the treatment of optimism as a time-invariant, personal characteristic. *Pre-Optimistic* refers to the time period before the respective executive first holds an option that is at least 40% in-the-money until the final maturity year, and *Post-Optimistic* refers to the time period thereafter. Table 8 shows that optimistic CEOs are significantly more likely to use PSD than rational CEOs, both before and after they are classified by our algorithm. This finding supports the notion that optimism is a time-invariant, personal characteristic.

In Column 4 we employ a different identification method of optimism, suggested by Malmendier and Tate (2005b). According to this method, CEOs are classified as optimistic if they hold stock options that are at least 67% in the money five years after the respective option grants. A CEO needs to show this behavior at least twice during his tenure to be classified as optimistic. Malmendier and Tate (2005b) refer to this measure as *Holder 67*.[23] Using the *Holder 67* measure instead of the original optimism variable, our results are even stronger than before.

In Column 5, we use a new identification method of optimism first proposed by Sen and Tumarkin (2009). Instead of analyzing executives' option exercise behavior, this method examines the executives' stock holdings. An executive is classified as

[23] We are grateful to Rik Sen for providing us with this measure.

optimistic if his total stock holdings relative to his salary exceed the median stock holdings to salary ratio. The intuition for this classification is similar to the *Optimistic* classification. Executives are generally poorly diversified and have a large idiosyncratic risk exposure to their firms. Consequently, they should hold as little of their companies' stock as possible. If executives voluntarily hold more stock, they are likely to be overly optimistic with respect to the future performance of their firms. According to Core and Larcker (2002), many firms have a minimum stock holding requirement for their top executives in place, which often is stated in terms of multiples of the executives' salary. Like Sen and Tumarkin (2009) we use the median of this stock holdings-to-salary multiple as our threshold to distinguish between rational and optimistic executives. Again, the results in Table 8 confirm our previous findings that firms with optimistic CEOs are more likely to use performance-pricing provisions than firms managed by rational CEOs. In summary, our findings are robust to several alternative optimism specifications.

4.2 CEO Characteristics

Bertrand and Schoar (2003) show that managerial style, which is likely to be affected by manager characteristics such as age, gender or educational background, significantly affects corporate financial policy. For example, Beber and Fabbri (2012) find that CEO age and education is correlated with speculation in the FX market. Huang and Kisgen (2013) find that male executives make riskier financial and investment decisions than female executives. Kaplan et al. (2012) find that general CEO ability and execution skills matter in buyout and venture capital transactions. To address the concern that our optimism measure may be correlated with CEO characteristics that also affect

risk-taking and therefore the decision to issue PSD, we explicitly control for CEO age, tenure, gender, and education in this section.

In addition to personal managerial characteristics, executive compensation plans are likely to also affect risk-taking behavior. In the context of PSD, Tchistyi et al. (2011) document that managers whose compensation is more sensitive to stock return volatility choose riskier pricing grids. To rule out the possibility that our results are driven by a correlation between the optimism measures and the delta/vega of the CEOs stock option portfolio, we explicitly control our analysis for these sensitivities. We follow Core and Guay (2002) in calculating delta and vega. The results are reported in Table 9.

[Table 9 here]

Besides optimism, the only variable that is significantly correlated with the decision to issue PSD is age, that is, the age of the CEO at the time of the debt issue (in years). Older CEOs are less likely to issue loans that contain performance-pricing provisions than younger CEOs. The other personal characteristics, as well as the delta and the vega of the CEO's stock and option portfolio are not significantly related to the decision to issue PSD. As noted above, controlling for delta and vega mitigates concerns that our optimism measure is positively correlated with a larger general risk preference by those executives.

5 Conclusion

This paper explores the impact of managerial optimism on debt contract design. In particular, we investigate whether optimistic CEOs, that is, managers who persistently overestimate their firms' future expected cash flow, are more likely to issue performance-sensitive debt (PSD) than rational managers. This possibility arises when optimistic managers decide to pool with rational managers who signal their credit worthiness using PSD.

We find that optimistic managers are indeed more likely to issue PSD than rational managers. We further find that within the subset of PSD issuing firms, optimistic managers choose contracts with larger risk-compensation to lenders, that is, pricing grids with more coupon rate increase potential in response to performance deterioration. Finally, we find that firms managed by optimistic managers perform worse after a PSD issue compared to firms managed by rational managers. This result confirms that our results are not simply driven by optimistic managers possessing some information advantage relative to rational managers. Our results are robust to the endogenous choice of the CEO as well as several robustness checks. Overall, our results suggest that managerial optimism can have a significant impact on a firm's debt contract design.

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Figure 1: PSD Pricing Grid Example

This figure exemplary shows the pricing grid embedded in the loan contract negotiated by International Business Machines Corporation (IBM) in March 2004. Information are taken from the Dealscan database. The black line shows the interest rate contingent upon the issuers credit rating. IBM's credit rating at the time of the loan issues was A+, the initial interest rate LIBOR + 12bp.

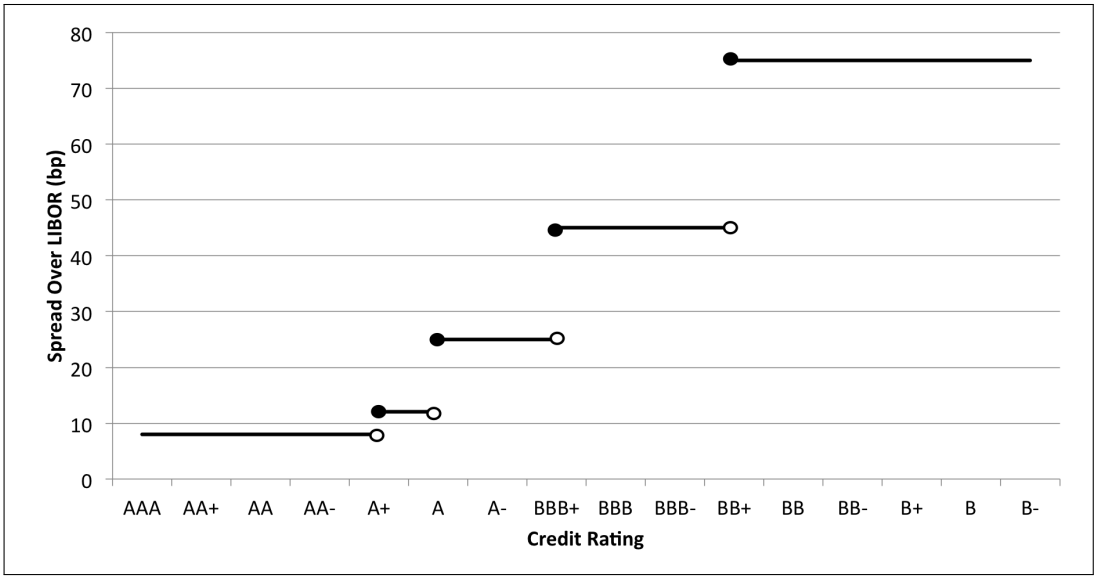

Figure 2: PSD Pricing Grids - Optimistic vs. Rational CEOs

This figure shows pricing grids for firms with optimistic CEOs (straight line) and rational CEOs (dashed line). The pricing grid is calculated by taking the average spread over LIBOR for each rating notch relative to the spread paid when the rating is AAA. These calculations are performed for both groups individually.

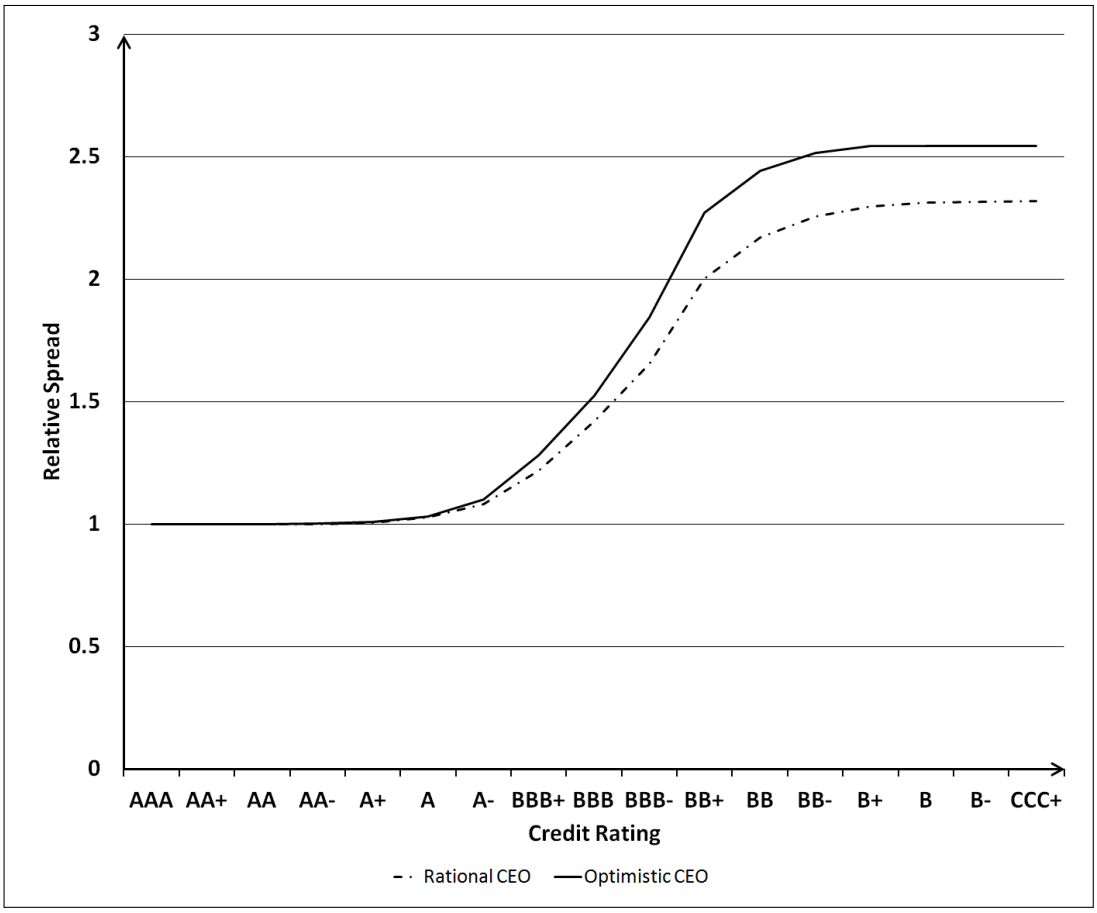

Figure 3: Slope of the PSD Pricing Grid

This figure shows a hypothetical rating-based performance pricing grid that links the borrower's credit rating to the interest rate S over a benchmark (e.g. LIBOR). Interest payments increase if the rating deteriorates and decline if the rating improves. This hypothetical pricing grid is defined over the ratings AA- to BBB. The rating as of loan issue is A-. The local measures are calculated over the pricing steps adjacent to the initial rating while the average measures are calculated over the entire pricing grid. The definitions of the local slope measures for this hypothetical performance pricing grid are:

$$\text{Local Slope} = 0.5 * \left(\frac{(S_{BBB+} - S_{A-})}{(Bond_{BBB+} - Bond_{A-})} + \frac{(S_{A-} - S_{A+})}{(Bond_{A-} - Bond_{A+})} \right)$$

$$\text{Local Slope} \uparrow = \frac{(S_{A-} - S_{A+})}{(Bond_{A-} - Bond_{A+})}$$

$$\text{Local Slope} \downarrow = \frac{(S_{BBB+} - S_{A-})}{(Bond_{BBB+} - Bond_{A-})}$$

The average slopes are calculated similar to the local slope measure but using all pricing steps that are defined in the grid.

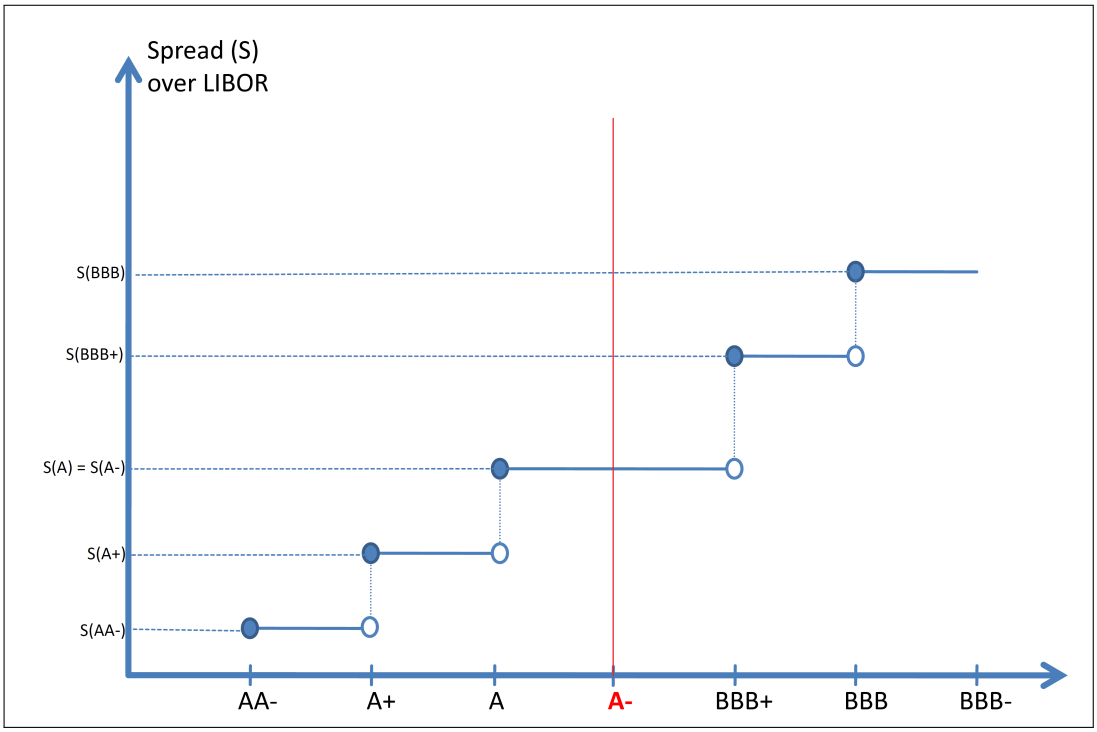

Table 1: Descriptive Statistics: Rational vs. Optimistic CEOs

This table reports descriptive statistics for loan and borrower characteristics. The sample is divided into firms with rational and optimistic CEOs. All variables are defined in the Appendix.

	Rational CEOs				Optimistic CEOs			
	Mean	Median	Std. Dev	#	Mean	Median	Std. Dev	#
Panel A: Borrower Characteristics								
Total Assets (million USD)	7,452.15	2,224.88	14,060.66	4,500	6,501.62	2,135.63	13,205.37	2,434
Leverage	0.27	0.26	0.19	4,500	0.25	0.24	0.16	2,434
Market-To-Book	1.78	1.48	0.95	4,500	1.87	1.60	0.95	2,434
Tangibility	0.35	0.29	0.23	4,500	0.33	0.26	0.24	2,434
Coverage	22.11	7.10	52.11	4,500	22.42	9.19	49.37	2,434
Profitability	0.18	0.15	0.15	4,500	0.17	0.14	0.13	2,434
Current Ratio	1.75	1.50	1.05	4,500	1.77	1.57	0.99	2,434
Not Rated (0/1)	0.31	0.00	0.46	4,500	0.31	0.00	0.46	2,434
Investment Grade (0/1)	0.43	0.00	0.50	4,500	0.46	0.00	0.50	2,434
Panel B.1: General Loan Characteristics								
Facility Amount (million USD)	537.39	250.00	987.89	4,500	539.44	250.00	1,021.55	2,434
Maturity (months)	44.16	50.00	23.08	4,500	43.99	55.00	22.58	2,434
Multiple Tranches (0/1)	0.42	0.00	0.49	4,500	0.44	0.00	0.50	2,434
Term Loan (0/1)	0.20	0.00	0.40	4,500	0.18	0.00	0.38	2,434
Secured	0.37	0.00	0.48	4,500	0.33	0.00	0.47	2,434
PSD (0/1)	0.53	1.00	0.50	4,500	0.57	1.00	0.49	2,434
Panel B.2: PSD Characteristics								
PSD(Rating) (0/1)	0.43	0.00	0.50	2,367	0.44	0.00	0.51	1,397
PSD(Accounting) (0/1)	0.58	1.00	0.49	2,367	0.57	1.00	0.50	1,397
PSD(Increasing) (0/1)	0.12	0.00	0.33	2,367	0.14	0.00	0.35	1,397
PSD(Mixed) (0/1)	0.67	1.00	0.47	2,367	0.65	1.00	0.48	1,397
PSD(Decreasing) (0/1)	0.19	0.00	0.39	2,367	0.18	0.00	0.39	1,397
# Pricing Steps	4.73	5.00	1.30	2,367	4.71	5.00	1.31	1,397

Table 2: Performance-Sensitive vs. Straight Debt

This table reports the marginal effects for a probit regression using a dummy as the dependent variable that equals one whenever a loan includes a performance pricing provision and zero otherwise. The main variable of interest is *Optimistic*, which is an indicator variable that equals one if the CEO of the borrower is classified as optimistic and zero otherwise. All variables are defined in the Appendix. Marginal effects for each covariate are constructed as the difference in predicted probabilities for a particular outcome computed at their mean values holding all other covariates constant. For factor levels it is computed as a discrete change from the base level. The regressions include time, industry, and rating (notch level) dummies when indicated. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms. *, **, *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	(1)	(2)	(3)	(4)
Panel A: Optimism Classification				
Optimistic	0.063***	0.061***	0.058***	0.057***
	(0.022)	(0.022)	(0.022)	(0.022)
Panel B: Borrower Characteristics				
ln(Total Assets)			−0.032***	−0.097***
			(0.011)	(0.013)
Leverage			−0.088	−0.096
			(0.069)	(0.069)
Market-to-Book			−0.003	−0.004
			(0.012)	(0.012)
Tangibility			−0.092	−0.043
			(0.072)	(0.075)
Coverage			0.000	0.000
			(0.000)	(0.000)
Profitability			0.124	−0.002
			(0.090)	(0.089)
Current Ratio			−0.017	−0.011
			(0.012)	(0.012)
Panel C: Loan Characteristics				
ln(Facility Amount)				0.136***
				(0.010)
ln(Maturity)				0.119***
				(0.012)
Multiple Tranches				0.073***
				(0.017)
Term Loan				−0.233***
				(0.020)
Secured				0.154***
				(0.022)
Observations	6,749	6,703	6,703	6,703
Pseudo R^2	0.060	0.074	0.078	0.154
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	No	Yes	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes	Yes	Yes

Table 3: Interest Increasing vs. Interest Decreasing PSD

This table reports the marginal effects for a multinominal logit regression using a dummy as the dependent variable, which equals one for PSD contracts that contain mainly spread increase features (Column 1), two for PSD contracts that contain both spread increase and spread decrease features (Column 2), three for PSD contracts that contain mainly spread decrease features (Column 3) and zero for non-PSD contracts (base group). The main variable of interest is *Optimistic*, which indicates the probability of optimistic CEO to choose a loan contract with the respective spread change feature. The regressions furthermore include all control variables used in Table 2. All variables are defined in the Appendix. Marginal effects for each covariate are constructed as the difference in predicted probabilities for a particular outcome computed at their mean values holding all other covariates constant. For factor levels it is computed as a discrete change from the base level. The regressions include time, industry, and rating (notch level) dummies. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms. *, **, *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	(1)	**(2)**	**(3)**
Optimistic	0.044^{***}	0.007	0.007
	(0.017)	(0.012)	(0.005)
Observations	6,718		
Pseudo R^2	0.182		
Firm Characteristics	Yes		
Loan Characteristics	Yes		
Year Fixed Effects	Yes		
Industry Fixed Effects	Yes		
Credit Rating Fixed Effects	Yes		

Table 4: Managerial Optimism and the Slope of PSD Contracts

This table reports OLS regressions, relating the slope of the performance pricing grids to CEO, borrower and loan characteristics. The sample includes straight debt contracts and rating-based PSD contracts. The dependent variables are slope measures for the PSD pricing grids. The local slope is defined as follows.

$$Local\ Slope = 0.5 * \left(\frac{(S_{i+1} - S_i)}{(Bond_{i+1} - Bond_i)} + \frac{(S_i - S_{i-1})}{(Bond_i - Bond_{i-1})} \right)$$

S_i is the spread that the borrower pays at the initial rating i. S_{i+1} (S_{i-1}) is the spread hat the borrower has to pay when the company is downgraded (upgraded) and the next pricing step at the rating $i+1$ ($i-1$) is reached. $Bond_i$, $Bond_{i+1}$, and $Bond_{i-1}$ are the levels of the bond market index for the respective rating notches at the time of the loan issue. The slope of straight debt is 0. While the *Local Slope* is defined over the pricing steps directly adjacent to the initial pricing step only, the *Average Slope* is calculated as a mean over all pricing steps defined in the grid. *Local Slope* ↑ and *Average Slope* ↑ are defined over all credit ratings above the firm's rating at the time of contract inception, i.e. for rating upgrades. *Local Slope* ↓ and *Average Slope* ↓ are defined over all credit ratings below the firm's rating at the time of contract inception, i.e. for rating downgrades. The main independent variable of interest is *Optimistic*, which is an indicator variable, which equals one if the CEO of the borrower is classified as optimistic and zero otherwise. The regressions furthermore include all control variables used in Table 2. All variables are defined in the Appendix. The regressions include time, industry, and rating (notch level) dummies. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms. *, **, *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	(1) Local Slope	(2) Local Slope ↑	(3) Local Slope ↓	(4) Average Slope	(5) Average Slope ↑	(6) Average Slope ↓
Optimistic	0.014**	0.006	0.018***	0.012*	0.009	0.014**
	(0.007)	(0.006)	(0.007)	(0.007)	(0.006)	(0.007)
Observations	4,502	4,365	4,428	4,502	4,366	4,430
Adj. R^2	0.228	0.206	0.210	0.229	0.230	0.208
Firm Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Loan Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 5: Post-PSD-Issue Performance

This table reports OLS regressions showing the change in Debt-to-EBITDA between the year of the loan issue *(t)* and k years after the issue *(k = 1,2)*. The sample is restricted to PSD contracts with a spread-increase potential. This table further reports marginal effects of probit regressions using a dummy as the dependent variable, which equals one if the borrowing firm was downgraded k years after the issue of PSD. Again, the sample is restricted to PSD contracts with a spread-increase potential. Marginal effects for each covariate are constructed as the difference in predicted probabilities for a particular outcome computed at their mean values holding all other covariates constant. For factor levels it is computed as a discrete change from the base level. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms. *, **, *** indicate statistical significance at the 10%, 5% and 1% level, respectively. The regressions include time, rating, and insdustry fixed effects, as well as loan, and borrower characteristics. All variables are defined in the Appendix.

	(1)	**(2)**	**(3)**	**(4)**
	Δ Debt-to-EBITDA		Rating Downgrade	
	$k = 1$	$k = 2$	$k = 1$	$k = 2$
Optimistic	0.401**	0.350*	0.052*	0.021
	(0.155)	(0.185)	(0.028)	(0.042)
Observations	2,341	2,193	941	913
Adjusted R^2	0.032	0.042		
Pseudo R^2			0.105	0.057
Control Variables	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes	Yes	Yes

Table 6: Propensity Score Matching - PSD vs. Straight Debt

This table reports the marginal effects for the second stage of a propensity score matching model using a dummy as the dependent variable that equals one whenever a loan includes a performance-pricing provision and zero otherwise. The propensity scores are estimated in the first stage by a probit regression using a dummy as the dependent variable that equals one if the firm is managed by an optimistic CEO and zero otherwise. *Optimistic* is an indicator variable that equals one if the CEO of the borrower is classified as optimistic, i.e., if the CEO ever held an option until the final maturity year, which is at least 40% in the money and zero otherwise. The regressions furthermore include all control variables used in Table 2. All variables are defined in the Appendix. Marginal effects for each covariate are constructed as the difference in predicted probabilities for a particular outcome computed at their mean values holding all other covariates constant. For factor levels it is computed as a discrete change from the base level. The regressions include time, industry, and rating (notch level) dummies. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms. *, **, *** indicate statistical significance at the 10%, 5% and 1% level respectively.

	(1)	**(2)**
Optimistic	0.090***	0.082**
	(0.033)	(0.033)
Observations	1,716	1,716
Pseudo R^2	0.127	0.219
Firm Characteristics	Yes	Yes
Loan Characteristics	No	Yes
Year Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes

Table 7: CEO Turnover - PSD vs. Straight Debt

This table reports results for fixed effects linear probability models using a dummy as the dependent variable which is equal to one whenever a loan includes a performance pricing provision and zero otherwise. The sample solely includes loans issued during the three years before and after CEO turnover. Further, it includes only observations where the new CEO can be classified as optimistic or rational. In total, the sample comprises 161 CEO changes. *Post Turnover* is an indicator variable which equals one if the loan was issued in the three years following CEO turnover. In model (1), loan issues are included where the incoming CEO was classified as optimistic. In model (2), we include loan issues where the incoming CEO was classified as rational. The regressions furthermore include all control variables used in Table 2. All variables are defined in the Appendix. The regressions include time, rating (notch level), and firm fixed effects. *, **, *** indicate statistical significance at the 10%, 5% and 1% level respectively.

	(1)	**(2)**
Post Turnover	0.295^{**}	-0.058
	(0.148)	(0.082)
Observations	236	620
Adj. R^2	0.530	0.449
Firm Characteristics	Yes	Yes
Loan Characteristics	Yes	Yes
Year Fixed Effects	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes
Firm Fixed Effects	Yes	Yes

Test if coefficients are equal in both models:

Post Turnover (Optimistic) = Post Turnover (Rational)

$\chi^2(1) = 5.15$

Prob $> \chi^2 = 0.0233^{**}$

Table 8: Alternative Optimism Classifications

This table reports the marginal effects for probit regressions using a dummy as the dependent variable that equals one whenever a loan includes a performance pricing provision and zero otherwise. *Optimism 70* and *Optimism 100* are indicator variables that equal one if the CEO of the borrower is classified as optimistic, i.e. if the CEO ever held an option until the final maturity year, which is at least 70 or 100% in the money and zero otherwise. *Holder67* is an indicator variable that is equal to one if CEOs did not exercise options that were at least 67% in the money in their fifth year at least twice during their tenure. *Pre-Optimistic* and *Post-Optimistic* indicate the time period before an executive ever held an option until the final maturity year, which is at least 40% in the money and the the time period after this activity, respectively. Voluntary Holder is an indicator variable that equals one if CEOs voluntarily holds more stocks of their company than required by company constitutions. The regressions furthermore include all control variables used in Table 2. All other variables are defined in the Appendix. Marginal effects for each covariate are constructed as the difference in predicted probabilities for a particular outcome computed at their mean values holding all other covariates constant. For factor levels it is computed as a discrete change from the base level. The regressions include time, industry, and rating (notch level) dummies. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms. *, **, *** indicate statistical significance at the 10%, 5% and 1% level respectively.

	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Optimistic (70)	0.050**				
	(0.024)				
Optimistic (100)		0.055**			
		(0.025)			
Pre-Optimistic			0.062**		
			(0.028)		
Post-Optimistic			0.050*		
			(0.027)		
Holder 67				0.077***	
				(0.027)	
Voluntary Holder					0.062***
					(0.023)
Observations	6,703	6,703	6,703	3,379	6,417
Pseudo R^2	0.153	0.153	0.154	0.167	0.147
Firm Characteristics	Yes	Yes	Yes	Yes	Yes
Loan Characteristics	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes	Yes	Yes	Yes

Table 9: CEO Characteristics

This table reports the marginal effects for probit regressions using a dummy as the dependent variable that equals one whenever a loan includes a performance pricing provision and zero otherwise. *Optimistic*is and indicator variables that equal one if the CEO of the borrower is classified as optimistic, i.e. if the CEO ever held an option until the final maturity year, which is at least 40% in the money and zero otherwise. *Female* is a dummy variable that is equal to one if the CEO is female. *Ph.D.* is a dummy variable if the CEO holds a Ph.D. degree. *Tenure* is the time in days since the executive became CEO. *Delta* measures the sensitivity of the CEO's overall option and stock portfolio to price movements of the company's stock. *Vega* measures the sensitivity of the CEO's overall option and stock portfolio to volatility changes of the company's stock. The regressions furthermore include all control variables used in Table 2. All variables are defined in the Appendix. Marginal effects for each covariate are constructed as the difference in predicted probabilities for a particular outcome computed at their mean values holding all other covariates constant. For factor levels it is computed as a discrete change from the base level. The regressions include time, industry, and rating (notch level) dummies. Standard errors are heteroskedasticity robust and clustered at the firm level to account for non-independent observations within firms. *, **, *** indicate statistical significance at the 10%, 5% and 1% level respectively.

	(1)	**(2)**	**(3)**
Optimistic	0.057**	0.053**	0.050**
	(0.023)	(0.023)	(0.023)
Female	−0.023		−0.041
	(0.080)		(0.084)
Ph.D.	0.016		−0.001
	(0.057)		(0.059)
Age	−0.003**		−0.003*
	(0.001)		(0.002)
Tenure	0.001		0.002
	(0.002)		(0.002)
Delta		−0.150	−0.133
		(0.271)	(0.275)
Vega		−0.002	−0.001
		(0.005)	(0.005)
Observations	6,567	6,139	6,008
Pseudo R^2	0.154	0.149	0.150
Firm Characteristics	Yes	Yes	Yes
Loan Characteristics	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes	Yes

Appendix

Variable Name	Definition
Managerial Characteristics:	
Optimistic	A dummy variable which equals one if a manager holds executive stock options until the last year of maturity that are at least 40% in-the-money and zero otherwise.
Pre-Optimistic	A dummy variable which equals one in the time period before a manager ever held an option until the final maturity year, which is at least 40% in the money and zero otherwise.
Post-Optimistic	A dummy variable which equals one in the time period after a manager ever held an option until the final maturity year, which is at least 40% in the money and zero otherwise.
Holder67	A dummy variable which equals one if a manager holds options five years after the option grant that are at least 67% in-the-money. This behavior has to be shown at least twice by the manager.
Voluntary Holder	A dummy variable, which equals one if $\frac{Stock\ Holdings}{Salary} >= Median(\frac{Stock\ Holdings}{Salary})$ and zero otherwise, where: Stock holdings is the value of company stock held by the CEO in $million. Salary is the CEO salary in $million.
Delta	Overall delta of the option and stock portfolio held by the CEO divided by total shares outstanding. The individual stock delta is one per definition, the delta of an individual option is defined as $e^{-dT}N(Z)$.
Vega	$e^{-dT}N^{'}(Z)ST^{1/2} * (0.01)$. In our regressions we use $log(1 + vega)$ to correct for the skewness of vega. where: $Z = \left[ln\left(S/X\right) + T\left(r - d + \sigma^2/2\right)\right]/\sigma T^{1/2}$ N = cumulative probability function for the normal distribution

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Variable Name	Definition
	$N^{'}$ =normal density function.
	S = price of the underlying stock
	X = exercise price of the option
	σ = expected stock-return volatility over the life of the option
	r = natural logarithm of the risk-free rate
	T = time to maturity of the option in years
	d = natural logarithm of expected dividend yield over the life of the option
Female	A dummy variable, which equals one if the CEO is female.
Ph.D.	A dummy variable, which equals one if the CEO holds a Ph.D. degree.
Age	Age of the CEO in years at the time of the debt issue.
Tenure	Time in days since the executive became CEO.
Borrower/Issuer characteristics:	
Total Assets	Firm's total assets in $million.
Leverage	Long-term debt divided by total assets.
Market-to-Book	Market value of the firm divided by the book value of assets.
Tangibility	Net property plant and equipment divided by total assets.
Coverage	Interest expenses divided by EBITDA.
Profitability	EBITDA divided by total assets.
Current Ratio	Current assets divided by current liabilities.
Loan characteristics:	
Facility Amount	Overall facility volume in $million.
Maturity	Time to maturity in months.
Multiple Tranches	A dummy that equals one if the deal consists of more than one tranche and zero otherwise.

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Variable Name	**Definition**
Term Loan	A dummy variable, which equals one if the loan type is defined as "Term Loan", "Term Loan A ... Term Loan H", or "Delay Draw Term Loan", and zero otherwise.
Secured	A dummy variable, which equals one if the loan contains collateral
PSD grid characteristics:	
PSD	A dummy variable, which equals one if the loan contract includes a performance pricing provision and zero otherwise.
PSD(Rating)	A dummy variable, which equals one if the loan contract includes a performance pricing provision based on the issuer's credit rating and zero otherwise.
PSD(Increasing)	A dummy variable, which equals one if $\frac{(S_i - S_{Min})}{(S_{Max} - S_{Min})} < \frac{1}{3}$ and zero otherwise.
PSD(Mixed)	A dummy variable, which equals one if $\frac{1}{3} >= \frac{(S_i - S_{Min})}{(S_{Max} - S_{Min})} < \frac{2}{3}$ and zero otherwise.
PSD(Decreasing)	A dummy variable, which equals one if $\frac{(S_i - S_{Min})}{(S_{Max} - S_{Min})} >= \frac{2}{3}$ and zero otherwise.
# Pricing Steps	Number of pricing steps defined in the pricing grid.
Local Slope	$0.5 * \left(\frac{(S_{i+1} - S_i)}{(Bond_{i+1} - Bond_i)} + \frac{(S_i - S_{i-1})}{(Bond_i - Bond_{i-1})} \right)$
Local Slope ↑	$\frac{(S_i - S_{i+1})}{(Bond_i - Bond_{i+1})}$
Local Slope ↓	$\frac{(S_{i-1} - S_i)}{(Bond_{i-1} - Bond_i)}$
	where:
	i is the borrower's long-term credit rating as of contract inception
	$i + 1$ is the borrower's long-term credit rating as of contract inception plus one notch (upgrade)
	$i - 1$ is the borrower's long-term credit rating as of contract inception minus one notch (downgrade)
	S_i is the spread that the borrower has to pay given rating i

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Variable Name	**Definition**
	S_{i+1} is the spread that the borrower has to pay given rating $i+1$
	S_{i-1} is the spread that the borrower has to pay given rating $i-1$
	S_{Min} is the lowest spread defined in the pricing grid
	S_{Max} is the highest spread defined in the pricing grid
	Bond refers to the market spread for the respective rating notch
Average Slope	Calculated as Local Slope but over all rating notches defined in the pricing grid.
Average Slope ↑	Calculated as Local Slope ↑, but over all credit ratings above the firm's rating at the time of contract inception.
Average Slope ↓	Calculated as Local Slope ↓, but over all credit ratings below the firm's rating at the time of contract inception.