Managerial Biases and Debt Contract Design

The Case of Syndicated Loans

Adam, Tim R.; Burg, Valentin; Scheinert, Tobias; Streitz, Daniel

Document Version
Accepted author manuscript

Published in:
Management Science

DOI:
10.1287/mnsc.2018.3165

Publication date:
2020

License
Unspecified

Citation for published version (APA):
Adam, T. R., Burg, V., Scheinert, T., & Streitz, D. (2020). Managerial Biases and Debt Contract Design: The Case of Syndicated Loans. *Management Science*, *66*(1), 352-375. https://doi.org/10.1287/mnsc.2018.3165

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

Tim R. Adam, Valentin Burg, Tobias Scheinert, and Daniel Streitz

Journals article (Accepted manuscript*)

Please cite this article as:
Adam, T. R., Burg, V., Scheinert, T., & Streitz, D. (2020). Managerial Biases and Debt Contract Design: The Case of Syndicated Loans. *Management Science*, *66*(1), 352-375.
https://doi.org/10.1287/mnsc.2018.3165

DOI: https://doi.org/10.1287/mnsc.2018.3165

Managerial Biases and Debt Contract Design:

The Case of Syndicated Loans*

Tim R. Adam
Humboldt University of Berlin

Valentin Burg
Humboldt University of Berlin

Tobias Scheinert
Humboldt University of Berlin

Daniel Streitz
Copenhagen Business School

June 19, 2018

Abstract

We examine whether managerial overconfidence impacts the use of performance-pricing provisions in loan contracts (PSD). Managers with biased views may issue PSD because they consider this form of debt to be mispriced. Our evidence shows that overconfident managers are more likely to issue rate-increasing PSD than regular debt. They choose PSD with steeper performance-pricing schedules than rational managers. We reject the possibility that overconfident managers have (persistent) positive private information and use PSD for signaling. Finally, firms appear to benefit less from using PSD ex post if they are managed by overconfident rather than rational managers.

Keywords: Behavioral Biases, Overconfidence, Performance-Sensitive Debt, Debt Contracting, Syndicated Loans

JEL-Classification: G02, G30, G31, G32

*The authors would like to thank Tobias Berg, Sudipto Dasgupta, Jerome Detemple, Ruediger Fahlenbrach, Chitru Fernando, Simon Gervais, Jean Helwege, Kose John, Swaminathan Kalpathy, Asad Kausar, Maria-Teresa Marchica, Steven Ongena, Oliver Spalt, Rik Sen, Sascha Steffen, Alex Stomper, David Thesmar, and seminar participants at HKUST, Humboldt University, Trier University, Bonn University, University of Zurich, Copenhagen Business School, Tilburg University, the 2014 EFA Annual Meeting, the 2013 Campus for Finance (WHU) Meeting, the 2013 Marie Curie ITN Conference, the 2013 DGF Meeting, the 2013 FMA Annual Meeting, and the 2014 BFWG Meeting for helpful comments and suggestions. Furthermore, we thank the Editor, Gustavo Manso, an anonymous Associate Editor, and two anonymous referees for their comments and suggestions. Financial assistance from the Collaborative Research Center 649: Economic Risk is gratefully acknowledged. Daniel Streitz gratefully acknowledges support from the Center for Financial Frictions (FRIC), grant no. DNRF102. Corresponding author: Tim R. Adam, Tel.: +49(0)30 2093 99430, E-mail: tim.adam@hu-berlin.de.

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

In 1990, Morton International, a producer of chemicals and salt, issued performance-sensitive debt (PSD), which stipulated that the coupon would rise if Morton's credit rating were to deteriorate. In return, Morton received a lower initial coupon than without this performance-pricing provision. The above quote shows that at the time of this debt issue the executive of Morton International, John Bowen, 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. Obviously, this may have been bad luck. On the other hand, the executive may have had overly optimistic expectations about Morton's future performance, and included a performance-pricing provision in the debt contract because of these expectations. This paper examines whether managerial biases, such as overconfidence, impact the use of performance-pricing provisions in a systematic manner.

Performance-sensitive debt (PSD) comes in two general flavors: rate-increasing and rate-decreasing contracts. In rate-increasing contracts the coupon increases as the firm's performance deteriorates. In rate-decreasing contracts the coupon decreases as the firm's performance improves.[1] One can think of PSD as regular debt plus a portfolio of options (collars), one for each coupon payment. The underlying asset of the collars is some measure of firm performance, usually the issuer's credit rating or a leverage ratio. In the case of rate-increasing PSD, the collars deliver a premium to the borrower in the form of a lower initial coupon. In the case of rate-decreasing PSD, the collars deliver a premium to the lender in form of a higher initial coupon. The two general contract types are shown in Figure 1.

[1] Mixed contracts containing rate-increasing and rate-decreasing segments are also possible.

[Figure 1 here]

Beliefs about the distribution of the issuer's future performance clearly impact the valuation of the options implicit in PSD. If these beliefs differ between borrower and lender, then this could affect the use of performance-pricing provisions. For example, overconfident managers, whose beliefs about the firm's future expected cash flow are biased upwards, would regard the options implicit in rate-increasing (rate-decreasing) PSD to be overvalued (undervalued) and may hence regard PSD as a cheap financing form.[2] If the use of PSD is motivated by biased views, then its use could potentially be costly to shareholders. Since the use of performance-pricing provisions is a frequent phenomenon in private debt contracts, occurring in about half of all syndicated and non-syndicated loans contained in the Dealscan database, it is important to determine whether the use of PSD is subject to behavioral biases.

We examine this question using a sample of syndicated and non-syndicated loan tranches issued by U.S. non-financial corporations between 1992 and 2010, obtained from the LPC Dealscan database. Since the personal views of managers are not directly observable we follow Malmendier and Tate (2005a) and infer overconfidence from managers' exercise behavior of their executive stock options. Malmendier and Tate (2005a) classify managers as overconfident if they ever held an executive stock option until maturity that was at least 40% in-the-money at the year-end prior to maturity.[3] They show that on average managers do not benefit from this delayed exercise behavior and therefore conclude that these managers, who are labeled as longholders, hold biased views

[2] Issuing rate-increasing PSD can be considered as selling a collar consisting of two calls on the borrower's performance, while issuing rate-decreasing PSD can be considered as buying a collar consisting of two puts on the borrower's performance. See Section 1 for more details.

[3] The rationale behind this measure is that managers have a large fraction of their personal wealth tied to their companies and only limited diversification possibilities. Therefore, managers should exercise their stock options if they are sufficiently deep in-the-money and exercisable. Executives who delay exercise of deep in-the-money options may do so because they regard their company's stock to be undervalued, which can arise from an upward bias in the expected return distribution of the firm's stock, i.e., overconfidence.

on average.[4] An advantage of Malmendier and Tate (2005a)'s longholder measure is that it relies on actual managerial actions and is computable for a relatively large set of executives. Perhaps due to these advantages the longholder measure has been used in many subsequent studies such as Deshmukh, Goel, and Howe (2013), Humphery-Jenner, Lisic, Nanda, and Silveri (2016), and Huang, Tan, and Faff (2016).[5]

Our results show that managers who delay their stock option exercises are 6 percentage points more likely to issue PSD than managers who do not. Given that the unconditional probability of issuing PSD is about 50%, this is an economically significant effect. Interestingly, the effect exists for rate-increasing contracts only, but not for mixed or rate-decreasing contracts. That is, overconfident managers are particularly likely to choose contracts that offer an immediate benefit, i.e., a reduction in the loan spread, but expose their firms to the risk of spread increases in the future. These results are robust to various measures of behavioral biases, the inclusion of bank and firm-fixed effects, and to the inclusion of manager characteristics such as age, tenure, education, and compensation characteristics.

We also find that overconfident managers choose PSD with steeper performance-pricing schedules than rational managers.[6] Steeper pricing schedules imply that the PSD contains more options. This result is consistent with the hypothesis that overconfident managers issue PSD because they consider the options implicit in the PSD to be mispriced and therefore issue debt that contains more of these options.

[4] We acknowledge that the term "biased" carries a negative connotation. That these managers, on average, have incorrect beliefs regarding the future performance of their firms is an empirical finding, i.e., not inherent in the calculation of the proxy for overconfidence.

[5] Several other ways to measure behavioral biases have been used in the literature. For example, Puri and Robinson (2007), Graham, Harvey, and Puri (2013), and Ben-David, Graham, and Harvey (2013) use surveys, while Malmendier and Tate (2005b) examine press statements about managers. Otto (2014) uses a measure based on forecasted versus realized earnings.

[6] We use the terms "overconfidence", "managerial biases", and "biased managers" interchangeably throughout when referring to the group of managers who delay their stock option exercises according to the Malmendier and Tate (2005a) (or similar) measure and use the term "rational" when referring to managers who do not display this behavior.

It is possible that managers who delay their stock option exercises possess positive private information about the future performance of their firms and use PSD as a signaling device as proposed by Manso, Strulovici, and Tchistyi (2010). To examine this possibility, we evaluate firms' post-issue performances. We focus on the two most common and therefore most relevant performance measures used in PSD contracts, i.e., the debt-to-EBITDA ratio and the issuer credit rating, which together account for over 3/4 of all PSD issues in our sample. We find that PSD-issuing firms run by overconfident managers perform *worse* after the issuance of PSD compared to firms run by rational managers. In particular, their debt-to-EBITDA ratios increase and they are more likely to be downgraded following PSD issues compared to firms with rational managers. These results are inconsistent with the possibility that overconfident managers possess positive private information about their companies' future performances.

Finally, we examine the initial loan spreads paid on PSD by overconfident and rational managers, and analyze the development of these spreads over the duration of the loans. The initial spread of rate-increasing (rate-decreasing) PSD is about 20-35 (10-15) bps lower (higher) compared to regular debt. This is consistent with the fact that in rate-increasing PSD borrowers sell options to the lender while in rate-decreasing PSD borrowers buy options from the lender. Interestingly, we find no significant differences in the initial pricing of PSD issued by overconfident and rational managers. Thus lenders appear not to differentiate between overconfident and rational managers when setting the initial loan terms. Over the duration of a loan the spreads of rate-increasing (rate-decreasing) PSD increase (decrease) by up to 10 (34) bps on average. This implies that, on average, rational managers who issue PSD pay lower spreads overall than rational managers who issue regular debt. This finding is consistent with Manso et al. (2010), who predict that higher quality firms issue PSD while lower quality firms issue regular debt. The spreads of rate-increasing PSD issued by overconfident managers, however, increase on average by up to 16

bps over the duration of the loan (60% more than PSD issued by rational managers). This is consistent with our prior finding that overconfident managers perform worse than rational managers and therefore reap lower benefits from using PSD.

When focusing on spread increases of more than 50 bps, we find that firms with overconfident managers who issue rate-increasing PSD are up to 8 percentage points more likely to experience such a severe spread increase compared to firms with rational managers who issue rate-increasing PSD. This effect is economically large given that the unconditional probability of observing a spread increase above 50 bps is only about 10 - 15%. Our results also indicate that severe spread changes, i.e., above +50 bps, are associated with a net loss from issuing rate-increasing PSD for overconfident managers. Overall, we document that overconfident managers gain less from issuing rate-increasing PSD than rational managers, which is inconsistent with overconfident managers possessing positive private information about their companies' future performances.

Our results contribute to several strands of the literature. First, we contribute to the literature that proposes several neoclassical explanations as to why firms use performance-pricing provisions. Beatty and Weber (2003) document a link between PSD and earnings management, while Asquith, Beatty, and Weber (2005) argue that PSD is used to reduce debt renegotiation costs. This is because the performance-pricing schedule reduces the need to renegotiate if an issuer's credit quality changes. Less frequent debt renegotiations also reduce hold-up concerns, which may arise in relationship lending, as pointed out by Adam and Streitz (2016). Manso et al. (2010) show that PSD can be used as a signaling device for a firm's credit quality. High quality firms issue (rate-increasing) PSD, while low quality firms issue regular debt. Low quality firms do not mimic high quality firms because they expect their credit qualities to deteriorate, which would cause their loan spreads to rise automatically were they to issue PSD. Tchistyi, Yermack, and Yun (2011) argue

that managerial compensation contracts can induce managers to use PSD. The use of PSD tends to increase a firm's earnings volatility, benefiting managers with large convexities in their compensation contracts. Finally, Tchistyi (2016) argue that PSD is an optimal contract in the presence of moral hazard, because conditional loan spread increases reduce an agent's incentive to divert cash for private consumption. Our paper is the first one to show that in addition to these neoclassical theories behavioral biases can also affect the use of PSD.

Second, we contribute to the literature on how behavioral biases impact corporate policy decisions, such as capital structure, investments, M&A, debt maturity, and payout policy.[7] In contrast to most of the existing literature our setting allows us to study how a behavioral bias such as overconfidence affects bi-lateral contracts. Our results indicate that (rational) lenders offer similar contract terms to both overconfident and rational managers. This may be due to competition in the loan market, as pointed out by Bond, Musto, and Yilmaz (2009). The study that is closest to ours is Landier and Thesmar (2009). These authors analyze the debt capital structure of small firms and find that optimistic entrepreneurs prefer lines of credit over longer term bank debt. The decision to issue PSD is not equivalent to debt maturity choice, however, because short-term debt exposes the borrower to changes in the market credit risk premium, while PSD locks-in the current market premium for the duration of the loan. Furthermore, we show that managerial biases can affect the debt contract design of large public corporations rather than small firms.

Third, we show that behavioral biases can impact the structure of syndicated loans. The existing literature focuses mainly on neoclassical theories. For example, Bharath, Dahiya, Saunders,

[7] See Malmendier and Tate (2005a), Malmendier, Tate, and Yan (2011) and Graham et al. (2013), Banerjee, Humphery-Jenner, and Nanda (2015), Ben-David et al. (2013), Campbell, Gallmeyer, Johnson, Rutherford, and Stanley (2011), Deshmukh et al. (2013), Ferris, Jayaraman, and Sabherwal (2013), Galasso and Simcoe (2011), Gervais, Heaton, and Odean (2011), Goel and Thakor (2008), Hirshleifer, Low, and Teoh (2012), Ho, Huang, Lin, and Yen (2016), Inoue, Kato, and Yamasaki (2012), Lowe and Ziedonis (2006), Malmendier, Pezone, and Zheng (2016), Malmendier and Tate (2015), Puri and Robinson (2007) and Otto (2014). Baker, Ruback, and Wurgler (2004) provide an excellent survey of the earlier literature on behavioral corporate finance.

and Srinivasan (2011), Ivashina and Kovner (2011), and Prilmeier (2017) show that repeated interactions between borrowers and lenders can reduce information asymmetries, which can impact loan contract terms. Dass, Nanda, and Wang (2012) document that agency problems affect the syndicate structure. Erel, Julio, Kim, and Weisbach (2012) and Qian and Strahan (2007) analyze how macroeconomic conditions and laws and institutions shape debt contracts.[8] A notable exception is Dougal, Engelberg, Parsons, and Van Wesep (2015), who provide evidence consistent with anchoring and adjustment behavior of banks and borrowers in the syndicated loan market. That is, banks and/or borrowers use past deal terms as an anchoring point in negotiations. In contrast to this study we explicitly analyze one specific managerial trait, overconfidence, and provide evidence that it can help explain variations in loan types across borrowers.

Finally, our study is related to the literature on why firms buy or sell options. The prior literature mainly focuses on hedging and speculative motives, e.g., Adam and Fernando (2006), Adam (2009), Géczy, Minton, and Schrand (1997), and Jenter, Lewellen, and Warner (2011). We add to this literature by providing evidence that behavioral biases can affect how firms use derivatives.

1 Hypothesis Development

PSD can be thought of as regular debt plus a collar for each coupon payment, written on some performance measure, such as the issuer's credit rating or its leverage ratio. More concretely, a rate-increasing contract can be obtained by a long position of an at-the-money call and a short position of an out-of-the-money call. Since the at-the-money call is more valuable than the out-of-the-money call, including this structure in the loan contract delivers a premium to the borrower in the form of a lower initial coupon. A rate-decreasing contract can be obtained by a short position

[8] This discussion is not meant to be exhaustive, as the literature on syndicated loans is very large.

of an at-the-money put and a long position of an out-of-the-money put. Since the at-the-money put is more valuable than the out-of-the-money put, this structure delivers a premium to the lender. These two structures are shown in Figure 1. A mixed contract arises if the at-the-money options are replaced by in-the-money options.

Since the issuer's future performance is a random variable, the valuation of the collars depends on the distribution of the performance measure. If the issuer has biased expectations about this distribution while the contracts are priced rationally, then the collars implicit in the PSD will appear as either under- or overvalued to the issuer. For example, if the issuer expects the firm's performance to be better (a higher credit rating or lower future leverage) than a rational lender then a call on the issuer's performance measure will appear to be overvalued to the issuer, while a put will appear undervalued.[9] Any collar consisting of two calls will thus appear overvalued, while any collar consisting of two puts will appear undervalued. We follow Malmendier and Tate (2005a) and define overconfidence as an upward bias in a firm's future performance distribution. Thus, overconfident managers have a preference to sell collars consisting of two calls, i.e., issue rate-increasing PSD, and to buy collars consisting of two puts, i.e., issue rate-decreasing PSD. This argument delivers our first testable hypothesis.

Hypothesis 1: *Overconfident managers are more likely to issue PSD than rational managers.*

If managers issue PSD because they consider the performance-pricing provision to be mis-priced, due to their biased beliefs, then these managers should enter contracts that contain more of these mispriced options compared to rational managers who issue PSD for other reasons, e.g., signaling or debt renegotiation costs. In other words, overconfident managers should choose

[9] We assume throughout that all contracts are priced rationally and that lenders offer the same contract terms to biased and rational managers. We investigate the reasonableness of this assumption in *Hypothesis 5*. Should a lender take advantage of a borrower's biased beliefs and adjust the loan pricing accordingly, then we should be less likely to find evidence that biased beliefs affect the use of PSD.

performance-pricing provisions with steeper slopes.

Hypothesis 2: *Overconfident managers choose performance-pricing provisions with steeper slopes than rational managers.*

When testing *Hypotheses 1* and *2* we will mainly rely on Malmendier and Tate (2005a)'s longholder measure to infer whether a manager is overconfident or rational. Of course, longholder managers could in principle possess positive private information about their firms' future performances and therefore not exercise their stock options. To examine this possibility, we consider the performance of firms after they issued PSD. If longholder managers possess positive private information, then their firms' performances should improve on average following the PSD issue relative to rational managers. If longholder managers do not possess positive private information, then their firms' performances should not improve on average following the PSD issue.

Manso et al. (2010) hypothesize that PSD could be used as a signaling device of a firm's unobservable credit quality. In their model, high quality firms issue PSD to signal their superior performance and hence credit quality to outsiders. If rational managers issue PSD for signaling reasons then their firms' performances should improve on average following the PSD issue. Overconfident managers, in contrast, only perceive the future performance of their firms to be superior. Therefore, their post-issue performance should be worse than the post-issue performance of (rational) managers who use PSD for signaling. Thus, examining the post-PSD-issue performance of firms also helps to separate the behavioral bias hypothesis from the signaling hypothesis.

Hypothesis 3: *The post-issue performance of PSD-issuing firms led by overconfident managers does not exceed / is worse than the post-issue performance of PSD-issuing firms led by rational managers.*

The performance-pricing provision links a firm's performance directly to the spread paid on

PSD. Therefore, one can examine the post-issue performance also by analyzing its impact on the spreads of PSD. The previous discussion delivers a hypothesis analog to *Hypothesis 3*.

Hypothesis 4: *The loan spreads of PSD issued by overconfident managers rise more strongly than the loan spreads of PSD issued by rational managers.*

We assume throughout that lenders offer the same loan terms to rational and overconfident managers. This assumption is reasonable if lenders are not able to differentiate between overconfident and rational managers. Alternatively, even if lenders are able to differentiate between overconfident and rational managers, competition in the loan market may not allow lenders to discriminate based on borrower type (Bond et al. (2009)). To test this assumption we compare the initial loan spreads paid by rational and overconfident managers.

Hypothesis 5: *The initial loan spreads do not differ between rational and overconfident managers.*

As discussed in the introduction there are several neoclassical explanations of why firms issue PSD. Our aim is not to invalidate these explanations but to show that behavioral explanations have incremental explanatory power. Therefore, we use various firm and manager characteristics, as well as firm fixed effects, to control for these alternative, neoclassical explanations.

2 Data Description

In this section, we discuss the construction of the Malmendier and Tate (2005a) measure and describe the sample of loans used in our analysis.

2.1 Measuring Managerial Overconfidence

We follow Malmendier and Tate (2005a) and classify CEOs as either rational or overconfident based on their exercise behavior of executive stock options. According to Malmendier and Tate (2005a), executives are overconfident if they ever held a stock option until maturity, which was at least 40% in-the-money at the year-end prior to maturity (*Longholder*).[10] The motivation for this definition of overconfidence lies in an executive's incentive to diversify her personal wealth. Through their employment contracts, executives have a large portion of their personal wealth and human capital tied to the value of the company they work for. Reducing this exposure through short-selling their company's stock is usually prohibited. Therefore, rational executives should reduce the exposures from their stock and option holdings of the company if the vesting period has passed and the options are sufficiently deep in-the-money. Executives who do not exercise their deep in-the-money stock options may do so because they consider the option lost by exercise to be too valuable. Such a view can arise if a manager overestimates the firm's expected stock return. In this case, the manager believes that the firm's stock offers positive risk-adjusted returns and therefore does not want to diversify her holdings.

In principle, managers who do not exercise their in-the-money stock options may do so because of positive private information rather than biased views. Malmendier and Tate (2005a) test for this possibility but conclude that this is not the case on average. We revisit this issue by testing *Hypothesis 3* and *4*. Our results are consistent with those by Malmendier and Tate (2005a).[11]

The longholder measure makes a number of debatable assumptions, such as the moneyness

[10] 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.

[11] We can, of course, not rule out that some managers who we classify as biased correctly predicted the outperformance of their firms. There are just not very many of these types of managers in the sample, i.e., our results indicate that the average longholder indeed holds biased views.

threshold, and could in principle be correlated with other managerial and firm-specific factors that could affect the use of PSD. Malmendier and Tate (2005a) do test the robustness of their measure and provide evidence supporting their assumptions. We follow their approach and also test the robustness of our results to using different measures of identifying managerial biases. Another criticism is that the Malmendier and Tate (2005a) measure may be subject to measurement error because option exercise can also be affected by corporate control issues as shown by Fos and Jiang (2016). If executives exercise their stock options to increase their personal voting rights when corporate control issues arise, then these managers are less likely to be classified as overconfident by the Malmendier and Tate (2005a) measure. This possibility should bias our analysis against finding the predicted effects because some biased managers are misclassified as rational managers. A more serious problem could arise, however, if the occurrence of corporate control issues is correlated with the use of PSD. Perhaps managers who are concerned about hostile takeovers and therefore exercise their stock options more quickly use (rate-increasing) PSD to make leveraged takeovers more costly. This possibility would cause a negative correlation between the Malmendier and Tate (2005a) measure and the use of (rate-increasing) PSD. Since, our hypotheses suggest positive correlations, however, corporate control issues should make it harder for us to find evidence in support of behavioral theories.[12]

While the Malmendier and Tate (2005a) measure identifies potential biases with respect to

[12] Measurement error could also arise if managers fail to exercise their options because of inertia. We see, however, no reason why inertia should be systematically related to the use of PSD. If anything, inert managers may be less likely to choose complex debt forms such as PSD. If so, inertia would be negatively related to the use of PSD, which is opposite the behavioral bias hypothesis. It is also possible that managers who hold on to their stock options longer have lower levels of risk-aversions and hence choose riskier financing strategies such as PSD. While this is a potential alternative explanation in this setting, managers classified as being overconfident using the Malmendier and Tate (2005a) measure have been shown to exhibit several traits that are inconsistent with a lower degree of risk aversion. For instance, Malmendier and Tate (2005a) document that overconfident managers exhibit a *higher* investment-cash flow sensitivity and argue that lower risk aversion should, if anything, predict a *lower* investment-cash flow sensitivity since less risk-averse managers should be more willing to lever up their firms. We replicate the base "longholder results" of Malmendier and Tate (2005a) (Table VII) and confirm that the managers that we classify as being overconfident, if anything, exhibit a *higher* investment-cash flow sensitivity (untabulated). Hence, to the extent that the managers in our sample do not have different risk attitudes towards different financial policies, our results are unlikely to be driven by managers having a lower degree of risk aversion.

the distribution of a firm's stock returns, the performance-pricing provisions are contingent on a firm's performance measures (credit rating and leverage ratios). While these are different random variables, Ben-David et al. (2013) find that managers who have biased beliefs about stock returns in general also have biased beliefs about their own firms' projects. This implies that behavioral biases such as overconfidence are a general trait applying to a variety of different aspects rather than to only one.

To construct the Malmendier and Tate (2005a) measure we rely on ExecuComp to obtain information on executives' stock option grants, exercised options, and option holdings. ExecuComp contains data on individual stock option grants only after 2006. Before 2006, ExecuComp contains information on executives' options portfolios only in an aggregated form and not on a grant level. To avoid using different methods to construct the Malmendier and Tate (2005a) measure, we rely on the Hall and Liebman (1998) procedure to infer executives' stock option grants for our entire sample period.[13] From the 4,064 CEOs contained in ExecuComp between 2002 and 2010 we can construct option portfolios for 3,987 CEOs.[14] We follow Malmendier and Tate (2005a) and retain only CEOs in the sample who at least once have had the chance to reveal themselves as being biased, i.e., all CEOs in our sample (both rational and overconfident) at least once possessed a stock option, which could have moved 40% in-the-money during the CEO's tenure at his firm if the option had not been exercised. This reduces the number of CEOs in our sample to 1,857.

[13] See Appendix 1 in Hall and Liebman (1998) and the online appendix of this paper for further details.

[14] We follow Hall and Murphy (2002) and restrict the initial ExecuComp sample to managers that are included in ExecuComp ten years after ExecuComp's initial year, that is, 2002, and the years thereafter to ensure that we can backtrack option grants and exercises for managers for a sufficient period of time.

2.2 Loan Sample

We obtain loan contract information from LPC Dealscan for all companies for which the executive of the borrowing firm can be classified as either rational or overconfident.[15] This effectively reduces the sample to loans issued by large public companies because ExecuComp contains compensation data for the S&P 1,500 firms only. After merging with Dealscan we retain 1,199 unique CEOs in the sample. We then complement our loan sample with financial information of the borrowers obtained from COMPUSTAT.[16] We restrict our loan sample to the 1992-2010 period so that we can examine firm performance in the years after loan issuance. We exclude financial firms (SIC codes 6000-6999).

Dealscan reports information on the performance-pricing provisions, i.e., the pricing grid, which links the spread on the loan to a measure of the borrower's performance. To identify whether a pricing grid contract is rate-increasing or rate-decreasing, we define the following ratio.

$$\textit{Increase-to-Decrease Ratio} = \frac{S_{Initial} - S_{Min}}{S_{Max} - S_{Min}}. \tag{1}$$

$S_{Initial}$ is the spread paid at contract inception and S_{Max} (S_{Min}) is the highest (lowest) spread defined in the pricing grid. If the ratio equals zero (one), then the pricing grid allows for rate increases (decreases) only. A ratio between zero and one implies that the PSD contract contains both rate-increasing and rate-decreasing segments. We define a contract as mostly increasing if the ratio is between 0 and 1/3, as mostly decreasing if the ratio is between 2/3 and 1, and as mixed if the ratio is between 1/3 and 2/3. We choose to define contracts as mostly in(de)creasing rather

[15] As is common in the literature, the loan panel is created on the facility (tranche) level (see Berg, Saunders, and Steffen (2016), and Bharath, Dahiyab, Saunders, and Srinivasan (2007)).

[16] 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.

than purely in(de)creasing so that the mixed category does not become too heterogeneous.[17]

Figure 2 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. IBM's senior debt rating at the time of the issue was A+.[18]

[Figure 2 here]

2.3 Descriptive Statistics

We provide descriptive statistics of borrower and loan characteristics in Table 1, and divide the sample into firms managed by rational (Longholder = 0) and overconfident (Longholder = 1) managers. The Appendix contains detailed descriptions of all variables used. 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. Firms with overconfident managers are on average smaller and have higher market-to-book ratios than firms with rational managers. The other borrower characteristics are similar.

Panel B.1 provides descriptive statistics of the general loan characteristics. Average loan amounts are large. The average loan amount is $540 million (median: $250 million) for both groups. The descriptive statistics also show that the unconditional probabilities of issuing PSD are 53% for rational managers and 57% for overconfident managers. This is a difference of 4 percentage points or 7.5%.

[17] We do check the robustness of our results by using a purely in(de)creasing categorization. Our results remain qualitatively similar. In the following we refer to *mostly* in(de)creasing PSD simply as in(de)creasing PSD.

[18] Since the increase-to-decrease ratio equals 0.05, we classify this PSD as a mostly rate-increasing contract.

Panel B.2 provides loan characteristics for the subset of performance-sensitive loans. In about 40% of contracts the performance measure is the issuers' credit rating, while 60% of contracts are based on some accounting ratio such as leverage. On average, the frequencies of issuing rate-increasing, rate-decreasing and mixed PSD are roughly equal. However, firms managed by overconfident managers seem to issue more rate-increasing and less rate-decreasing PSD compared to firms managed by rational managers.

[Table 1 here]

3 Managerial Overconfidence and Performance-Sensitive Debt

3.1 Performance-Sensitive vs. Regular Debt

In this section, we analyze the relationship between managerial overconfidence and the use of PSD. We begin by estimating the following logit regression model.

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

The dependent variable, PSD, is a dummy variable, which equals one if the loan contract includes a performance-pricing provision, and zero otherwise. $Longholder$ is a dummy variable, which equals one if the borrowing firm is managed by an overconfident manager, and zero if it is managed by a rational manager. X is a vector of borrower characteristics and Y a vector of loan characteristics to control our analysis for differences in borrower and loan types.[19] We also

[19] The subscript $t-1$ of X indicates that we obtain borrower information from the last available fiscal year *before* the loan issue.

include year, industry (2-digit SIC level), credit rating (notch), loan purpose, and loan type fixed effects in the above regression. In one specification we also include bank fixed effects to control for the possibility that the use of PSD is supply driven.

[Table 2 here]

The results, reported in Table 2, suggest that managerial traits are significantly correlated with a firms' decision to issue PSD. Loans issued by overconfident managers are about 6 percentage points more likely to contain performance-pricing provisions than loans issued by rational managers. This is an economically meaningful difference given the unconditional probability of using PSD of about 50%. The control variables further indicate that smaller firms are more likely to issue PSD than larger firms. Larger loans and loans with longer maturities are also 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 problems (see Asquith et al. (2005), Manso et al. (2010)), which are more significant when smaller borrowers issue larger loans.

[Table 3 here]

Next, we examine whether the higher likelihood of using PSD by overconfident managers is driven by rate-increasing or rate-decreasing PSD. Table 3 shows the regression results of a multinomial logit model, in which the dependent variable is equal to one of four values: 0 for regular debt, 1 for (mainly) rate-increasing PSD, 2 for mixed PSD, and 3 for (mainly) rate-decreasing PSD. The effect reported in Table 2 is in fact driven by a preference of overconfident managers for rate-increasing PSD contracts only. Overconfident managers are about 4 percentage points more

likely to use rate-increasing PSD than regular debt, while we find no significant correlations between managerial overconfidence and mixed or rate-decreasing PSD. These findings suggest that the managers identified as being overconfident have an asymmetric preference for different PSD types. Overconfident managers are more likely to choose contracts that offer an immediate reduction in the loan spread by exposing their firms to a larger downside risk (rate-increasing PSD), but are not more likely to pay a larger initial spread for the option of a spread reduction in the future (rate-decreasing PSD). One possible explanation for this finding could be that managers who overestimate the mean of their firm's future performance distribution also underestimate the variance. Ben-David et al. (2013), for instance, find that managers who are optimistic about their firms' financials also give too narrow confidence intervals when asked to forecast future market-wide stock returns, i.e., they underestimate the variance of risky processes. The reason this is relevant here is because an underestimation of the variance of a firm's future performance distribution will cause the manager to believe that options are priced too expensively. This would induce a preference to sell options, as is the case if they issue rate-increasing PSD, rather than to buy options, as is the case if they issue rate-decreasing PSD.

Even though we use a long list of control variables in the estimation of equation (2), we cannot rule out the possibility that unobservable, time-invariant factors drive our results. We therefore re-estimate the regressions in Table 3 by replacing the industry-fixed effects with firm-fixed effects. The results reported in Table 4 show that our previous results prevail, even if we limit the sample to cases, in which a rational manager is replaced by an overconfident manager or vice versa.[20]

[Table 4 here]

[20] Note that we report odds ratios in Table 4 because marginal effects cannot be obtained for fixed-effects logit models.

3.2 The Slope of the Pricing Grid

The literature has shown that firms issue PSD for a variety of reasons (transaction costs, signaling, moral hazard). In principle, these reasons apply to both rational and overconfident managers. For overconfident managers, however, there is an additional reason to negotiate performance-pricing provisions: due to their biased beliefs overconfident managers view the options implicit in these provisions to be mispriced. All else equal, overconfident managers should therefore issue PSD, which contains more of these mispriced options than rational managers. PSD with more implicit options implies that the slope of the pricing grid is steeper. We therefore analyze if the slope of the PSD pricing grid is related to managerial overconfidence.

Figure 3 shows the average relative pricing grids of PSD issued by overconfident and rational managers. The relative spread is defined as the actual spread paid at each credit rating divided by the spread paid if the credit rating were AAA. This is to ensure comparability across time since credit spreads are time-variant. The graph indicates that the difference between the maximum and the minimum spreads is on average higher if the PSD contract was issued by an overconfident manager rather than by a rational manager. This shows that overconfident managers issue PSD with steeper pricing grids than rational managers.[21] Of course, the graphical evidence serves as a first indication only, as firms with overconfident managers may differ on many other characteristics from firms with rational managers.

[Figure 3 here]

To analyze the PSD structure in a multivariate setting, we follow Tchistyi et al. (2011) and calculate the slope of the pricing grid. We benchmark the slope of the pricing grid against the market

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

interest rates for different credit ratings. Since market interest rates are available for different credit ratings but not for individual leverage ratios, we calculate the slope measures for rating-based PSD only. A slope of one implies that the pricing grid reflects the market interest rates at the time of the loan issue. A slope measure greater than one indicates that the coupon rate is more sensitive to rating changes than market interest rates at the time of the loan issue. To differentiate between up- and downgrade effects we further calculate slope measures separately for the rate-increasing and the rate-decreasing regions of the pricing grid. Similar to Tchistyi et al. (2011), we calculate a local slope considering pricing steps directly adjacent to the initial spread only, and an average slope considering all pricing steps. The local slope is defined as follows,

$$LocalSlope = \left(\frac{S_{i-1} - S_i}{Bond_{i-1} - Bond_i} + \frac{S_i - S_{i+1}}{Bond_i - Bond_{i+1}} \right) /2, \tag{3}$$

where S_i is the spread that the borrower pays at the initial rating i. S_{i-1} (S_{i+1}) is the spread, which the borrower pays at the next worse (better) rating notch. $Bond_i$ denotes a bond market index at rating i.[22] The average slope is calculated similarly by using all spread changes defined in the pricing grid. We follow Tchistyi et al. (2011) and define the slope of fixed rate debt to be zero.[23] Figure 4 illustrates the calculation of the slope measures.

[Figure 4 here]

The OLS regression results relating the slope of rating-based PSD contracts to managerial overconfidence are reported in Table 5. We address skewness in the slope measure by using $ln(Slope)$

[22] We use the Bloomberg Bond Market Index for the calculation of the slopes of the pricing grids.

[23] Both the economic and statistical significance of our results remains unaffected if we use a Tobit specification with zero as the lower bound.

in the regressions.

[Table 5 here]

The results in Table 5 show that PSD issued by overconfident managers has significantly larger (local) slopes than PSD issued by rational managers. This evidence supports *Hypothesis 2*. Consistent with a particular preference of overconfident managers for rate-increasing PSD, as documented in Section 3.1, the effect is concentrated over regions of rating downgrades (*Local Slope Int.-Increasing Segment*). This means that overconfident managers choose pricing grids, which allow for larger interest rate increases (relative to current market yields) than PSD contracts chosen by rational managers. The difference between the Longholder coefficient in Column 2 and Column 3 is statistically significant. Results for the average slope measures are qualitatively similar to those for the local slope measures but statistically weaker. To summarize, overconfident managers choose pricing grids with steeper slopes compared with the slopes of the pricing grids chosen by rational managers.

3.3 Post Debt Issue Performance

In this section we examine the borrowers' post debt issue performance. In Section 3.3.1 we focus on a firm's financial performance in terms of its debt-to-EBITDA ratio and its credit rating, while in Section 3.3.2 we focus on the loan spread development.

3.3.1 Post Issue Financial Performance

It is possible that overconfident managers possess positive private information, and use PSD to signal this information to the market rather than issue PSD because they think it is mispriced. To

rule out this possibility, we examine firms' post PSD issue performance. If the behavioral bias hypothesis is correct then firms should not see an improvement in their performances following a PSD issue on average (*Hypothesis 3*). In fact, if rational managers use PSD for signaling then firm performance of Longholder managers should be worse relative to rational managers using PSD. To examine firms' post-issue performance we estimate the following model.

$$\begin{aligned}
&\Delta \textit{Performance}_{it+k} = \alpha \\
&\quad + \beta_1 * \textit{Longholder}_{it} * \textit{PSD(Increasing)}_{it} + \beta_2 * \textit{Longholder}_{it} * \textit{PSD(Mixed)}_{it} \\
&\quad + \beta_3 * \textit{Longholder}_{it} * \textit{PSD(Decreasing)}_{it} + \beta_4 * \textit{PSD(Increasing)}_{it} \\
&\quad + \beta_5 * \textit{PSD(Mixed)}_{it} + \beta_6 * \textit{PSD(Decreasing)}_{it} + \beta_7 * \textit{Longholder}_{it} \\
&\quad + \gamma * X'_{it-1} + \delta * Y'_{it} + \epsilon_{it}.
\end{aligned} \tag{4}$$

$\Delta Performance_{it+k}$ is the change in the financial performance of borrower i over the k years after the issue ($k = 1, ..., 5$).[24] We measure performance by a firm's debt-to-EBITDA ratio and a firm's credit rating, which are the two most commonly used performance measures in PSD contracts and together account for over 75% of all PSD issues in our sample: $\Delta Debt - to - EBITDA_{ik}$ is the difference between the borrowers' debt-to-EBITDA ratio in year k and the debt-to-EBITDA ratio in the year of the loan issue. $\Delta Rating_{ik}$ is a dummy variable, which equals one if the borrowers' credit rating in year k is below the borrowers' credit rating in the year of the loan issue. We ensure that the analyzed performance measure matches the performance measure used in the pricing grid. That is, we analyze post-issue changes in the debt-to-EBITDA ratio for the set of debt-to-EBITDA-based PSD contracts and analyze changes in the issuer credit rating for the

[24] We focus on a 5-year window after a loan issue because the median maturity of the loans in our sample is about 4.5 years.

set of rating-based PSD contracts. In both cases straight debt contracts are included as the control group. Given that overconfident managers may have different preferences with respect to rate-increasing and rate-decreasing contracts (see Section 3.2), we use interaction terms to differentiate between these contract types.

[Tables 6 and 7 here]

The results reported in Table 6 show that in the years following a rate-increasing PSD issue the debt-to-EBITDA ratio of firms with overconfident managers rises relative to firms with rational managers. This effect is economically large. A change of 0.8 (~change over the first three years) represents about 35% of the average debt-to-EBITDA ratio in the sample at the time of the loan issue, which is about 2.3.[25]

In Table 7 we replicate the performance analysis for rating-based PSD. The results show that firms with overconfident managers are more likely to be downgraded following a rate-increasing PSD issue compared to PSD-issuing firms with rational managers. The effect is statistically significant four and five years after the PSD issue and is economically large. Firms with overconfident managers are about 12-13% more likely to be downgraded four to five years following a rate-increasing PSD issue compared to PSD-issuing firms with rational managers. Given the common delay in rating changes it is not surprising that we do not find immediate effects.

The results in Tables 6 and 7 are inconsistent with the possibility that overconfident managers possess positive private information about their firm's future performance and are therefore unlikely to use PSD for signaling reasons.

[25] A potential concern is that overconfident managers invest more than rational managers and finance this additional investment with debt rather than equity. This could partially explain the changes in the debt-to-EBITDA ratio we observe. However, if overconfident managers anticipate that investment and debt will increase then they should refrain from issuing PSD, because these policies would tend to increase the debt-to-EBITDA ratio and thus drive up the cost of PSD. Empirically, we find no differences in the levels of investment following PSD issues between overconfident and rational managers (untabulated).

3.3.2 Post Issue Spread Development

Another way to look at performance is to examine its impact on the loan spreads of PSD. If the worsening of a firm's performance, as documented in Section 3.3.1, is sufficiently strong it could trigger spread increases. These, according to *Hypothesis 4*, should rise more strongly for overconfident than for rational managers.

To obtain an estimate of the spread change for each PSD contract we multiply the slope of the pricing grid by the actual change in the issuer's debt-to-EBITDA ratio or the actual change in the issuer's credit rating. We approximate the slope of the pricing grid by the average spread change (in bps) per unit change in the performance measure underlying the pricing grid. To ensure that the imputed spreads are not outside the range defined by the pricing grid we cap them from above (below) by the maximum (minimum) spread defined in the grid. We then regress the spread changes on PSD type and manager type as well as a host of control variables and various fixed effects (cf. Tables 6 and 7).[26] The results are reported in Table 8.

[Table 8 here]

Firms issuing rate-increasing PSD experience an increase in the loan spread by about 4 to 10 bps over the five years following the PSD issue, while firms issuing rate-decreasing PSD experience a spread decrease by about 20 to 34 bps over the same period. The direction of these spread changes is to be expected because the spread can only increase (decrease) or remain unchanged for rate-increasing (rate-decreasing) PSD. These spread changes are economically meaningful given that the average initial all-in-drawn-spread for rate-increasing (rate-decreasing) contracts in the

[26] We retain straight debt contracts as a control group in the analysis. The post issue spread changes are zero for straight debt per definition.

sample is 75 (204) bps. This implies relative spread increases (decreases) by 5-13% (10-17%) for rate-increasing (rate-decreasing) PSD contracts.

More importantly, the analysis reveals that overconfident managers issuing rate-increasing PSD experience a 40-60% larger spread increase (by 2-6 bps) relative to rational managers following PSD issues. This implies that the performance deterioration we documented in the previous section is large enough to trigger significantly larger spread increases among overconfident managers. Consistent with our previous findings that overconfident managers have a particular preference for issuing rate-increasing PSD but not for rate-decreasing or mixed PSD, we find no significant effects for the latter two PSD types.

Next we ask whether overconfident managers, given their preferences for steeper pricing grids, are more likely to experience tail risk events, i.e., particularly strong and costly spread increases, than rational managers. We define any spread increase of more than +50 bps as a severe spread change. Given an average loan size of about 540 million USD, this spread increase corresponds to additional interest expenses of 2.7 million USD per year. The unconditional probability of observing such a spread change is 10-15% in our sample.[27] We estimate a logit regression to examine whether overconfident managers have a higher probability of experiencing severe spread increases than rational managers. The results are reported in Table 9.

[Table 9 here]

The results indicate that firms with overconfident managers are about 2.5-8 percentage points more likely to experience a severe spread increase following the PSD issue compared to firms with

[27] A spread increase above +50 bps corresponds to the 90th percentile in the first three years following a PSD issue. The unconditional probability of observing such a large spread increase is somewhat higher 4 - 5 years after a PSD issue.

rational managers.[28] Given the unconditional probability of observing a severe spread increase of 10-15% this effect is economically large.[29]

In summary, our results indicate that compared to rational managers overconfident managers, (i) experience larger spread increases following the issue of rate-increasing PSD on average, and (ii) are more likely to experience severe spread increases following the issue of rate-increasing PSD. These results are inconsistent with the possibility that overconfident managers possess positive private information about their firm's future performance.

3.4 The Initial Loan Spread

Finally, we examine the initial contract terms of PSD because we assumed throughout that lenders offer the same loan terms to rational and overconfident managers. Figure 1 shows that in rate-increasing contracts borrowers are net sellers of options, while in rate-decreasing contracts borrowers are net buyers of options. This implies that irrespective of borrower type the initial spread should be lower (higher) for rate-increasing (rate-decreasing) PSD compared to straight debt without implicit options. We test this prediction by regressing the initial loan spread on PSD type, a host of control variables and fixed effects to control for unobservable contract differences between PSD and regular debt.

[Table 10 here]

The results reported in Column 1 of Table 10 indicate that the initial spread for rate-increasing

[28] Note that the likelihood of observing an extreme spread increase increases over time. In particular in the first year many observations are omitted from the estimation given the large number of fixed effects that are included in the estimation and the insufficient variation of the dependent variable within the clusters. Hence, the number of observations is larger for the later years.

[29] Consistent with a differential effect of managerial biases on rate-increasing and rate-decreasing PSD, we do not find any evidence that overconfident managers are more likely to experience particularly strong interest rate reductions after issuing rate-decreasing PSD (untabulated).

PSD is 35 bps below the spread of straight debt contracts after controlling for loan and borrower characteristics. The initial spread for rate-decreasing PSD is 8.5 bps above the spread for straight debt contracts. These results are consistent with rate-increasing contracts borrowers being net sellers of options, while in rate-decreasing contracts borrowers are net buyers of options.

In Column 2 of Table 10 we interact the PSD type variables with the Longholder dummy to allow for different spreads for overconfident and rational managers. The results indicate that there are no statistically significant differences in the initial spreads between rational and overconfident managers, which is consistent with *Hypothesis 5*. All firms receive similar initial spreads, which only depend on firm and loan characteristics, but are independent of manager type. In a final test, we restrict our analysis to loan packages that contain both PSD and regular debt tranches. This allows us to compare the initial spreads of PSD and regular debt of the same issuer and at the same time. Despite the reduced number of observations we find that the initial spread for rate-increasing PSD is approx. 20 bps below the spread of straight debt tranches and there are no observable spread differences between overconfident and rational managers. Taken together the results reported in Table 10 suggest that the initial spread discount for rate-increasing PSD is in the range of 20 to 35 bps, both for loans issued by overconfident managers and loans issued by rational managers.

We conclude from these results that lenders either do not observe the managerial biases of their clients at the time of the loan issue (and hence cannot discriminate based on this attribute), or do not discriminate because of strong bank competition for example, which forces lenders to offer the same loan terms to all their clients irrespective of their beliefs. Since the syndicated loan market is highly competitive, with mostly large loans to public corporations, this argument seems applicable here. While lenders may not benefit from the overconfidence of their clients ex-ante, they may benefit ex-post. As we have seen in Tables 8 and 9, the spreads of PSD issued by overconfident

managers increase faster than the spreads of PSD issued by rational managers.

Comparing the initial loan spread with the subsequent spread increases, we note that rational managers benefit from rate-increasing PSD by an initial spread reduction of 20-35 bps, while subsequently the loan spreads increase by up to 10 bps on average. Overconfident managers benefit from the same initial spread reduction, while their loan spreads increase by up to 16 bps on average. While this is clearly a worse ex-post performance, overconfident managers appear to still gain ex-post from issuing PSD, although smaller in magnitude compared to rational managers, on average.

One may wonder why any rational manager would issue regular debt if PSD seemingly offer better overall loan terms. Different loan terms, however, are consistent with the adverse selection model by Manso et al. (2010), in which good type managers issue PSD and bad type managers issue regular debt. In this separating equilibrium PSD issuers receive overall better loan terms than regular debt issuers. However, our regression results do not allow one to make statements about the overall loan terms because we consider the initial and subsequent loan spreads only. Due to data limitations, we are forced to ignore specific loan fees, such as upfront fees, which affect total costs. As a result, we cannot make inferences about loans' overall costs from our regressions results, and argue that a particular type of borrower would be better off by switching strategies.

The initial spread discount range for rate-increasing PSD of 20 to 35 bps is, however, below the severe post issue spread increase of more than +50 bps analyzed in Table 9. We confirm that rate-increasing PSD issues with such severe post-issue spread increases do not have significantly different/lower initial spreads compared to other rate-increasing PSD issues (untabulated). That is, events where the loan spread increased by more than +50 bps post issue likely are instances where the borrower experienced a net loss from issuing rate-increasing PSD.

In summary, we document that overconfident managers gain less from issuing rate-increasing

PSD than rational managers and that overconfident managers are significantly more likely to experience instances of severe spread increases following the issue of rate-increasing PSD. In these cases PSD likely turned out to be a costly financing choice ex post. These results are inconsistent with the possibility that overconfident managers possess positive private information about their firm's future performance.

4 Robustness

4.1 Alternative Measures of Managerial Biases

The Malmendier and Tate (2005a) measure of overconfident managers is subject to various measurement errors as discussed previously. Furthermore, the construction of the Malmendier and Tate (2005a) measure is in some regards ad hoc. We therefore, test the robustness of our results by employing different proxies for managerial overconfidence. For example, we check whether our results are robust to different moneyness thresholds in the original longholder definition by Malmendier and Tate (2005a), to relaxing the assumption that overconfidence is a manager fixed effect, and to alternative methods of identifying biased managers.

[Table 11 here]

According to Malmendier and Tate (2005a), managers are overconfident if they ever held an executive stock option until maturity, which was at least 40% in-the-money. Obviously, the 40% threshold is somewhat arbitrary. But even if we use more conservative moneyness thresholds of 60% and 100% our previous results prevail as shown in Column 1 and 2 of Table 11. Firms managed by overconfident managers are more likely to include a rate-increasing performance-pricing

provision in their loan contracts than firms managed by rational managers.[30] The coefficient is not statistically significant when we use the 100% threshold. However, assuming a 100% moneyness threshold is very restrictive and leads to few managers being identified as biased.

Next, we follow Malmendier and Tate (2008) and distinguish between the time before and after a biased manager has ever shown evidence of being biased. The motivation for this separation is to justify the treatment of the managerial bias as a time-invariant, personal characteristic. *Pre-Longholder* refers to the time period before an executive ever held an executive stock option until the final maturity year that was at least 40% in-the-money. *Post-Longholder* refers to the time period thereafter. Column 3 of Table 11 shows that biased managers are significantly more likely to use PSD than rational managers, both before and after they are classified by the Malmendier and Tate (2005a) algorithm. This finding supports the assumption that overconfidence is indeed a time-invariant, personal characteristic.

In Column 4 of Table 11 we use a different identification method of managerial biases, proposed by Malmendier and Tate (2005b). According to this method, managers are classified as biased if they hold stock options that are at least 67% in the money five years after the respective option grant. A manager needs to show this behavior at least twice during her tenure to be classified as overconfident. Malmendier and Tate (2005b) refer to this measure as *Holder 67*.[31] Using the *Holder 67* measure instead of the longholder variable does not affect our previous conclusions.

Next, we use the identification method of managerial biases proposed by Sen and Tumarkin (2015). Instead of analyzing executives' option exercise behavior, this method examines executives' stock holdings. In particular, Sen and Tumarkin (2015) show theoretically that a manager

[30] We focus on the choice between rate-increasing PSD and straight debt here to save space. Our previous results indicate that there is no significant correlation between managerial biases and mixed or rate-decreasing PSD. This is also the case if the alternative managerial bias classifications are used. These results are available upon request.

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

will retain shares received from exercising company stock options if and only if she has biased views. An executive is classified as biased if the cumulative shares retained by the manager on option exercise days during a fiscal year exceeds 1% and zero otherwise. The intuition for this definition is similar to Malmendier and Tate (2005a)'s longholder definition. 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.

One notable difference between the *Share Retainer* variable proposed by Sen and Tumarkin (2015) and the longholder definition by Malmendier and Tate (2005a) is that *Share Retainer* does not assume that the behavioral bias is a time-invariant, personal characteristic of the executive. Loan issues are repeated events and firms usually pursue longer-term financing strategies. Hence, a time-variant measure, where managers are allowed to switch from being biased to being rational, may underestimate the true effect in our setting. We therefore also report results assuming that the share retainer behavior is a fixed effect. In particular, we additionally define *Share Retainer FE* as a dummy variable, which equals one for firms with managers that at least once exhibit the share retainer behavior, and zero otherwise.[32] The results are reported in Columns 5 and 6 of Table 11. While *Share Retainer* is uncorrelated with the use of PSD, *Share Retainer FE* is highly statistically significant with an economic magnitude that is comparable to the other specifications. This finding again indicates that behavioral biases are likely time-invariant, personal characteristics of the managers. In summary, our findings are robust to several alternative managerial bias specifications.

[32] The *Share Retainer* variable is publicly available at www.tumarkin.net. The measure is provided at the firm-year level and not the manager-year level. We therefore define *Share Retainer FE* as a firm-fixed effect. One can think of this measure as a comparison of firms that are prone to be managed by biased managers and firms that are prone to be managed by rational managers. Our results remain virtually unchanged if we require that the managers of a firm exhibit the share retainer behavior at least two/three times.

4.2 Manager Characteristics

It is possible that the Malmendier and Tate (2005a) identifies more risk-tolerant managers. These managers may choose PSD because this form of debt is riskier than regular debt. Since this could be an alternative explanation for our results, we control our analysis for differences in the risk-aversion of managers.

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 manager age and education are 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, Klebanov, and Sorensen (2012) find that general manager ability and execution skills matter in buyout and venture capital transactions. To address the concern that the longholder measure may be correlated with manager characteristics that also affect risk-taking and therefore the decision to issue PSD, we explicitly control for manager age, tenure, gender, and education in this section.

In addition to personal managerial characteristics, executive compensation plans may 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 longholder measure and managerial compensation, we explicitly control for the delta and vega of the manager's stock option portfolio.[33]

[Table 12 here]

[33] We follow Core and Guay (2002) in calculating delta and vega.

The regression results are reported in Table 12. The only variable that is significantly correlated with the decision to issue PSD after controlling for several manager characteristics is the longholder variable. The other personal characteristics, as well as the delta and the vega of the manager'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 the longholder measure is positively correlated with a larger general risk preference by those executives.

5 Conclusion

This paper explores the impact of managerial biases such as overconfidence on debt contract design in the syndicated loan market. In particular, we focus on the use of performance-pricing provisions, which are common but under-researched contract features in corporate loans. We find that executives with biased views as identified by Malmendier and Tate (2005a) are more likely to issue rate-increasing performance-sensitive debt (PSD) than rational managers. Furthermore, we find that managers with behavioral biases choose contracts with higher performance-pricing sensitivities, i.e., pricing grids with steeper slopes. Finally, we find that firms managed by overconfident managers perform worse after a PSD issue compared to firms managed by rational managers.

These results are consistent with the hypothesis that overconfident managers view PSD as mispriced and therefore a relatively cheap source of funding. Our results are inconsistent with the possibility that overconfident managers possess positive inside information about their firms and use PSD for signaling. Our evidence is also inconsistent with the possibility that risk-tolerance of managers or convexity in managerial compensation packages impact the use of PSD by biased managers. Overall, our results suggest that behavioral biases can have a significant impact on debt contract design in the syndicated loan market.

References

Adam, T. R. (2009). Capital expenditures, financial constraints, and the use of options. *Journal of Financial Economics 92*(2), 238–251.

Adam, T. R. and C. S. Fernando (2006). Hedging, speculation and shareholder value. *Journal of Financial Economics 81*(2), 283–309.

Adam, T. R. and D. Streitz (2016). Hold-up and the use of performance sensitive debt. *Journal of Financial Intermediation 26*(1), 47–67.

Asquith, P., A. Beatty, and J. Weber (2005). Performance pricing in bank debt contracts. *Journal of Accounting and Economics 40*(1-3), 101–128.

Baker, M., R. S. Ruback, and J. Wurgler (2004). Behavioral corporate finance: A survey. Working Paper 10863, National Bureau of Economic Research.

Banerjee, S., M. Humphery-Jenner, and V. Nanda (2015). Restraining overconfident CEOs through improved governance: Evidence from the sarbanes-oxley act. *Review of Financial Studies 28*(10), 2812–2858.

Beatty, A. and J. Weber (2003). The effects of debt contracting on voluntary accounting method changes. *Accounting Review 78*(1), 119–142.

Beber, A. and D. Fabbri (2012). Who times the foreign exchange market? Corporate speculation and CEO characteristics. *Journal of Corporate Finance 18*(5), 1065 – 1087.

Ben-David, I., J. R. Graham, and C. R. Harvey (2013). Managerial miscalibration. *Quarterly Journal of Economics 128*(4), 1547–1584.

Berg, T., A. Saunders, and S. Steffen (2016). The total costs of corporate borrowing: Don't ignore the fees. *Journal of Finance 71*(3), 1357–1392.

Bertrand, M. and A. Schoar (2003). Managing with style: The effect of managers on firm policies. *Quarterly Journal of Economics 118*(4), 1169–1208.

Bharath, S., S. Dahiyab, A. Saunders, and A. Srinivasan (2007). So what do I get? The bank's view of lending relationships. *Journal of Financial Economics 85*(2), 368–419.

Bharath, S. T., S. Dahiya, A. Saunders, and A. Srinivasan (2011). Lending relationships and loan contract terms. *Review of Financial Studies 24*(4), 1141–1203.

Bond, P., D. K. Musto, and B. Yilmaz (2009). Predatory mortgage lending. *Journal of Financial Economics 94*(3), 412–427.

Campbell, T. C., M. Gallmeyer, S. A. Johnson, J. Rutherford, and B. W. Stanley (2011). CEO optimism and forced turnover. *Journal of Financial Economics 101*(3), 695–712.

Chava, S. and M. R. Roberts (2008). How does financing impact investment? The role of debt covenants. *Journal of Finance 63*(5), 2085 – 2121.

Core, J. and W. Guay (2002). Estimating the value of employee stock option portfolios and their sensitivities to price and volatility. *Journal of Accounting Research 40*(3), 613–630.

Dass, N., V. Nanda, and Q. Wang (2012). Within-syndicate conflicts and financial contracts: Evidence from bank loans. Working paper, Scheller College of Business, Georgia Institute of Technology.

Deshmukh, S., A. Goel, and K. Howe (2013). CEO overconfidence and dividend policy. *Journal of Financial Intermediation 22*(3), 440–463.

Dougal, C., J. Engelberg, C. A. Parsons, and E. D. Van Wesep (2015). Anchoring on credit spreads. *Journal of Finance 70*(3), 1039–1080.

Erel, I., B. Julio, W. Kim, and M. S. Weisbach (2012). Macroeconomic conditions and capital raising. *Review of Financial Studies 25*(2), 341–376.

Ferris, S. P., N. Jayaraman, and S. Sabherwal (2013). CEO overconfidence and international merger and acquisition activity. *Journal of Financial and Quantitative Analysis 48*(1), 137–164.

Fos, V. and W. Jiang (2016). Out-of-the-money CEOs: Private control premium and option exercises. *Review of Financial Studies 29*(6), 1549–1585.

Galasso, A. and T. S. Simcoe (2011). CEO overconfidence and innovation. *Management Science 57*(8), 1469–1484.

Géczy, C., B. A. Minton, and C. Schrand (1997). Why firms use currency derivatives. *Journal of Finance 52*(4), 1323–1354.

Gervais, S., J. B. Heaton, and T. Odean (2011). Overconfidence, compensation contracts, and capital budgeting. *Journal of Finance 66*(5), 1735–1777.

Goel, A. and A. Thakor (2008). Overconfidence, CEO selection, and corporate governance. *Journal of Finance 63*(6), 2737–2784.

Graham, J. R., C. R. Harvey, and M. Puri (2013). Managerial attitudes and corporate actions. *Journal of Financial Economics 109*(1), 103–121.

Hall, B. and J. Liebman (1998). Are CEOs really paid like bureaucrats? *Quarterly Journal of Economics 113*(3), 653–691.

Hall, B. J. and K. J. Murphy (2002). Stock options for undiversified executives. *Journal of Accounting and Economics 33*(1), 3–42.

Hirshleifer, D., A. Low, and S. H. Teoh (2012). Are overconfident CEOs better innovators? *Journal of Finance 67*(4), 1457–1498.

Ho, P.-H., C.-W. Huang, C.-Y. Lin, and J.-F. Yen (2016). CEO overconfidence and financial crisis: Evidence from bank lending and leverage. *Journal of Financial Economics 120*(1), 194–209.

Huang, J. and D. J. Kisgen (2013). Gender and corporate finance: Are male executives overconfident relative to female executives? *Journal of Financial Economics 108*(3), 822–839.

Huang, R., K. J. K. Tan, and R. W. Faff (2016). CEO overconfidence and corporate debt maturity. *Journal of Corporate Finance 36*(1), 93–110.

Humphery-Jenner, M., L. L. Lisic, V. Nanda, and S. D. Silveri (2016). Executive overconfidence and compensation structure. *Journal of Financial Economics 119*(3), 533–558.

Inoue, K., H. K. Kato, and T. Yamasaki (2012). Managerial overconfidence: Evidence from japanese CEOs. Working paper, Tokyo Institute of Technology.

Ivashina, V. and A. Kovner (2011). The private equity advantage: Leveraged buyout firms and relationship banking. *Review of Financial Studies 24*(4), 2462–2498.

Jenter, D., K. Lewellen, and J. B. Warner (2011). Security issue timing: What do managers know, and when do they know it? *Journal of Finance 66*(2), 413–443.

Kaplan, S. N., M. M. Klebanov, and M. Sorensen (2012). Which CEO characteristics and abilities matter? *Journal of Finance 67*(3), 973–1007.

Landier, A. and D. Thesmar (2009). Financial contracting with optimistic entrepreneurs. *Review of Financial Studies 22*(1), 117–150.

Lowe, R. A. and A. A. Ziedonis (2006). Overoptimism and the performance of entrepreneurial firms. *Management Science 52*(2), 173–186.

Malmendier, U., V. Pezone, and H. Zheng (2016). Managerial duties and managerial biases. Working paper, UC Berkeley.

Malmendier, U. and G. Tate (2005a). CEO overconfidence and corporate investment. *Journal of Finance 60*(6), 2661–2700.

Malmendier, U. and G. Tate (2005b). Does overconfidence affect corporate investment? CEO overconfidence measures revisited. *European Financial Management 11*(5), 649–659.

Malmendier, U. and G. Tate (2008). Who makes acquisitions? CEO overconfidence and the market's reaction. *Journal of Financial Economics 89*(1), 20–43.

Malmendier, U. and G. Tate (2015). Behavioral CEOs: The role of managerial overconfidence. *Journal of Economic Perspectives 29*(4), 37–60.

Malmendier, U., G. Tate, and J. Yan (2011). Overconfidence and early-life experiences: The effect of managerial traits on corporate financial policies. *Journal of Finance 66*(5), 1687–1733.

Manso, G., B. Strulovici, and A. Tchistyi (2010). Performance-sensitive debt. *Review of Financial Studies 23*(5), 1819–1854.

Otto, C. (2014). CEO optimism and incentive compensation. *Journal of Financial Economics 114*(2), 366–404.

Prilmeier, R. (2017). Why do loans contain covenants? Evidence from lending relationships. *Journal of Financial Economics 123*(3), 558–579.

Puri, M. and D. Robinson (2007). Optimism and economic choice. *Journal of Financial Economics 86*(1), 71–99.

Qian, J. and P. E. Strahan (2007). How laws and institutions shape financial contracts: The case of bank loans. *Journal of Finance 62*(6), 2803–2834.

Sen, R. and R. Tumarkin (2015). Stocking up: Executive optimism, option exercise, and share retention. *Journal of Financial Economics 118*(2), 399–430.

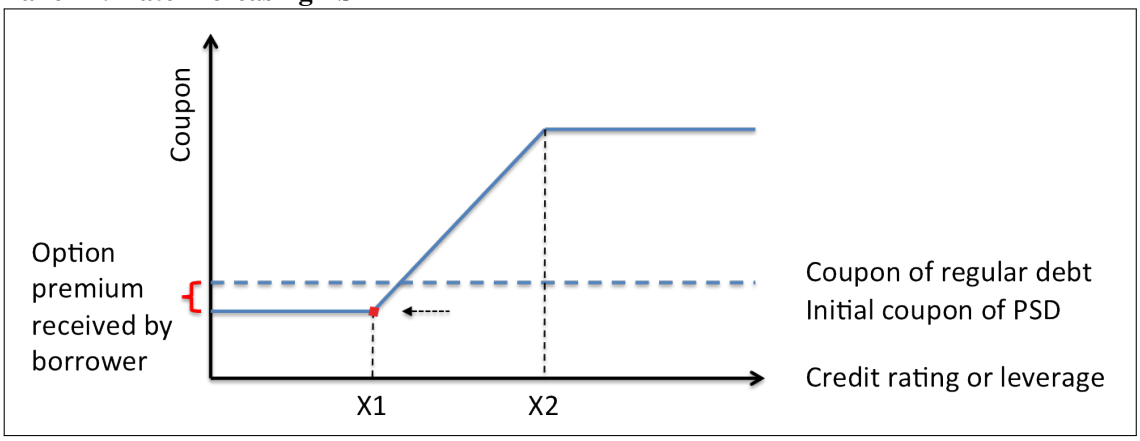
Tchistyi, A. (2016). Security design with correlated hidden cash flows: The optimality of performance pricing. Working paper, University of Illinois at Urbana-Champaign.

Tchistyi, A., D. Yermack, and H. Yun (2011). Negative hedging: Performance-sensitive debt and CEOs' equity incentives. *Journal of Financial and Quantitative Analysis 46*(3), 657–686.

Figure 1: Performance-Sensitive Debt Types

This figure shows the coupon structures of purely rate-increasing (Panel A) and purely rate-decreasing PSD (Panel B). In Panel A the current performance measure (e.g. leverage ratio or credit rating) of the issuer is equal to X1. Hence, rate-increasing PSD can be obtained by a long position of an at-the-money call with a strike price X1 and a short position of an out-of-the-money call with a strike price X2. This structure delivers a premium to the borrower in form of a lower initial spread compared to regular debt. In Panel B the current performance measure of the issuer is equal to X2. Hence, rate-decreasing PSD can be obtained by a short position of an at-the-money put with a strike price X2 and a long position of an out-of-the-money put with a strike price X1. This structure delivers a premium to the lender in form of a higher initial spread.

Panel A: Rate-increasing PSD



Panel B: Rate-decreasing PSD

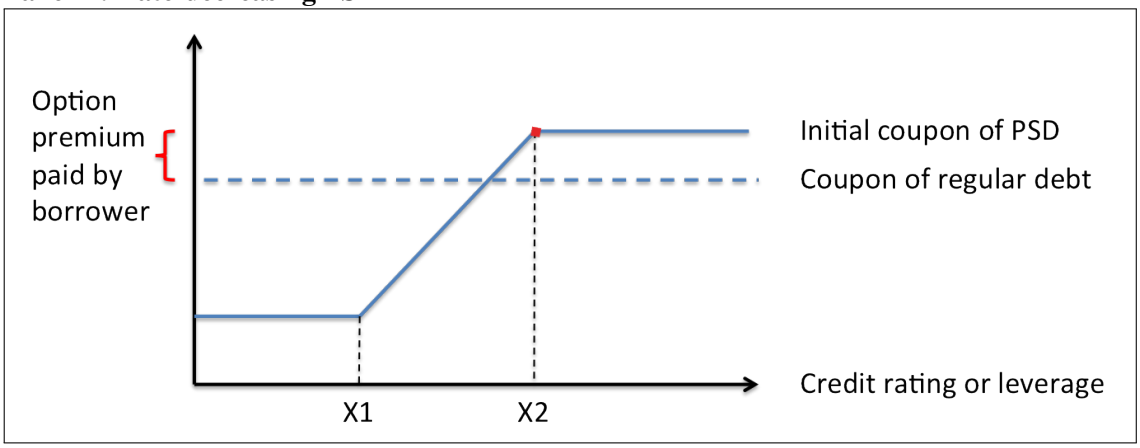


Figure 2: The Pricing Grid of a Loan to IBM

This figure shows the spread over LIBOR IBM paid on a syndicated loan contract negotiated in March 2004. IBM's senior credit rating at the time of the loan issue was A+, the initial interest rate was LIBOR + 12bp. Source: Dealscan.

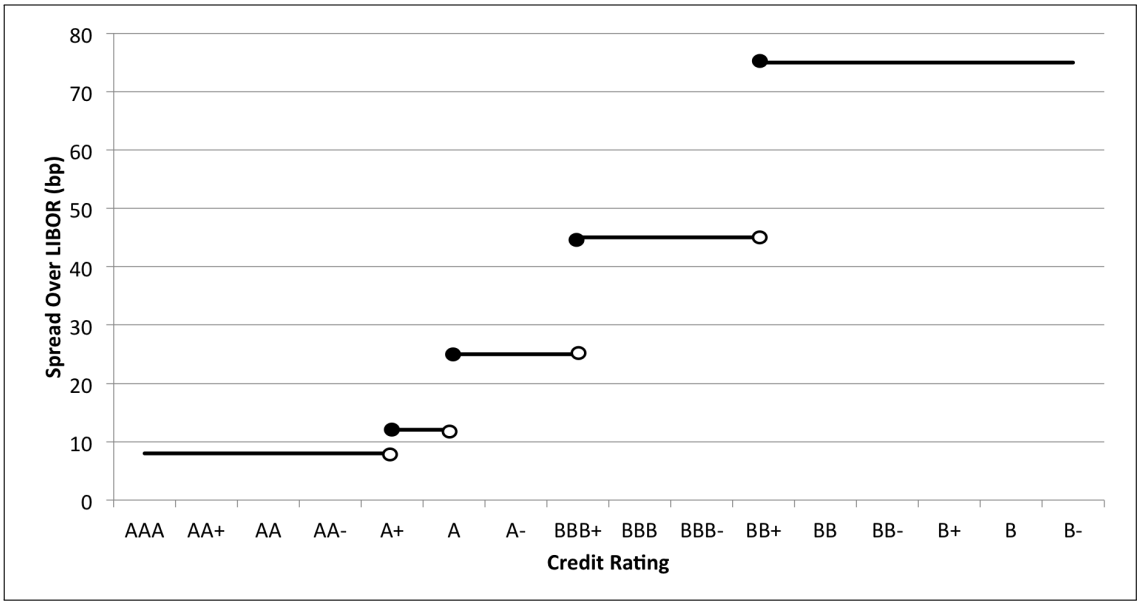


Figure 3: PSD Pricing Grids: Overconfident vs. Biased Managers

This figure shows the average relative pricing grids of (rating-based) PSD issued by overconfident managers (solid line) and rational managers (dashed line). The relative spread at each rating notch is defined by the actual spread at that rating notch divided by the spread paid if the issuer had a credit rating of AAA.

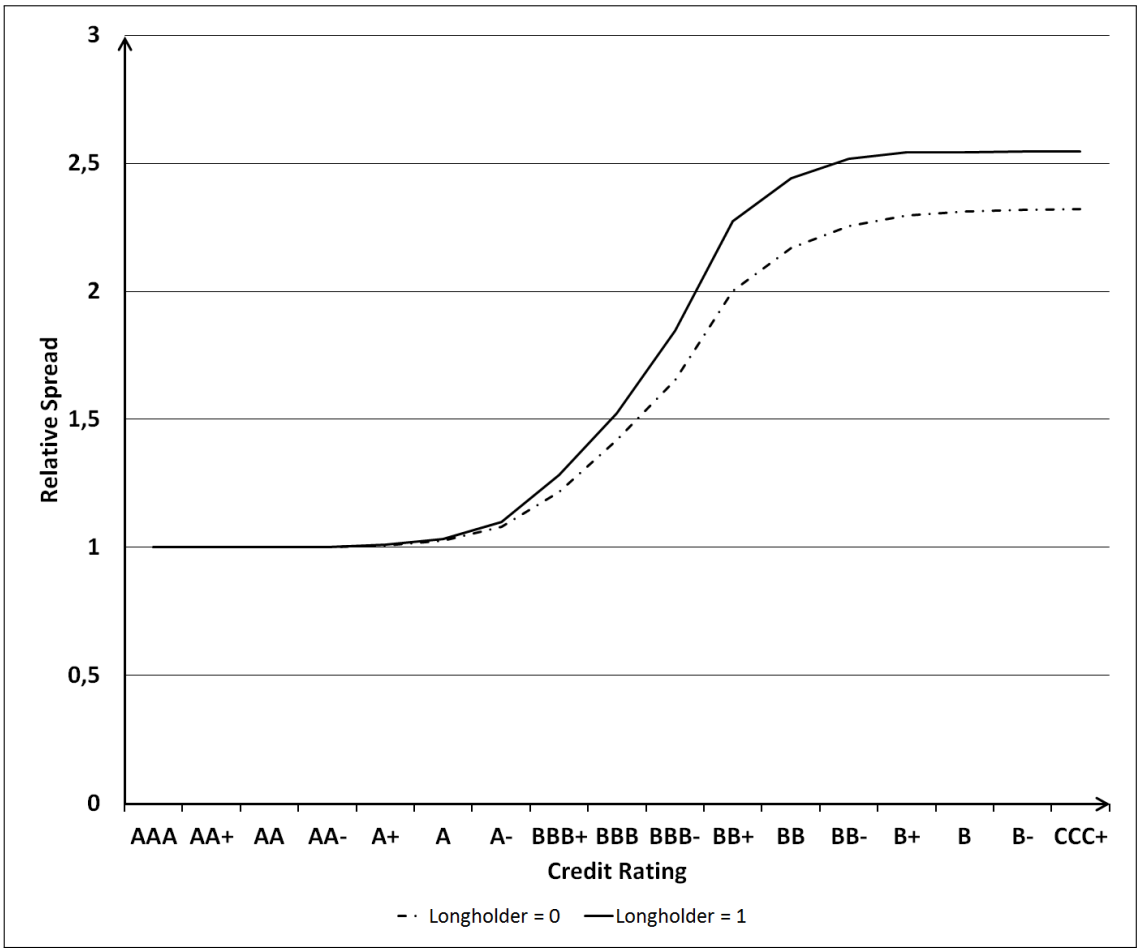


Figure 4: Slope of the Pricing Grid

This figure shows a hypothetical rating-based performance-pricing grid. The rating at the time of loan origination is assumed to be A. The *Local Slope* measures the average slope around the initial rating and is defined as follows:

$$\textit{Local Slope} = \left(\frac{S_{A-} - S_A}{Bond_{A-} - Bond_A} + \frac{S_A - S_{A+}}{Bond_A - Bond_{A+}} \right) /2$$

S_i is the spread at rating notch i, and $Bond_i$ is the level of the bond market index for rating notch i. The *Average Slope* measures the average slope over the entire region of spread changes and is defined as follows:

$$\textit{Average Slope} = \left(\frac{S_A - S_{A+}}{Bond_A - Bond_{A+}} + \frac{S_{A-} - S_A}{Bond_{A-} - Bond_A} + \frac{S_{BBB+} - S_{A-}}{Bond_{BBB+} - Bond_{A-}} \right) /3$$

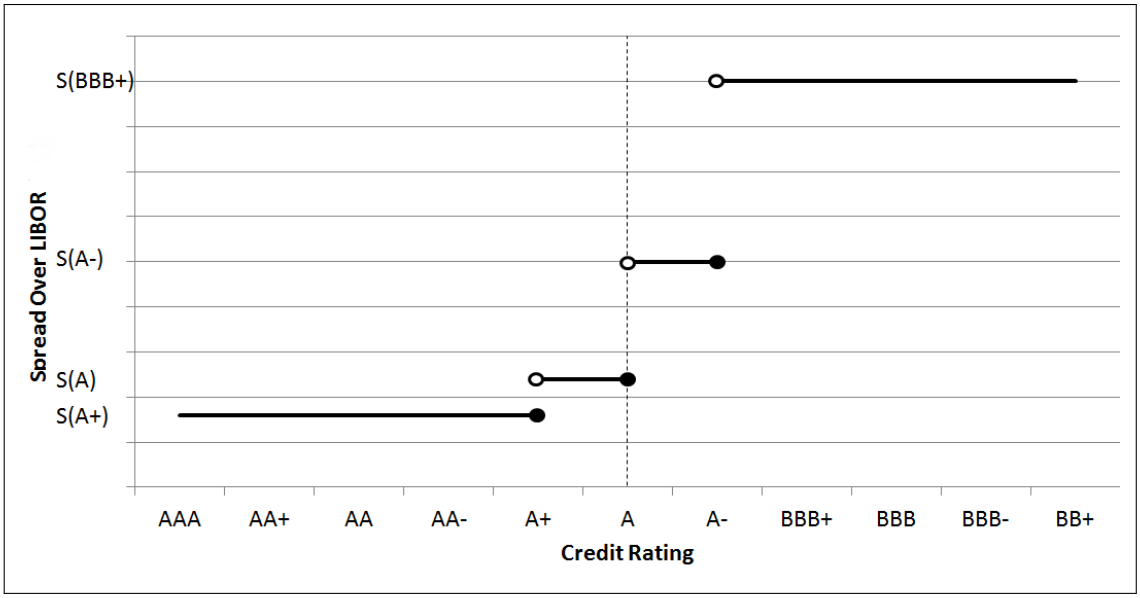


Table 1: Descriptive Statistics

This table reports descriptive statistics of loan and borrower characteristics of syndicated loans and non-syndicated loans reported by Dealscan between 1992-2010. The sample is divided into firms with rational CEOs (Longholder = 0) and firms with overconfident CEOs (Longholder = 1). All variables are defined in the Appendix. (0/1) indicates a dummy variable.

	Longholder = 0				**Longholder = 1**			
	Mean	Median	Std. Dev	Obs.	Mean	Median	Std. Dev	Obs.
Panel A: Borrower Characteristics								
Total Assets (million USD)	7,452	2,224	14,060	4,500	6,501	2,135	13,205	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
Interest 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
Rating: AA or better (0/1)	0.01	0.00	0.12	4,500	0.03	0.00	0.16	2,434
Rating: Betw. AA- and A- (0/1)	0.17	0.00	0.38	4,500	0.18	0.00	0.39	2,434
Rating: Betw. BBB+ and BB- (0/1)	0.42	0.00	0.49	4,500	0.43	0.00	0.50	2,434
Rating: B+ or worse (0/1)	0.07	0.00	0.26	4,500	0.05	0.00	0.21	2,434
No Rating (0/1)	0.31	0.00	0.46	4,500	0.31	0.00	0.46	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
Secured (0/1)	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)	0.38	0.00	0.49	2,367	0.42	0.00	0.49	1,397
PSD(Mixed) (0/1)	0.30	0.00	0.46	2,367	0.28	0.00	0.45	1,397
PSD(Decreasing) (0/1)	0.32	0.00	0.47	2,367	0.29	0.00	0.46	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. Regular Debt

This table reports the marginal effects of logit regressions. The dependent variable equals one if a loan includes a performance pricing provision and zero otherwise. The main variable of interest is *Longholder*, which is an indicator variable that equals one if the CEO of the borrower is classified as biased, and zero otherwise. All variables are defined in the Appendix. The regressions include year, industry (two-digit SIC), rating (rating notch level), deal purpose (corporate, debt repayment, acquisition, working capital, commercial paper backup, or other), loan type (term loan, revolver, bridge loan, or 365-day facility), and bank (lead arranger) fixed effects where indicated. Marginal effects for each covariate are calculated 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% levels respectively.

	(1)	(2)	(3)	(4)
Longholder (0/1)	0.052**	0.059***	0.059**	0.055**
	(0.024)	(0.023)	(0.024)	(0.025)
Borrower Characteristics				
ln(Total Assets)	–0.109***	–0.103***	–0.086***	–0.091***
	(0.012)	(0.013)	(0.014)	(0.015)
Leverage	–0.231***	–0.143**	–0.069	–0.071
	(0.074)	(0.072)	(0.074)	(0.083)
Market-to-Book	–0.021*	–0.004	0.001	–0.003
	(0.012)	(0.012)	(0.013)	(0.013)
Tangibility	–0.034	–0.007	–0.065	–0.060
	(0.079)	(0.077)	(0.081)	(0.082)
Interest Coverage	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Profitability	0.045	0.008	0.008	–0.014
	(0.091)	(0.090)	(0.093)	(0.095)
Current Ratio	–0.012	–0.011	–0.012	–0.015
	(0.013)	(0.013)	(0.013)	(0.013)
Loan Characteristics				
ln(Facility Amount)	0.139***	0.145***	0.138***	0.131***
	(0.011)	(0.011)	(0.012)	(0.012)
ln(Maturity)	0.107***	0.102***	0.126***	0.126***
	(0.013)	(0.013)	(0.022)	(0.022)
Multiple Tranches (0/1)	0.022	0.027	0.070***	0.060***
	(0.018)	(0.018)	(0.019)	(0.020)
Secured (0/1)	0.086***	0.139***	0.158***	0.171***
	(0.022)	(0.023)	(0.024)	(0.024)
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Credit Rating Fixed Effects	No	Yes	Yes	Yes
Deal Purpose Fixed Effects	No	No	Yes	Yes
Loan Type Fixed Effects	No	No	Yes	Yes
Bank Fixed Effects	No	No	No	Yes
Observations	6,705	6,703	6,703	6,700
Pseudo R^2	0.107	0.138	0.184	0.212

Table 3: Rate-increasing vs. Rate-Decreasing PSD

This table reports the marginal effects of a multinominal logit regression. The dependent variable equals one if the pricing grid is rate-increasing (Column 1), two if the pricing grid contains both rate-increasing and rate-decreasing segments (Column 2), three if the pricing grid is rate-decreasing (Column 3), and zero for non-PSD contracts (base group). The main variable of interest is *Longholder*, which is an indicator variable that equals one if the CEO of the borrower is classified as biased, and zero otherwise. The other independent variables (loan and borrower characteristics) are the same as the ones used in Table 2 and are defined in the Appendix. The regressions include year, industry (two-digit SIC), rating (rating notch level), deal purpose (corporate, debt repayment, acquisition, working capital, commercial paper backup, or other), loan type (term loan, revolver, bridge loan, or 365-day facility), and bank (lead arranger) fixed effects where indicated. Marginal effects for each covariate are computed 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% levels respectively.

	(1) Increasing	(2) Mixed	(3) Decreasing
Longholder (0/1)	0.038**	0.004	0.006
	(0.015)	(0.009)	(0.005)
Borrower Characteristics	Yes		
Loan Characteristics	Yes		
Year Fixed Effects	Yes		
Industry Fixed Effects	Yes		
Credit Rating Fixed Effects	Yes		
Deal Purpose Fixed Effects	Yes		
Loan Type Fixed Effects	Yes		
Bank Fixed Effects	Yes		
Observations	6,718		
Pseudo R^2	0.235		
Rate-increasing = rate-decreasing PSD? (p-value)		0.086*	

Table 4: PSD vs. Regular Debt - Firm Fixed Effects Regressions

This table reports odds ratios of fixed effects logit regressions. The dependent variable equals one for rate-increasing PSD, and zero for straight debt. *Longholder* is an indicator variable that equals one if the CEO of the borrower is classified as biased, and zero otherwise. The other independent variables (loan and borrower characteristics) are the same as in Table 2 and are defined in the Appendix. The regressions include year, industry, rating (rating notch level), deal purpose (corporate, debt repayment, acquisition, working capital, commercial paper backup, or other), loan type (term loan, revolver, bridge loan, or 365-day facility), bank, and firm fixed effects where 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% levels respectively.

	(1)	(2)	(3)
Longholder (0/1)	1.353***	1.997*	2.205**
	(0.158)	(0.810)	(0.889)
Borrower Characteristics	Yes	Yes	Yes
Loan Characteristics	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	No	No
Credit Rating Fixed Effects	Yes	Yes	Yes
Deal Purpose Fixed Effects	Yes	Yes	Yes
Loan Type Fixed Effects	Yes	Yes	Yes
Bank Fixed Effects	No	No	Yes
Firm Fixed Effects	No	Yes	Yes
Observations	4,471	3,009	3,009
Pseudo R^2	0.180	0.244	0.328

Table 5: Managerial Biases and the Slope of PSD Contracts

This table reports OLS regressions of the slope of the performance pricing grid on CEO, borrower, and loan characteristics. The dependent variables are the slope measures defined in Figure 4. In addition, we define one-sided slope measures over the rate-increasing segment of the pricing grid (credit ratings below the firm's rating at the time of contract inception) and over the rate-decreasing segment of the pricing grid (credit ratings above the firm's rating at the time of contract inception). *Longholder* is an indicator variable that equals one if the CEO of the borrower is classified as biased, and zero otherwise. The other independent variables (loan and borrower characteristics) are the same as in Table 2 and are defined in the Appendix. All regressions include year, industry (two-digit SIC), rating (rating notch level), deal purpose (corporate, debt repayment, acquisition, working capital, commercial paper backup , or other), loan type (term loan, revolver, bridge loan, or 365-day facility), and bank (lead arranger) fixed effects. The sample includes straight debt contracts and rating-based PSD contracts only. 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% levels respectively.

Panel A: Local Slopes

	(1) Local Slope	(2) Local Slope Int.-Decreasing Segment	(3) Local Slope Int.-Increasing Segment
Longholder (0/1)	0.012*	0.005	0.016**
	(0.007)	(0.006)	(0.007)
Borrower 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
Deal Purpose Fixed Effects	Yes	Yes	Yes
Loan Type Fixed Effects	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes
Observations	4,502	4,365	4,428
Adj. R^2	0.260	0.227	0.242
Local Slope Increasing = Local Slope Decreasing ? (p-value)		0.033**	

Panel B: Average Slopes

	(4) Average Slope	(5) Average Slope Int.-Decreasing Segment	(6) Average Slope Int.-Increasing Segment
Longholder (0/1)	0.010	0.007	0.012*
	(0.007)	(0.006)	(0.007)
Borrower 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
Deal Purpose Fixed Effects	Yes	Yes	Yes
Loan Type Fixed Effects	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes
Observations	4,502	4,366	4,430
Adj. R^2	0.264	0.259	0.241
Average Slope Increasing = Average Slope Decreasing ? (p-value)		0.361	

Table 6: Post-Issue Performance - Change in Debt-to-EBITDA

This table reports OLS regressions of the change in a firm's Debt-to-EBITDA ratio k years after a loan issue (k = *1,...,5*). *Longholder* is an indicator variable that equals one if the CEO of the borrower is classified as biased, and zero otherwise. The sample comprises Debt-to-EBITDA-based PSD contracts and straight debt contracts only. *PSD (Increasing)* equals one if the pricing grid is rate-increasing. *PSD (Mixed)* equals one if the pricing grid contains both rate-increasing and rate-decreasing segments. *PSD (Decreasing)* equals one if the pricing grid is rate-decreasing. The remaining independent variables (loan and borrower characteristics) are the same as the ones used in Table 2 and are defined in the Appendix. The regressions include year, industry, rating (rating notch level), deal purpose (corporate, debt repayment, acquisition, working capital, commercial paper backup, or other), loan type (term loan, revolver, bridge loan, or 365-day facility), and bank (lead arranger) fixed effects. 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% levels respectively.

	Year +1	**Year +2**	**Year +3**	**Year +4**	**Year +5**
	(1)	(2)	(3)	(4)	(5)
PSD (Increasing) (0/1)*Longholder (0/1)	0.76**	0.86**	0.76*	0.41	0.79*
	(0.37)	(0.38)	(0.46)	(0.42)	(0.48)
PSD (Mixed) (0/1)*Longholder (0/1)	0.21	0.34	1.13**	1.02	0.34
	(0.32)	(0.44)	(0.50)	(0.88)	(0.55)
PSD (Decreasing) (0/1)*Longholder (0/1)	0.73*	0.42	0.23	0.35	0.48
	(0.41)	(0.48)	(0.48)	(0.42)	(0.50)
PSD (Increasing) (0/1)	0.23	0.38	0.53*	0.85***	0.57*
	(0.23)	(0.24)	(0.29)	(0.27)	(0.32)
PSD (Mixed) (0/1)	0.21	0.41	0.03	0.24	0.44
	(0.24)	(0.30)	(0.31)	(0.38)	(0.39)
PSD (Decreasing) (0/1)	-0.16	-0.16	-0.23	-0.14	-0.24
	(0.33)	(0.32)	(0.31)	(0.34)	(0.38)
Longholder (0/1)	-0.20	-0.41**	-0.25	-0.21	-0.14
	(0.15)	(0.18)	(0.20)	(0.22)	(0.23)
Borrower 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
Deal Purpose Fixed Effects	Yes	Yes	Yes	Yes	Yes
Loan Type Fixed Effects	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	4,274	4,274	4,274	4,274	4,274
Ajd. R^2	0.109	0.113	0.097	0.094	0.078

Table 7: Post-Issue Performance - Change in Credit Rating

This table reports marginal effects of logit regressions. The dependent variable equals one if the borrower is downgraded in year *k* after a loan issue (*k = 1,...,5*), and zero otherwise. *Longholder* is an indicator variable that equals one if the CEO of the borrower is classified as biased, and zero otherwise. The sample comprises rating-based PSD contracts and straight debt contracts only. *PSD (Increasing)* equals one if the pricing grid is rate-increasing. *PSD (Mixed)* equals one if the pricing grid contains both rate-increasing and rate-decreasing segments. *PSD (Decreasing)* equals one if the pricing grid is rate-decreasing. The remaining independent variables (loan and borrower characteristics) are the same as the ones used in Table 2 and are defined in the Appendix. The regressions include year, industry, rating (rating notch level), deal purpose (corporate, debt repayment, acquisition, working capital, commercial paper backup, or other), loan type (term loan, revolver, bridge loan, or 365-day facility), and bank (lead arranger) fixed effects. Marginal effects for each covariate are calculated 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% levels respectively.

	Year +1	**Year +2**	**Year +3**	**Year +4**	**Year +5**
	(1)	(2)	(3)	(4)	(5)
PSD (Increasing) (0/1)*Longholder (0/1)	0.025	0.029	0.058	0.127*	0.125*
	(0.036)	(0.050)	(0.059)	(0.067)	(0.069)
PSD (Mixed) (0/1)*Longholder (0/1)	-0.018	-0.021	-0.043	-0.072	-0.046
	(0.034)	(0.051)	(0.060)	(0.062)	(0.067)
PSD (Decreasing) (0/1)*Longholder (0/1)	-0.051	0.013	0.024	0.100	0.088
	(0.056)	(0.110)	(0.131)	(0.163)	(0.163)
PSD (Increasing) (0/1)	-0.016	-0.002	-0.014	-0.043	-0.040
	(0.021)	(0.032)	(0.036)	(0.041)	(0.042)
PSD (Mixed) (0/1)	0.029	0.042	0.036	0.053	0.047
	(0.030)	(0.043)	(0.046)	(0.048)	(0.049)
PSD (Decreasing) (0/1)	-0.037	-0.022	0.014	-0.014	-0.005
	(0.034)	(0.054)	(0.069)	(0.071)	(0.076)
Longholder (0/1)	0.018	0.027	0.026	-0.008	-0.014
	(0.021)	(0.031)	(0.036)	(0.039)	(0.042)
Borrower 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
Deal Purpose Fixed Effects	Yes	Yes	Yes	Yes	Yes
Loan Type Fixed Effects	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	3,401	3,430	3,448	3,474	3,488
Pseudo R^2	0.098	0.091	0.112	0.132	0.145

Table 8: Post-Issue Performance - Change in Loan Spread

This table reports OLS regressions of the change in the all-in-spread-drawn (in bps) k years after a loan issue (k = *1,...,5*). The methodology for calculating the post-issue spread changes for PSD contracts is defined in detail in Section 3.3.2. The post-issue spread changes for straight debt are zero per definition. *Longholder* is an indicator variable that equals one if the CEO of the borrower is classified as biased, and zero otherwise. *PSD (Increasing)* equals one if the pricing grid is rate-increasing. *PSD (Mixed)* equals one if the pricing grid contains both rate-increasing and rate-decreasing segments. *PSD (Decreasing)* equals one if the pricing grid is rate-decreasing. The remaining independent variables (loan and borrower characteristics) are the same as the ones used in Table 2 and are defined in the Appendix. The regressions include year, industry, rating (rating notch level), deal purpose (corporate, debt repayment, acquisition, working capital, commercial paper backup, or other), loan type (term loan, revolver, bridge loan, or 365-day facility), and bank (lead arranger) fixed effects 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% levels respectively.

	Year +1	**Year +2**	**Year +3**	**Year +4**	**Year +5**
	(1)	(2)	(3)	(4)	(5)
PSD (Increasing) (0/1)*Longholder (0/1)	2.03*	3.08*	3.03	5.48**	6.03**
	(1.23)	(1.65)	(1.94)	(2.28)	(2.47)
PSD (Mixed) (0/1)*Longholder (0/1)	-1.51	0.79	2.34	0.68	0.63
	(1.98)	(2.69)	(2.82)	(3.14)	(3.21)
PSD (Decreasing) (0/1)*Longholder (0/1)	-0.58	-1.73	-4.17	-1.66	2.92
	(3.72)	(4.18)	(3.95)	(4.46)	(4.71)
PSD (Increasing) (0/1)	4.05***	7.47***	9.21***	9.69***	9.96***
	(0.94)	(1.19)	(1.34)	(1.47)	(1.51)
PSD (Mixed) (0/1)	0.69	-0.41	-0.85	-3.09	-4.37**
	(1.29)	(1.61)	(1.75)	(2.07)	(2.14)
PSD (Decreasing) (0/1)	-20.04***	-24.02***	-25.89***	-31.42***	-33.96***
	(1.77)	(2.15)	(2.48)	(2.91)	(3.10)
Longholder (0/1)	0.06	-0.56	-0.57	-0.50	-0.63
	(0.46)	(0.53)	(0.56)	(0.69)	(0.73)
Borrower 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
Deal Purpose Fixed Effects	Yes	Yes	Yes	Yes	Yes
Loan Type Fixed Effects	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	5,836	5,836	5,836	5,836	5,836
Ajd. R^2	0.218	0.244	0.257	0.281	0.271

Table 9: Post-Issue Performance - Large Spread Increases After Rate-Increasing PSD Issues

This table reports marginal effects of logit regressions. The dependent variable equals one if the change in the all-in-spread-drawn is above +50 bps in year *k* after a rate-increasing PSD issue (*k = 1,...,5*), and zero otherwise. The methodology for calculating the post-issue spread changes for PSD contracts is defined in detail in Section 3.3.2. *Longholder* is an indicator variable that equals one if the CEO of the borrower is classified as biased, and zero otherwise. The sample comprises rate-increasing PSD contracts only. The remaining independent variables (loan and borrower characteristics) are the same as the ones used in Table 2 and are defined in the Appendix. The regressions include year, industry, rating (rating notch level), deal purpose (corporate, debt repayment, acquisition, working capital, commercial paper backup, or other), loan type (term loan, revolver, bridge loan, or 365-day facility), and bank (lead arranger) fixed effects where indicated. Marginal effects for each covariate are calculated 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% levels respectively.

	Year +1	**Year +2**	**Year +3**	**Year +4**	**Year +5**
	(1)	(2)	(3)	(4)	(5)
Longholder (0/1)	-0.000	0.0248*	0.0280**	0.0457*	0.0804**
	(0.000)	(0.0145)	(0.0139)	(0.0235)	(0.0318)
Borrower 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
Deal Purpose Fixed Effects	Yes	Yes	Yes	Yes	Yes
Loan Type Fixed Effects	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	356	689	828	781	763
Pseudo R^2	0.665	0.438	0.431	0.416	0.336

Table 10: Initial Loan Spread

This table reports OLS regressions relating the initial all-in-spread-drawn (in bps) to the use of performance-sensitive debt and managerial biases. *Longholder* is an indicator variable that equals one if the CEO of the borrower is classified as biased, and zero otherwise. *PSD (Increasing)* equals one if the pricing grid is rate-increasing. *PSD (Mixed)* equals one if the pricing grid contains both rate-increasing and rate-decreasing segments. *PSD (Decreasing)* equals one if the pricing grid is rate-decreasing. The remaining independent variables (borrower and loan characteristics) are the same as the ones used in Table 2 and are defined in the Appendix. The regressions include year, industry, rating (rating notch level), deal purpose (corporate, debt repayment, acquisition, working capital, commercial paper backup, or other), loan type (term loan, revolver, bridge loan, or 365-day facility), bank (lead arranger), and loan package fixed effects 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% levels respectively.

			Within loan package
	(1)	(2)	(3)
PSD (Increasing) (0/1)*Longholder (0/1)		2.58	6.89
		(5.37)	(10.35)
PSD (Mixed) (0/1)*Longholder (0/1)		0.67	16.35
		(6.08)	(16.24)
PSD (Decreasing) (0/1)*Longholder (0/1)		-6.07	12.29
		(7.00)	(12.81)
PSD (Increasing) (0/1)	-35.25***	-36.13***	-20.43**
	(2.83)	(3.60)	(8.20)
PSD (Mixed) (0/1)	-26.77***	-26.93***	-23.30
	(3.46)	(4.31)	(14.63)
PSD (Decreasing) (0/1)	8.42**	10.51**	-14.18
	(4.14)	(4.99)	(11.91)
Longholder (0/1)		-2.76	(omitted)
		(4.37)	
Borrower Characteristics	Yes	Yes	No
Loan Characteristics	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	No
Industry Fixed Effects	Yes	Yes	No
Credit Rating Fixed Effects	Yes	Yes	No
Deal Purpose Fixed Effects	Yes	Yes	Yes
Loan Type Fixed Effects	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes
Loan Package Fixed Effects	No	No	Yes
Observations	5,993	5,993	2,618
Ajd. R^2	0.695	0.695	0.915

Table 11: Alternative Managerial Bias Classifications

This table reports the marginal effects of logit regressions, in which the dependent variable equals one if a loan includes a rate-increasing performance pricing provision, and zero for straight debt. We use several different overconfidence variables as suggested by Malmendier and Tate (2008) and Sen and Tumarkin (2015). *Longholder 60* and *Longholder 100* are indicator variables, which equal one if the CEO ever held an option until the final maturity year that was at least 60 or 100% in the money and zero otherwise. *Holder 67* is an indicator variable, which equals one if a CEO at least twice did not exercise options that were at least 67% in the money five years after the option grant, and zero otherwise. *Pre-Longholder* and *Post-Longholder* indicate the time period before an executive ever held an option until the final maturity year that was at least 40% in the money and the time period after this activity, respectively. *Share Retainer* is a dummy variable, which equals one if the cumulative shares retained by a CEO on option exercise days during a fiscal year exceeds 1% and zero otherwise. *Share Retainer FE* is a dummy variable, which equals one for firms with CEOs that show the *Share Retainer* behaviour at least once, and zero otherwise. The other independent variables (loan and borrower characteristics) are the same as the ones used in Table 2 and are defined in the Appendix. The regressions include year, industry (two-digit SIC), rating (rating notch level), deal purpose (corporate, debt repayment, acquisition, working capital, commercial paper backup, or other), loan type (term loan, revolver, bridge loan, or 365-day facility), and bank (lead arranger) dummies where indicated. 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% levels respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Longholder (60) (0/1)	0.052*					
	(0.030)					
Longholder (100) (0/1)		0.038				
		(0.032)				
Pre-Longholder (0/1)			0.068*			
			(0.038)			
Post-Longholder (0/1)			0.090**			
			(0.035)			
Holder 67 (0/1)				0.090***		
				(0.034)		
Share Retainer (0/1)					–0.004	
					(0.021)	
Share Retainer FE (0/1)						0.093***
						(0.028)
Borrower 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
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Deal Purpose Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Loan Type Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,458	3,276	3,776	1,995	4,535	4,535
Pseudo R^2	0.258	0.259	0.250	0.272	0.219	0.222

Table 12: CEO Characteristics

This table reports the marginal effects of logit regressions, in which the dependent variable equals one if a loan includes an rate-increasing performance pricing provision, and zero for straight debt. *Longholder* is an indicator variable, which equals one if the CEO of the borrower is classified as biased, and zero otherwise. *Female* is a dummy variable which is equal to one if the CEO is female and zero otherwise. *Ph.D.* is a dummy variable if the CEO holds a PhD 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 other independent variables (borrower and loan characteristics) are the same as the ones used in Table 2 and are defined in the Appendix. The regressions include year, industry (two-digit SIC), rating (rating notch level), deal purpose (corporate, debt repayment, acquisition, working capital, commercial paper backup, or other), loan type (term loan, revolver, bridge loan, or 365-day facility), and bank (lead arranger) dummies where indicated. 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% levels respectively.

	(1)	(2)	(3)
Longholder (0/1)	0.076***	0.060**	0.068**
	(0.027)	(0.026)	(0.027)
Female (0/1)	0.081		0.033
	(0.081)		(0.082)
Ph.D. (0/1)	–0.045		–0.068
	(0.057)		(0.053)
ln(Age)	–0.109		–0.029
	(0.096)		(0.101)
Tenure	–0.002		–0.002
	(0.002)		(0.002)
Delta		–0.213	–0.043
		(0.285)	(0.309)
ln(1+Vega)		–0.003	–0.003
		(0.006)	(0.006)
Borrower 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
Bank Fixed Effects	Yes	Yes	Yes
Deal Purpose Fixed Effects	Yes	Yes	Yes
Loan Type Fixed Effects	Yes	Yes	Yes
Observations	4,218	4,088	4,004
Pseudo R^2	0.232	0.233	0.236

Appendix: Variable Definitions

Variable Name	Description
Managerial Characteristics:	
Longholder (0/1)	A dummy variable, which equals one if a manager ever held executive stock options until the last year of maturity that were at least 40% in-the-money and zero otherwise.
Longholder (60) (0/1)	A dummy variable, which equals one if a manager ever held executive stock options until the last year of maturity that were at least 60% in-the-money and zero otherwise.
Longholder (100) (0/1)	A dummy variable, which equals one if a manager ever held executive stock options until the last year of maturity that were at least 100% in-the-money and zero otherwise.
Pre-Longholder (0/1)	A dummy variable, which equals one only in the time period *before* a manager ever held executive stock options until the final maturity year that were at least 40% in the money and zero otherwise.
Post-Longholder (0/1)	A dummy variable, which equals one only in the time period *after* a manager ever held executive stock options until the final maturity year that were at least 40% in the money and zero otherwise.
Holder 67 (0/1)	A dummy variable, which equals one if a manager at least twice held executive stock options five years after the option grant that were at least 67% in-the-money.
Share Retainer (0/1)	A dummy variable, which equals one if the cumulative shares retained by a CEO on option exercise days during a fiscal year exceeds 1% and zero otherwise.
Share Retainer FE (0/1)	A dummy variable, which equals one for firms with CEOs that show the Share Retainer behaviour at least once, and zero otherwise.
Delta	Delta of a CEO's option and stock portfolio divided by total shares outstanding. The delta of a stock equals one. The delta of an individual option equals $e^{-dT}N(Z)$. $Z = \left[ln\left(S/X\right) + T\left(r - d + \sigma^2/2\right)\right]/\sigma T^{1/2}$ $N\left(\right) =$ cumulative probability function for the normal distribution $N'\left(\right) =$normal density function. $S =$ price of the underlying stock $X =$ exercise price of the option $\sigma =$ 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
Vega	Vega of a CEO's option and stock portfolio. The vega of a stock equals zero. The vega of an individual option equals $e^{-dT}N'\left(Z\right)ST^{1/2} * 0.01$. In our regressions we use $ln\left(1 + \textit{vega}\right)$ to correct for the skewness of vega.
Female (0/1)	A dummy variable, which equals one if the CEO is female and zero otherwise.
PhD (0/1)	A dummy variable, which equals one if the CEO holds a PhD degree and zero otherwise.
Age	Age of the CEO in years at the time of the debt issue.

Continued on next page

continued from previous page

Variable Name	Description
Tenure	Time in days since the executive became CEO.
Borrower/Issuer characteristics:	
Total Assets	Firm's total book 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. Market value equals market value of equity plus book value of debt.
Tangibility	Net property plant and equipment divided by total assets.
Interest Coverage	Interest expense divided by EBITDA.
Profitability	EBITDA divided by net sales.
Current Ratio	Current assets divided by current liabilities.
Debt-to-EBITDA	Total debt divided by EBITDA.
No Rating (0/1)	A dummy variable, which equals one if the borrower was not rated by S&P at the time of the debt issue.
Rating: AA or better (0/1)	A dummy variable, which equals one if the borrower was rated better than AA- by S&P at the time of the debt issue.
Rating: Betw. AA- and A- (0/1)	A dummy variable, which equals one if the borrower was rated between AA- and A- by S&P at the time of the debt issue.
Rating: Betw. BBB+ and BB- (0/1)	A dummy variable, which equals one if the borrower was rated between BBB+ and BB- by S&P at the time of the debt issue.
Rating: B+ or worse (0/1)	A dummy variable, which equals one if the borrower was rated worse than BB- by S&P at the time of the debt issue.
Loan characteristics:	
Facility Amount	Total loan amount (in $million).
Maturity	Time to maturity in months.
Multiple Tranches (0/1)	A dummy variable, which equals one if a loan consists of more than one tranche and zero otherwise.
Secured (0/1)	A dummy variable, which equals one if the loan is secured by collateral.
PSD characteristics:	
PSD (0/1)	A dummy variable, which equals one if the loan contract includes a performance pricing provision and zero otherwise.
PSD(Rating) (0/1)	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(Accounting) (0/1)	A dummy variable, which equals one if the loan contract includes a performance pricing provision based on an accounting ratio and zero otherwise.
PSD(Increasing) (0/1)	A dummy variable, which equals one if $\frac{S_i - S_{Min}}{S_{Max} - S_{Min}} <= \frac{1}{3}$, and zero otherwise. S_{Min} (S_{Max}) is the lowest (highest) spread defined in the pricing grid.
PSD(Mixed) (0/1)	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. S_{Min} (S_{Max}) is the lowest (highest) spread defined in the pricing grid.
PSD(Decreasing) (0/1)	A dummy variable, which equals one if $\frac{S_i - S_{Min}}{S_{Max} - S_{Min}} >= \frac{3}{3}$, and zero otherwise. S_{Min} (S_{Max}) is the lowest (highest) spread defined in the pricing grid.
# Pricing Steps	Number of pricing steps defined in the pricing grid.
Local Slope	Slope of the pricing grid for rating-based PSD around the initial rating. $Local\ Slope = \left(\frac{S_{i-1} - S_i}{Bond_{i-1} - Bond_i} + \frac{S_i - S_{i+1}}{Bond_i - Bond_{i+1}} \right) / 2$

Continued on next page

continued from previous page

Variable Name	Description
	i is the borrower's long-term credit rating as of contract inception $i+1$ is the borrower's long-term credit rating plus one rating notch (upgrade) $i-1$ is the borrower's long-term credit rating minus one rating notch (downgrade) S_i is the spread that the borrower has to pay given rating i $Bond_i$ is the market spread of bonds with rating i.
Local Slope Int.-Increasing Segment	Local slope calculated over the rate-increasing segment of the PSD pricing grid. $\left(\frac{S_{i-1}-S_i}{Bond_{i-1}-Bond_i}\right)$
Local Slope Int.-Decreasing Segment	Local slope calculated over the rate-decreasing segment of the PSD pricing grid. $\left(\frac{S_i-S_{i+1}}{Bond_i-Bond_{i+1}}\right)$
Average Slope	Average slope of the pricing grid for rating-based PSD over all spread changes. $Average\ Slope = \frac{1}{n}\sum_{j=1}^{n}\frac{S_{j-1}-S_j}{Bond_{j-1}-Bond_j}$ n is the number of pricing steps
Average Slope Int.-Increasing Segment	Average slope calculated over the rate-increasing segment of the PSD pricing grid.
Average Slope Int.-Decreasing Segment	Average slope calculated over the rate-decreasing segment of the PSD pricing grid.