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Performance-sensitive debt – The intertwined effects of performance measurement and pricing grid asymmetry[1]

Christina E. Bannier[*] and Markus Wiemann[†]

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Abstract

This paper studies the use of performance pricing (PP) provisions in debt contracts and compares accounting-based with rating-based pricing designs. We find that rating-based provisions are used by volatile-growth borrowers and allow for stronger spread increases over the credit period. Accounting-based provisions are employed by opaque-growth borrowers and stipulate stronger spread reductions. Further, a higher spread-*increase* potential in rating-based contracts lowers the spread at the loan's inception and improves the borrower's performance later on. In contrast, a higher spread-*decrease* potential in accounting-based contracts lowers the initial spread and raises the borrower's leverage afterwards. The evidence indicates that rating-based contracts are indeed employed for different reasons than accounting-based contracts: the former to signal a borrower's quality, the latter to mitigate investment inefficiencies.

JEL-Classification: G30, M40

Keywords: Performance pricing, performance-sensitive debt, accounting data, credit ratings, underinvestment, collateral

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1. Introduction

Performance pricing (PP) is a nowadays well-established provision in many loan contracts.[2] Whereas traditional bank loans charge a fixed spread over prime or LIBOR, PP provisions link the interest rate to a measure of the firm's credit quality: The interest rate increases with deteriorating performance and decreases with improving performance over the credit period according to pre-specified terms.

Recent work has linked the use of PP to information asymmetries between borrowers and lenders and to agency costs of debt financing (Asquith et al., 2005; Martin, 2009; Koziol and Lawrenz, 2010; Manso et al., 2010; Begley, 2012; Adam and Streitz, 2014). The particular design of PP provisions, however, has so far met only scant attention. This study attempts to close this gap. We examine two dimensions of PP design. The first is the type of performance measurement: Credit risk can be measured either by the borrower's credit rating (rating-based performance pricing, RBPP henceforth) or by an accounting ratio (accounting-based performance pricing, ABPP henceforth), typically the ratio of debt to EBITDA. Since the choice of performance measurement has been shown to play an important role for debt covenants (Christensen and Nikolaev, 2012; Demerjian, 2011), we explore in a similar vein whether ABPP and RBPP provisions are employed for different functions. To pin down this function, we examine also a second dimension of PP design: The shape of the pricing grid, i.e. the degree to which the loan allows for interest rate rises or reductions over the credit period. Our paper thus focuses on examining the specific pricing channels that allow ABPP and RBPP provisions to solve, if any, different debt contracting issues.

Using a dataset of U.S. bank loans drawn down by rated firms between 1993 and 2008, we derive three main results. First, we show that RBPP contracts are employed by large firms with high ratings and very strong but volatile growth prospects. Borrowers with ABPP contracts, in contrast, tend to be solid-growth firms with high leverage and low degrees of transparency.

In a second step, we examine the shapes of the pricing grids in ABPP and RBPP contracts. We observe that contracts with RBPP provisions stipulate stronger interest rate increases for performance deteriorations, while contracts with ABPP provisions allow for stronger spread reductions for performance improvements over the credit period. We show furthermore that the spread-increase potential in RBPP contracts is the higher the stronger the borrower's growth prospects are. Borrowers with disappointing performance realization, i.e. deteriorating ratings, will then have to accept strongly increasing debt costs. This observation indicates the use of RBPP provisions as a signal of future creditworthiness or credit quality, because borrowers who do not live up to their signal of high quality will be severely punished and the ex-ante expected

[2] Asquith et al. (2005) find that 54% of bank loans by dollar value in their sample feature PP provisions. Manso et al. (2010) observe that about 40% of the loans use PP provisions.

costs of this punishment are higher for borrowers with less than compelling growth prospects. We also show that a higher pricing grid asymmetry (towards stronger potential spread increases) in RBPP contracts reduces the spread requested at loan initiation. Borrowers that are particularly confident of their future quality are hence immediately rewarded for agreeing to a loan contract with strong spread-increasing PP.

With ABPP contracts, in contrast, we find that the pricing grids stipulate larger interest rate reductions for performance improvements the more severe the borrower's underinvestment risk (à la John et al. (2003)) is. Underinvestment occurs if a firm's high leverage makes low-risk, positive-NPV projects unattractive as the largest part of the cashflows in case of success will accrue to the debtholders while the equityholders will bear the costs of debt in any case. If ABPP contracts allow an interest rate reduction, then engaging in low-risk, positive NPV-projects will be rewarded by lower credit costs once the borrowers' performance improves measurably. Interest-reducing pricing schemes are hence suitable to mitigating the investment inefficiency. We also demonstrate that a stronger asymmetry in the ABPP pricing grid (towards stronger potential interest rate reductions) leads to lower spreads at loan initiation.

Finally, we show that the particular designs of the pricing grids are indeed effective in fulfilling the indicated functions from an ex-post perspective. In this respect, we find that borrowers with RBPP contracts succeed in realizing high quality after the loan initiation, i.e. they improve their credit ratings and increase their returns significantly. These performance improving effects turn out to be the stronger the higher the pricing grid asymmetry is. Quite similarly, borrowers with ABPP contracts appear to be able to overcome potential investment inefficiencies and are able to draw down more debt as a consequence in the medium to long-term after the loan initiation.[3] Again, the positive leverage effect is the stronger, the more interest-reduction potential the pricing grid stipulates. These results complement and reinforce earlier findings by Martin (2009), Manso et al. (2010) and Begley (2012), who study the role of PP provisions in loan contracts but disregard the intertwined effects of performance measurement type and pricing grid asymmetry.

Interestingly, our results differ in some ways from earlier findings by Asquith et al. (2005). They distinguish between interest-increasing and interest-decreasing loan provisions but do not measure the degree of pricing asymmetry nor do they account for the type of performance measurement. They find that interest-increasing PP is mostly employed to reduce moral hazard problems, while interest-decreasing PP is used to resolve adverse selection problems. Our results, in contrast, demonstrate more specifically that moral hazard problems of the underinvestment type are suitably resolved by ABPP contracts that allow for strong spread reductions, while information asymmetries are mainly tackled via RBPP contracts with strong

3 Borrowers that are afflicted by underinvestment problems tend to face difficulties in issuing debt (Smith and Watts, 1992; Rajan and Zingales, 1995; Lang et al., 1996).

but not universal spread increase potential. Since the dataset used by Asquith et al. (2005) is confined to the early years of loan issuance with PP provisions (1995 to 1998), though, this discrepancy in results emphasizes that the role of debt contracting features is and will continue to be subject to change.

Our work makes several contributions to the literature. First, while the use and design of debt covenants has been analyzed extensively in recent years (Berlin and Mester, 1992; Rajan and Winton, 1995; Chava and Roberts, 2008; Garleanu and Zwiebel, 2009; Roberts and Sufi, 2009; Demerjian, 2011), detailed studies of performance pricing both in public and private debt financing remain relatively rare so far. We contribute to this literature by analyzing empirically the specific channel via which PP provisions help to overcome debt-contracting problems rooting in information asymmetries and stockholder-debtholder conflicts.

Second, we add to the general discussion on the use of accounting data versus rating information in debt contracting. Ball et al. (2008), for instance, conclude that "[…] the timeliness provided by the accounting information is more important than the informativeness provided by the rating." Even though credit ratings are widely accepted as comprehensive measures of credit risk, John et al. (2003) show that ratings do not sufficiently account for agency-related credit risk in collateralized debt.[4] They prove that the pledging of safe assets as collateral creates an underinvestment problem which the credit rating does not account for. This underinvestment problem takes the form of a neglect of necessary investments to uphold the collateral value over time – a specific type of perquisite consumption. Our work reconciles this observation and underlines that borrowers with underinvestment problems refrain from using rating-based contracting mechanisms and rely on accounting-based loan contracts instead.

Finally, our study contributes – albeit only indirectly – to the relation between the use of PP provisions and covenants in loan contracts. Adam and Streitz (2014) show that Debt/EBITDA covenants are set less tight in loan contracts that also use PP based on the Debt/EBITDA metric provided that the contract specifies interest rate increases. This confirms a substitutionary relation between covenants and same-variable PP provisions. According to our results, however, spread increases are much more common in RBPP provisions than in ABPP provisions. As a consequence, our work leads us to conjecture that the substitutionary relation between covenants and PP provisions will hold also when the borrower's performance is measured via the rating and

[4] John et al. (2003) ascribe this problem to the so-called process of rating notching. Rating notching is a procedure that is employed to make distinctions between different types of a borrower's liabilities. The most important liability class is rated first. Usually, this is the senior unsecured debt. Then, all other classes of liabilities are rated relative to this first class. For instance, secured debt is typically rated one notch above the senior unsecured debt, subordinated debt is rated one notch below. While this procedure is mainly fixed for investment-grade rated borrowers, there is more variability for sub-investment grade rated issuers. John et al. (2003) show that the particular discretion of rating analysts with regard to these lower-quality borrowers contributes to the neglect of underinvestment problems in the eventual rating assessment.

we prove this presumption to hold true. The negative relation between PP provisions and covenants is hence more general than previously thought.

The rest of the paper proceeds as follows. Section 2 gives some background information on PP contracts and presents two loan examples. Section 3 sketches the data and presents some univariate analyses. Section 4 reports tests on the choice of ABPP vs. RBPP loans based on the borrowers' characteristics, while section 5 displays a simultaneous equation analysis of the pricing of PP loans, i.e. the asymmetry of the pricing grid and the initial spread requested. Section 6 studies the ex-post performance of firms issuing PP loan contracts. Section 7 discusses robustness checks and section 8 concludes.

2. Background information on PP contracts and examples

The earliest empirical reference to PP provisions in private debt contracts dates from Loomis (1991) in a description of various performance measures as a basis to price credit risk. PP provisions have become widely used starting with the expansion of the syndicated loan market in the early 1990s. Asquith et al. (2005) study 8,761 U.S. bank loans issued between 1995 and 1998. Of these, 41% have PP provisions (54% by dollar volume). In a sample of 5,020 loans to public firms between 1995 and 2005, Manso et al. (2010) report that 40% of these loans feature PP provisions.

Appendix A provides two examples of loans with PP provisions, one in which performance is measured by an accounting ratio and one in which performance is captured by the firm's credit rating. The ABPP example refers to a syndicated revolving loan issued by Shaw Industries Inc. on March 16, 1998. The contract stipulates a spread over LIBOR in accordance with the firm's Debt/EBITDA ratio. At inception, the interest rate is set at 55 basis points above LIBOR. This spread is based on a concurrent Debt/EBITDA ratio of 3.5. If the Debt/EBITDA ratio declines over the credit period, the applicable spread will decrease across three pricing buckets to a minimum of 22 basis points (for Debt/EBITDA ratios between 1 and 2). However, if the Debt/EBITDA ratio increases above 3.5, the spread will jump into one higher pricing bucket at 75 basis points. Overall, the maximum interest rate reduction potential in this loan is 55 - 22 = 33 basis points that stretches over three pricing buckets, and the spread increase potential is 75 – 55 = 20 basis points that is contained in one further pricing bucket. The applicable spread will be determined on a quarterly basis depending on the firm's fiscal data.

The RBPP example refers to a revolving syndicated loan drawn down by South Jersey Industries Inc. on August 21, 2003. At inception, South Jersey Industries holds a rating of A from S&P and of Baa1 from Moody's. The applicable loan spread for these ratings is 47.5 basis points. The contract stipulates spread increases with each rating notch below BBB+ / Baa1 until a maximum

spread of 100 basis points is reached for ratings less than BBB- / Baa3. Overall, this contract features a maximum spread increase potential of 100 – 47.5 = 52.5 basis points that stretches over three pricing buckets and does not allow for any spread reductions. The applicable spread will be determined by any rating change announced by S&P or Moody's on a day-to-day basis. Should the agencies' rating assessments differ and fall within adjacent pricing buckets, the higher rating will determine the spread. If the rating difference exceeds one pricing bucket, the pricing bucket one above the lowest of the two ratings will apply.

The simple comparison of these two pricing grids already suggests strong differences between ABPP and RBPP loans. While the exemplary ABPP grid allows for more spread decreases than increases, the RBPP contract stipulates no spread decreases but strong spread increases. Recent research has attributed the employment of PP provisions in loan contracts to the information asymmetry between borrower and lender and to agency costs of debt. Manso et al. (2010) show that making the interest rate contingent on a measure of the firm's performance may serve as a screening device: If borrowers' quality is not known with certainty, firms that choose PP are more likely to display high growth and improve their credit ratings within one year after closing the loan than firms with fixed-rate contracts. Begley (2012) confirms this signaling role of PP contracts and shows that it depends on the convexity of the pricing grid.[5] Martin (2009) observes that interest-reducing PP contracts allow to mitigate the agency costs of debt. These are particularly severe for intransparent growth firms because growth opportunities are often difficult for lenders to contract upon ex-ante and monitor ex-post. However, none of these earlier papers examined the particular channel via which PP loans fulfill their function, i.e. how the interplay of performance measurement and pricing grid asymmetry attracts or incentivizes the borrowers according to the contracts' particular purpose – an aspect that is at the heart of our analysis.[6]

In the following, we will extend these earlier papers by i) controlling for the type of performance measurement and by ii) examining explicitly the effects induced by the structure of the pricing grids. Our analysis will proceed in three steps. First, we will – based on Manso et al. (2010) and Martin (2009) - study whether borrower or loan characteristics that proxy for signaling needs or investment inefficiencies drive the choice of PP provisions. This will help us to assess whether ABPP and RBPP contracts are employed to serve different functions. Second, we will examine

[5] Pricing grid convexity is calculated by Begley (2012) as the difference between the initial spread a borrower has to pay and the hypothetical spread from a linear interpolation of the endpoints of the pricing grid at the initial performance measure. While this convexity measure captures information on the hypothetical reduction of credit costs at the starting point of the loan, it does not indicate how much incentivizing room (vial potential future spread reductions) or threat opportunity (via potential future spread increases) a PP contract entails. This, however, is important for our analysis.

[6] Begley (2012) considers the potential convexity of the pricing grid in the form of dummy variables but does not consider the actual size of spread increases and decreases that the contracts stipulate for each borrower.

the asymmetry of the pricing grid in PP contracts and test whether the pricing design is suitable for the functions derived in the first step. Finally, we will analyze from an ex post perspective whether the particular pricing design is successful in fulfilling the respective functions.

3. Data description and univariate analysis

We obtain data on bank loans from Thomson Reuters LPC DealScan. For our sample, we collect all loans issued between 1993 and 2008. We exclude all entries with missing information on the loan amount, the maturity, the all-in spread drawn,[7] the rating or the securitization status and restrict loans to have a maturity of 30 years or less. We also delete loans to financial institutions or government-related entities. This leaves us with an initial loan sample of 35,312 tranches in 23,461 loan deals.[8]

Table 1 displays the different types of performance measures used in the initial loan sample. As can be seen, among the accounting-based performance measures, the Debt/EBITDA ratio is most frequently employed (57%), while the senior rating, as the next-often used measure, is applied to 22% of all contracts.[9] Taken together, these two performance measures are used for 79% of all PP loan contracts in our sample and for 86% of the outstanding loan volume. Given the large difference in employment between the Debt/EBITDA ratio and the next-often used accounting-based measure (leverage, used in 5% of loans), we refer to the Debt/EBITDA ratio as our general proxy for accounting-based performance measures and neglect loans with all other accounting-based measures in the following analysis.

We then match the reduced loan sample with borrower-specific information from Compustat. Our final dataset consists of 4,905 loan tranches issued by 1,442 firms.[10] Of these, 1,889 loans are fixed-rate contracts ("no-PP" henceforth), 1,326 are PP loans that are based on the Debt/EBITDA ratio (we will refer to these as ABPP), and 1,690 are PP loans based on the senior rating (RBPP).[11]

[Table 1 about here]

[7] In the following, we will always refer to the all-in spread drawn when discussing loan spreads. The all-in spread drawn is an all-inclusive spread that is paid on top of a reference rate, typically LIBOR.

[8] In our sample, 42.5% of all loans consist of only one tranche, 32.9% consist of two tranches and 24.6% of all loans have more than two tranches.

[9] The order is reversed when referring to the loan volume: The rating applies to a much larger volume of contracts (54%) than the Debt/EBITDA ratio (33%).

[10] We conduct our analysis on the loan tranche level. The statistical tests control for the potential interdependencies between the individual tranches of a loan deal.

[11] Note that in the following analyses, the number of observations may vary with the borrower characteristics employed. Particularly the item "intangible assets" is not available for all firms in the early years of our sample. Analyses that make use of this item therefore rely on a smaller number of observations.

Table 2 presents the development of the issuance numbers of the three loan types (no-PP, ABPP and RBPP) over the years 1993 to 2008. The total number of loan initiations in our sample increases steadily until 1997 and rises strongly again between 2002 and 2005. While there have been only very few contracts with PP provisions in the early years of our sample, from 1997 onwards a relatively stable number of PP contracts has been reached with slightly varying proportions of ABPP and RBPP contracts. RBPP contracts seem to have been particularly popular between 2004 and 2006, i.e. immediately before the financial crisis of 2007/08.

[Table 2 about here]

Table 3 displays the major characteristics of our sample. Panel A refers to borrower characteristics, panel B to loan characteristics. Borrowers with RBPP loans are seen to be much larger (with a median market capitalization of US$ 4.03 billion and a median amount of total assets equal to US$ 4.6 billion) than companies with ABPP (US$ .81 and US$ 1.04) or fixed-rate contracts (US$ .94 and US$ 1.76). Both borrowers with RBPP and ABPP loans display higher returns on assets (0.13 both) and higher market-to-book ratios (1.4 both) than borrowers with no-PP contracts (0.11 and 1.28 respectively). Interestingly, borrowers with ABPP contracts show a much larger fraction of intangible assets. Borrowers with RBPP contracts, in contrast, display a lower leverage and a better credit rating than companies with ABPP or fixed-rate contracts. Note that, consistent with the literature, we convert the letter ratings into a numerical scale, where 1 is equivalent to AAA, 2 to AA+, etc., so that higher numerical values represent worse ratings. The median rating of a borrower with a rating-based loan is BBB, for a borrower with an accounting-based or with a fixed-rate contract it is BB-, i.e. four notches lower.

[Table 3 about here]

Figure 1 elaborates further on this latter aspect and shows the distribution of the three loan types according to the senior rating of the borrower at loan inception along the finer rating scale (including the rating modifiers + and -). The distribution of borrowers with ABPP contracts is particularly steep and situated mainly below the investment-grade boundary, while the distribution of RBPP contracts is slightly flatter and peaks at a BBB rating. Overall, the two PP distributions appear to be quite clearly divided by the investment-grade boundary. The distribution of fixed-rate contracts, in contrast, stretches virtually over the total rating universe, though a larger fraction of the density is situated in the subinvestment-grade region.

[Figure 1 about here]

Regarding the loan characteristics in Panel B of Table 3, we find that loans with RBPP provisions are larger (median tranche amount of US$ 470 million) than loans with ABPP (US$ 175 million) or with no-PP (US$ 200 million), have a shorter maturity and involve a higher number of previous deals. With a median maturity of 60 months, ABPP loans are comparably long-term. With regard to loan pricing, we find that the initial spread in RBPP loans is much lower than in ABPP contracts (58 basis points against 225 basis points), while the number of pricing buckets is about 5 for both types of contracts. At the same time, the spread change over the total pricing grid is smaller in RBPP (65 basis points) than in ABPP contracts (87.5 basis points). Finally, we observe that loan contracts with ABPP provisions are much more often collateralized than loans with RBPP or with no-PP, while RBPP loans are more often a line of credit. It is also interesting to note that contracts with PP (of either type) have a much higher probability of including financial covenants and are less likely to be a first deal with the lending bank than are contracts with fixed spreads.

Both borrower and loan characteristics hence show clear differences. Borrowers with ABPP and RBPP contracts display stronger growth according to their returns on assets and market-to-book values than borrowers with no-PP contracts. Borrowers with RBPP contracts, however, seem to be larger and of a higher quality as mirrored by their ratings. They also draw down larger loans. Firms with ABPP contracts, in contrast, appear to be more highly-levered and less transparent according to their intangible assets and they pledge collateral more often. These characteristics may be seen as first indications of debt-contracting problems that typically afflict opaque firms with high growth. In the following, we will use these differences in borrower and loan characteristics to examine in a multivariate analysis which functions the two types of PP provisions may fulfill.

4. Choice of performance measurement

To assess the differences in employment between ABPP and RBPP contracts, we run a multinomial logit regression where borrower and loan characteristics are used to explain the choice of RBPP over no-PP, respectively of ABPP over no-PP. The dependent variable takes on a value of 0 if the loan is of the fixed-rate category, of -1 if the loan uses RBPP provisions and of +1 if it uses ABPP provisions. Since we hypothesize that RBPP and ABPP loans fulfill different

functions, the assumption of independence of irrelevant alternatives that underlies the multinomial logit model should be defendable.[12]

Based on the earlier literature (John et al., 2003; Martin, 2009; Manso et al, 2010; Begley, 2012), we hypothesize that borrowers may use PP provisions to separate themselves from other borrowers with regard to their superior quality or to reduce agency costs in the form of investment inefficiencies. We consider both firm-specific and loan-specific variables as proxies for these two different functions.

We use several different proxies to capture firm quality. Clearly, the firm's credit rating will be a first indicator of credit quality. In a more prospective view, we also employ measures of growth as proxies for future quality:[13] the market-to-book ratio (MB) as the most-frequently used proxy of growth potential (Adam and Goyal, 2008)[14] and the return on assets (ROA) as a second indicator of growth. Furthermore, since among the high-quality firms those with more volatile growth development should be the ones in highest need of signaling, we also employ the four-quarter volatility in returns on assets (ROA-vola) as a further indicator. It should be noted that the market-to-book ratio, the return on assets and its volatility display correlation coefficients above 30%. We therefore run separate regressions (model I, II and III) where we include these variables in turn.

To gauge the potential for investment inefficiencies, we first of all consider the firms' leverage, since agency costs of debt increase strongly in the degree of indebtedness. We then use two more specific proxies: First, we employ intangible assets (int assets). This item includes patents, copyrights, trademarks and operating licenses that qualify for the interpretation of real options in the sense of Myers (1977). Highly-levered firms with considerable real growth options are most likely to suffer from suboptimal investment decisions because intangible growth opportunities are particularly difficult to contract upon. This raises the costs of debt and affects the firms' investment choices (Sundaresan, Wang and Yang, 2014; Martin, 2009). Second, according to John et al. (2003), the pledging of safe assets as collateral in loan contracts creates an underinvestment problem. We hence use a dummy variable (sec dum) for the secured status of a loan as a more specific indicator for underinvestment problems.

Additionally to these main variables, we include several borrower and loan characteristics as control variables. Among the firm-specific factors we consider the firm size (calculated as the natural logarithm of total assets) and control for the borrower's industry. Among the loan

[12] We also employ a multinomial probit model in a robustness check to weaken the assumption of independence of irrelevant alternatives. The results are qualitatively unchanged and are available upon request.

[13] All firm-specific variables are taken from the quarter before the loan initiation.

[14] We are aware of the fact that the market-to-book ratio might be affected by accounting conservatism. Current research attempts to quantify the importance of accounting conservatism in the market-to-book ratio (McNichols et al., 2010). In order to render our results more robust, we therefore consider alternative measures of growth such as the return on assets or the amount of intangible assets.

characteristics we use the natural logarithm of the loan size, the loan maturity and the number of lenders. We include dummies for a first deal, for the existence of financial covenants and for loan syndication. Loan purpose and loan type dummies control for the stated purpose of the loan, e.g. capital structure or working capital reasons, and the stated loan type, e.g. bridge loan, term loan or credit line. Finally, to account for macroeconomic effects, we also include the LIBOR. A summary of the variables and a brief description of their construction and data source are given in Appendix B. Table 4 presents the results.

[Table 4 about here]

Note that every two adjoining columns, denoted RBPP and ABPP, belong to one multinomial regression model. Signs of coefficients have to be interpreted relative to the choice of a fixed rate contract in each case.[15]

Supporting the descriptive analysis of Section 3, we find that RBPP contracts are more likely to be drawn down than fixed-rate contracts if a borrower has a good rating. RBPP borrowers also show a higher growth-potential via the significant MB. Similarly, their ROA is higher, but also more volatile than for borrowers with no-PP contracts. Finally, borrowers with RBPP contracts have a lower leverage and pledge collateral less often than borrowers with fixed-rate contracts. Borrowers with ABPP contracts, in contrast, also display a higher ROA but they hold a much higher fraction of intangible assets than fixed-rate borrowers. Finally, ABPP contracts also require the pledging of collateral more often.

While both types of PP contracts hence seem to be used by borrowers with high growth potential, these growth opportunities appear to induce different types of problems: Borrowers with RBPP contracts display a very volatile return development,[16] whereas borrowers with ABPP contracts show rather opaque growth opportunities due to the high fraction of intangible assets. The latter characteristic may be interpreted as a strong susceptibility to investment inefficiencies in the general sense of Myers (1977). Additionally, we see that borrowers with ABPP contracts pledge collateral much more often which, according to John et al. (2003), contributes to underinvestment problems as one particular type of investment inefficiencies. These results may be taken as a first indication that borrowers with RBPP contracts feel the need

[15] For example, the negative coefficient of the leverage tells that a higher leverage significantly reduces the probability of employing RBPP provisions as compared to fixed-rate contracts, but it does not significantly influence the use of ABPP provisions relative to fixed-rate contracts.

[16] This is a very interesting observation since it might have been expected that – due to the proclaimed stability of credit ratings via the "through-the-cycle" rating methodology – only borrowers with stable performance make use of ratings as performance measures. However, it seems to be exactly the other way round: Borrowers with volatile performance paths tend to be assessed by a stable measurement type. This procedure may help to reduce the costs of frequent interest rate changes that would be the consequence of performance measurement via accounting ratios.

to signal a high and sustainable future quality, while borrowers with ABPP contracts appear to be affected by investment inefficiencies. On the basis of these findings, we shall in the following scrutinize the pricing grids that the two types of PP contracts stipulate and examine whether the pricing designs are conducive to solving the respective problems.

5. Choice of pricing grid asymmetry

5.1. Univariate analysis

In order to examine the channel via which PP provisions may help to signal quality or reduce underinvestment, we need to assess more closely the design of the pricing grid, i.e. its spread-increase respectively spread-decrease potential relative to the initial spread. We develop an index variable that captures the asymmetry of the pricing grid in a simple way. The index variable (DTI for spread decrease-to-increase potential)

$$DTI = 2 \cdot \frac{initial\ spread - lowest\ spread}{highest\ spread - lowest\ spread} - 1 \in [-1,1]$$

is centered around 0. A DTI value of 0 represents a fully symmetric pricing design that allows the same amount of spread decreases for performance improvements as spread increases for performance deteriorations. A value of +1 (-1) indicates that, at the loan's inception, the borrower is located in the pricing bucket with the highest (lowest) spread and, as a consequence, can only see spread decreases (increases). Hence, the higher the index value, the larger are the potential spread reductions relative to spread increases that the contract stipulates.

Referring to the two exemplary loan contracts described in Section 2, we calculate a DTI value for the ABPP loan of 0.25 and for the RBPP loan of -1. The ABPP loan hence allows for 25% more spread decreases than increases relative to the initial spread, while the RBPP contract stipulates only spread increases over the loan duration.

For our loan sample, we find the average DTI value for contracts with RBPP provisions to be -.35, for contracts with ABPP provisions it is .44. Average RBPP contracts hence allocate 35% more potential to spread increases, while ABPP contracts allow for 44% more spread reductions. Furthermore, 21.8% of the firms with RBPP contracts are not allowed any spread reductions since they are already placed in the pricing bucket with the lowest spread (DTI value of -1). With ABPP, in contrast, 44.7% of the borrowers can only reduce their spreads as they are initially already placed in the bucket with the highest spread (DTI value of +1). However, about 70% of all RBPP contracts and almost 50% of all ABPP contracts allow for both spread increases and spread decreases. Figure 2 illustrates the distribution of the DTI ratio.

[Figure 2 about here]

The fact that ABPP contracts allow for stronger spread reduction potential, while RBPP contracts tend to grant more spread increase potential supports the indicated investment incentivizing function of ABPP contracts and signaling function of RBPP contracts: Reducing the debt costs for borrowers with improving performance in ABPP loans mitigates the underinvestment incentive, while the threat of increasing debt costs for borrowers with deteriorating performance in RBPP loans makes the claim of a borrower's high quality credible.

However, robust conclusions can only be drawn from a multivariate analysis.[17] When examining the DTI ratio in a multivariate approach, though, we need to take into account that this variable is co-determined with the initial spread requested at the initiation of the loan (the all-in spread drawn, AISD). The negotiation between the borrowing firm and the lending bank makes it well conceivable that a complementary relation between the initial spread and the DTI ratio arises: a higher spread increase potential, i.e. a smaller DTI ratio, in exchange for a lower initial spread and vice versa.

Before conducting a simultaneous estimation of the DTI index and the initial spread, it is worthwhile to examine the distribution of the initial spread over the three different contract groups. Figure 3 depicts the mean AISD at loan origination conditional on the borrower's rating, differentiating between ABPP contracts, RBPP contracts and fixed-rate contracts. A very interesting observation can be made: Not only in RBPP loans are initial spreads indeed lower than in fixed-rate contracts over almost all rating classes,[18] but also the initial spreads in ABPP contracts are lower – at least for the speculative-grade rating classes, where ABPP loans are most often used. This latter observation is particularly surprising since it cannot be explained by the complementary relation between the initial spread and the DTI ratio that may arise from the negotiation between the borrowing firm and the lending bank. Rather, ABPP contracts grant high spread reduction potential - and still seem to offer lower initial spreads than fixed-rate contracts.

[Figure 3 about here]

Even though the observation of lower initial spreads may be taken as a first sign that PP provisions are indeed successful in their respective function by reducing the debt-contracting problems vis-à-vis fixed rate contracts, we need to control for additional borrower- and loan-

[17] In a univariate analysis we cannot not rule out that the strong spread increase potential in RBPP contracts is simply caused by the fact that borrowers with these provisions are highly rated, i.e. nearer to the top of the rating scale (AAA), such that, by definition, further rating improvements and, hence, spread decreases are hardly possible. The same argument would not be applicable to ABPP contracts, though, since the debt to cash-flow measure is not bounded on a specific interval that would prescribe a maximum spread charge.

[18] This holds with the exception of loan contracts issued by borrowers with ratings of AA and better. The number of borrowers with RBPP loans in these rating classes is very small, though.

specific characteristics before we are able to draw a solid conclusion in this respect. This will be done in the next section.

5.2 Simultaneous estimation of pricing variables

An analysis of the asymmetry of the pricing grid and of the initial spread level in a multivariate approach needs to consider the relationship between these two variables. It is reasonable to assume that the two pricing variables will be decided upon simultaneously. We therefore employ a system of simultaneous equations and treat the two pricing variables as endogenous. Of particular interest is how the proxies for the signaling function and the investment incentivizing function, in particular the leverage, market-to-book value, intangible assets, and collateral pledging, affect these two endogenous pricing variables. We also include loan-specific control variables such as the loan maturity and financial covenants and treat them effectively as exogenous variables.[19] As further control variables, we consider dummies for the borrower's rating class. Since these represent a borrower's default risk, they should be expected to influence both the asymmetry of the pricing grid and the spread initially requested. Further variables that control for the loan being a first deal, for the loan purpose and for the number of lenders and the LIBOR will only be included in the AISD equation. In sum, we run the following system of two equations:

$$DTI = \alpha_0 + \alpha_1\ RBPP\ dum + \alpha_2\ AISD + \alpha_3 leverage + \alpha_4 MB + \alpha_5 int\ assets + \alpha_6 sec\ dum + \alpha_7 maturity + \alpha_8 fincov\ dum + \boldsymbol{\alpha}_9\ controls\_sc + \varepsilon$$

$$AISD = \beta_0 + \beta_1\ RBPP\ dum + \beta_2\ DTI + \beta_3 leverage + \beta_4 MB + \beta_5 int\ assets + \beta_6 sec\ dum + \beta_7 maturity + \beta_8 fincov\ dum + \boldsymbol{\beta}_9 controls\_AISD + \zeta$$

Note that in order to allow for differential pricing effects between ABPP and RBPP contracts, we interact the explanatory variables with a dummy for RBPP provisions. For reasons of brevity, we report only those interaction effects that show significant differential impacts of RBPP and ABPP contracts. Given the non-linearity of our estimation technique, the employment of interaction terms may nevertheless be seen as problematic. We therefore also run the equation system individually on the subset of ABPP contracts and on the subset of RBPP contracts. Though we do not report the results, this procedure can be shown to deliver similar qualitative

[19] Though we are aware of the fact that the various loan provisions may be decided upon simultaneously as well, we believe it is warranted to assume that the non-pricing related items of a loan contract are the basis upon which the decision on the pricing will be made.

results. Finally, note that we do not – in accordance with the literature – quote the R^2 for the estimated equations as these are unreliable test statistics in system estimations (Goldberger, 1991). Table 5 displays the results of the simultaneous estimation procedure.

[Table 5 about here]

From the DTI equation, we make a first interesting observation: The RBPP dummy does not show a significant coefficient. Hence, despite the strong observable differences between the DTI ratio distributions of RBPP and ABPP contracts as indicated in Figure 2, we cannot conclude that the pricing asymmetry is influenced by the type of performance measurement per se.

Rather, it seems to be the factors that represent the underlying agency problem that drive the design of the pricing grid. In this respect, we observe that the DTI ratio is negatively affected by the MB. Hence, the higher the growth potential of the borrower as indicated by the MB, the smaller is the decrease-to-increase potential in the spread, i.e. the more importance does the pricing grid give to spread increases rather than spread reductions. This clearly coincides with the signaling function of the pricing scheme.

Even though the intangible assets do not show a significant impact on the asymmetry of the pricing grid, the pledging of collateral does: We find a highly significant positive effect on the DTI ratio of collateral pledging in ABPP contracts. The effect in RBPP contracts is much weaker both statistically and economically as it is given by the sum of the sec dum coefficient, which is positive, and the interaction term's (sec dum x RBPP dum) coefficient, which is negative. Also, worse ratings lead to a higher spread decrease-to-increase ratio. Thus, borrowers with more severe underinvestment problems are dealt loans with higher spread reduction potential.

Corresponding to the complementary relation between the two pricing variables delineated in Section 5.1, we find that the DTI ratio is indeed positively affected by the initial spread. I.e. the higher the AISD, the larger is the spread decrease potential that the contract grants. Vice versa, the lower the initial spread, the larger is the spread increase potential of the loan. This effect holds both for ABPP and RBPP contracts, since the (unreported) interaction with the RBPP dummy does not display a significant coefficient.

Interestingly, the inclusion of financial covenants raises the DTI in RBPP but not ABPP contracts. Stated differently, the use of financial covenants reduces the spread-increase or signaling potential of the RBPP grid. This may be taken as an indication of a substitutionary relationship between RBPP provisions and financial covenants. It may even support the interpretation of PP provisions as a smoother version of financial covenants: While covenants prescribe a change in contract conditions at only one specific point (at the breach of the

respective ratio or the triggering of a rating threshold), PP provisions prescribe a staggered reaction over the respective ratio or rating development.

Note that the results do not change if we replace the MB by the ROA. The ROA-volatility, in contrast, turns out to be not significant. For reasons of brevity, we do not display these results. Overall, our findings show quite clearly that the asymmetry of the pricing grid is conducive to remedying the borrowers' debt contracting problems that appear to be different for borrowers with ABPP and those with RBPP contracts. Specifically, the pledging of collateral for high-risk borrowers with ensuing underinvestment problems appears to be mitigated by loan contracts with strong spread decrease-to-increase ratio. Conversely, borrowers with particularly strong growth potential seem to employ loan contracts with lower DTI ratio the higher their growth potential is. This threat of interest rate increases in case of performance deteriorations renders the signal of a sustainable future quality credible.

Looking at the AISD in the second equation, one of the most interesting observations is that the DTI ratio has a strong negative impact on the initial spread in ABPP contracts, but a weak positive effect in RBPP contracts. Hence, a *higher* DTI ratio leads to a lower initial spread in ABPP contracts, but in RBPP contracts it is a *lower* DTI (i.e. a higher spread *increase* potential) that reduces the initial spread. Combined with the results from the first equation, this may be taken as an indication that ABPP contracts with high DTI ratios are indeed perceived as successful instruments to mitigate underinvestment problems and therefore lead to a lower initial spread if the pricing grid stipulates this feature. Contracts with RBPP provisions, in contrast, that threaten the borrower with higher spread increases in case of quality deteriorations (low DTI ratios) seem to work as credible signals of high quality so that initial spreads can equally be reduced.

Additional observations from the AISD estimation equation support this conclusion: First, as a higher leverage increases the problems of investment inefficiencies but not the need to signal high-growth potential, this may explain why the leverage increases the initial spread strongly in ABPP contracts but hardly in RBPP contracts. Second, similar effects can be observed for the secured dummy and the loan maturity. Both variables have a strong, positive effect on the initial spread in ABPP loans but almost none in RBPP loans. Particularly the effect of the secured status deserves some further examination. At first sight, it may appear intriguing that a borrower needs to pay a higher initial spread if she pledges collateral, even after controlling for the borrower's rating. John et al. (2003) solved this puzzle by showing that the pledging of safe assets as collateral aggravates the underinvestment problem that may afflict highly levered borrowers. They conclude that the rating process is not able to account for the increase in credit risk that follows from refraining to invest in upholding the value of assets pledged as collateral

even though these investments enhance the firm value. Our analysis extends their findings by showing not only that this argument explains the preference of ABPP over RBPP provisions for borrowers that need to pledge collateral and, hence, are susceptible to this type of underinvestment problem. Also, we demonstrate that the corresponding pricing grid stipulates interest rate reductions in case of performance improvements that appear to reduce the underinvestment problem and the corresponding credit risk and therefore allow to decrease the initial spread requested.

5.3 Initial spread reduction vis-à-vis fixed rate contracts

Overall, we may conclude so far that the design of RBPP provisions indeed appears suitable for fulfilling the signaling role of debt contracts, while the design of ABPP provisions seems appropriate for attenuating underinvestment problems. In the following, we complement this qualitative result by an analysis of the quantitative effects that the choice of the appropriate PP provisions have for a borrower. Essentially, we ask the following question: If debt contracts with PP provisions are successful in reducing the respective debt-contracting problems, does this lead to lower credit costs for the borrower? We frame the analysis such that we will learn how much a borrower will save immediately by choosing a loan contract with ABPP or RBPP provisions rather than a fixed-rate contract. By running a simple OLS regression on the AISD at loan initiation, controlling for borrower and loan characteristics, we will indeed see that contracts with either ABPP or RBPP provisions offer significant spread reductions vis-à-vis loan contracts without performance pricing.

As can be seen from Table 6, ABPP contracts allow for an even stronger reduction of the initial spread relative to fixed-rate contracts than loans with RBPP provisions. The marginal impact that the ABPP dummy has on the initial spread is almost sufficient to counterbalance the strongly positive effect that the pledging of collateral has (-59.2268 vs. 62.4879). Our analysis hence supports the argument by John et al. (2003) that the credit rating does not sufficiently account for the increases in credit risk due to underinvestment problems triggered by collateral pledging: The securitization dummy shows a high, statistically and economically significant effect on the initial spread despite controlling for the borrower's rating.

[Table 6 about here]

With regard to the other variables, we find the expected results: The MB and the intangible assets, as proxies for growth potential, reduce the AISD, the leverage in contrast increases it.

Similar effects are obtained for the rating dummies which measure the impact on the AISD relative to the loan of a borrower with a AAA rating.

Note that we can even show (in unreported results) that PP loans with only spread decrease potential (i.e. with a DTI ratio of +1) feature a lower initial interest rate than fixed-rate loans.[20] This is an interesting result as it implies that even with the most favorable pricing design for the borrower, a lender is still willing to grant a lower initial interest rate than with a fixed-rate contract. Hence, the performance pricing feature seems to fulfill a relevant task that leads to a reduction in credit risk so that the debt costs can be reduced. While the quantitative effect on the initial spread for loans with DTI ratios of +1 is smaller when ABPP provisions are used than when RBPP provisions are employed, the overall reduction is still significant.

6. Ex-post performance effects

If the two types of PP provisions are effective in mitigating debt-contracting problems, we should be able to observe distinctive changes in the borrowers' performance in the months after the loan inception. Following Manso et al. (2010) and Martin (2009), we investigate whether and in which way the borrowers' ratings and leverages change after the loan initiation. We scrutinize the 2, 4 and 8-quarter period after the loan inception. Additionally, we investigate how the borrowers' returns on assets develop in order to gather a more complete picture on the borrowers' performance after the loan initiation.

Note that we run two different types of regressions for each of the dependent variables and for each time horizon. In the first, we include all loan observations and check whether the respective dependent variable develops differently for borrowers with RBPP respectively ABPP contracts vis-à-vis borrowers with fixed-rate contracts. In the second regression, we examine only borrowers with PP contracts and compare the development of those with ABPP and RBPP provisions. This allows us to employ the DTI ratio as an additional regressor and study whether the asymmetry of the pricing grid has an influence on the borrower's performance. Examining this effect allows a more comprehensive evaluation of the question if PP contracts are successful in fulfilling a signaling respectively investment incentivizing function.

Table 7 presents the results of a regression that uses rating changes as performance indicator. In contrast to Manso et al. (2010), we employ the rating change measured in rating notches as dependent variable.[21] Note that a negative rating change represents a rating improvement. As can be seen from Table 7, borrowers with PP provisions improve their ratings (as compared to borrowers with fixed-rate contracts) over all time horizons even after controlling for borrower

[20] Results are available upon request.

[21] Manso et al. (2010) run a probit analysis where the dependent variable indicates only whether the rating improved, decreased or did not change at all. Our analysis, in contrast, considers also the size of the rating change, measured in rating notches.

and loan characteristics. The effect increases over time, so that rating improvements over the two years after the loan initiation are larger than those over the six months following the loan's inception. Borrowers with RBPP contracts show even stronger rating improvements than borrowers with ABPP contracts as the regressions on the sub-sample of firms with PP contracts demonstrate.

[Table 7 about here]

Most important for our analysis, however, is the effect that the asymmetry of the pricing grid exerts on the borrowing firm's ability to improve its rating: We find that a higher DTI ratio leads to rating deteriorations after the loan's inception. For ABPP contracts, the effect is only weakly significant and holds only for the medium to long time horizon. It is also small economically. For RBPP contracts, however, the effect is highly significant, both statistically and economically. It is given by the sum of the DTI coefficient and the coefficient of the interaction term DTI * RBPP dum. This clearly corroborates the signaling function of RBPP contracts: The stronger the interest rate increases (i.e. the smaller the DTI ratio) that the contract stipulates in order to signal a high sustainable quality, the stronger are the rating improvements in the quarters after the loan initiation.

Furthermore, as should have been expected, we observe that the MB has a positive effect on rating improvements, so that borrowers with higher growth potential are upgraded more strongly than borrowers with low growth potential. Similarly, the leverage's effect coincides with conventional wisdom that firms with weaker credit quality are downgraded more strongly. Interestingly, both variables have a slightly weaker economic effect on the rating change in the sub-sample of borrowers with PP contracts than in the total sample.

Interestingly, while the pledging of collateral leads to rating deteriorations the economic size of this effect is smaller if only PP contracts are analyzed. Again, this may be taken as an indication that the incentive effects induced by the pricing grids are effective in reducing underinvestment problems that may be induced by the pledging of collateral.

Table 8 reports the results from the regression that uses leverage changes as dependent variable. We observe that, compared to borrowers with fixed-rate contracts, borrowers with ABPP contracts increase their leverages in the first six months after the loan inception, while debtor firms with RBPP contracts reduce their leverages in the medium to long term. Again, the most interesting result relates to the effect that the asymmetry of the pricing grid exerts. We find that a higher reduction potential significantly raises the leverage for borrowers with ABPP contracts, as shown by the highly significant positive DTI ratio. The effect for borrowers with RBPP contracts

is much smaller, in contrast, because the interaction term DTI * RBPP dum displays a negative sign that almost halves the impact of the DTI ratio. This finding coincides with the investment incentivizing function of ABPP contracts: It shows that firms with underinvestment problems are able to overcome their financing shortages and increase their leverages after the employment of the appropriate PP loan contract.

[Table 8 about here]

In the short run, i.e. over the 6 months after loan inception, we also observe that after the pledging of collateral borrowers are able to raise their leverage, even though this effect shows only weak significance. Finally, the variable tranche imp measures the importance that the loan has for the firm. It is measured as the proportion of the loan size relative to the size of the borrower's balance sheet. As can be seen, a more sizeable loan increases the borrower's leverage not only in the short-run, but also in the medium to long-run.

Finally, Table 9 reports the results of a regression on the changes in borrowers' ROA. We observe only a short-term positive effect of RBPP provisions on returns, both in comparison to fixed-rate contracts and to ABPP contracts. Supporting our earlier findings on the signaling function of RBPP provisions, however, we see that a higher spread decrease to increase has a negative effect on the returns for borrowers with RBPP contracts but not for those with ABPP contracts. A higher signaling capacity of the loan contract (i.e. a lower DTI ratio) when RBPP provisions are used then leads to a better performance of the borrower as measured by the ROA in the medium to long-term. Interestingly, we also find that higher intangible assets increase a borrower's returns, while a more sizable loan reduces the returns.

[Table 9 about here]

Overall, our results hence support the conjecture that RBPP contracts are used by firms with high growth potential as a device to signal high and sustainable quality. Indeed, these borrowers show rating improvements and return increases after the loan initiation that are the stronger the larger the signaling potential of the loan contract, i.e. the larger the potential spread increases that the contract stipulates. ABPP contracts, in contrast, appear to be successful in mitigating the negative relationship between growth potential and leverage due to inefficient investment decisions. Borrowers with ABPP contracts indeed show leverage increases after the loan initiation that are the higher the stronger the interest rate reduction potential is that the contracts allow. The combination of performance measurement type with the asymmetry of the pricing

grid hence appears vital in resolving two important debt-contracting problems. The fact that the employment of PP contracts is successful is mirrored not only in a reduction of the interest rate charged at the loan initiation (ex-ante effect) but also in the respective performance development of the borrower after the loan initiation (ex-post effect).

7. Robustness tests

Our results are supported by different sets of robustness checks on some of which we already commented where appropriate throughout the text. In this section, we briefly portray the most important or interesting further analyses.

With regard to the choice of performance measurement, we also test whether banks tend to assign RBPP contracts to borrowers for which they expect performance improvements in the future. The argument underlying this hypothesis would be that due to the through-the-cycle rating methodology, credit ratings tend to react to performance improvements later than accounting ratios (Altman and Rijken, 2005). As such, by employing RBPP contracts for borrowers with expected performance improvements, the lending bank would have to reduce the interest rate at a later time than with ABPP contracts. In order to test this hypothesis, we proxy the expected future performance of a borrower in two ways: First, we use the past rating changes over a period of 2 and 4 quarters before the loan initiation, essentially assuming that past rating changes are valid predictors of future rating changes. Second, we use the Z-score change over the 2 and 4 quarters before the loan inception. Once we control for borrower growth by considering MB or intangible assets, however, our proxies for expected performance improvements lose significance. Hence, it does not seem to be the case that banks strategically choose a performance measure that allows to share the benefit of performance increases at the latest point in time. Moreover, this hypothesis implies a strong degree of negotiation power on the part of the lending bank, which we cannot test for.

A further concern regarding the choice of performance measure could be rooted in the fact that credit ratings do not represent a linear measure of credit risk. Rather, the probability of default increases much more strongly with each rating notch in the speculative grade region than for investment-grade ratings. As such, it could simply be the case that low-quality borrowers cannot be assessed sufficiently precisely by use of credit ratings and therefore accounting-ratios need to be employed in their loan contracts. In order to test this hypothesis, we analyze the correspondence between credit ratings and the Debt/EBITDA ratio as stated in the most recent version of S&P's key industrial and utility financial ratios. Converting the pricing grids of a sample of RBPP loans in our sample into pricing grids based on the corresponding Debt/EBITDA ratios shows that there are virtually no differences: Both the spread level in the

respective pricing buckets and the breadth of the pricing buckets are almost the same, no matter whether performance is measured via the borrower's rating or Debt/EBITDA ratio. Hence, we conclude that it does not matter from a measurement precision viewpoint whether low-quality borrowers apply ABPP or RBPP provisions.

One further set of robustness checks refers to the approximation of the pricing design. As Table 3 indicates, not only the spread change over the pricing grid appears to differ between ABPP and RBPP contracts but also the number of pricing buckets that the contracts stipulate. Therefore, we calculate an additional ratio that is constructed similarly to the DTI ratio but refers to the number of pricing classes instead of the spread change over the pricing buckets. It is calculated as DTI_classes = 2(number of initial class – 1)/(total number of classes – 1)-1 and describes how much "room" for spread increases or decreases the contract stipulates. The average ratio values are -.12 for RBPP contracts and .46 for ABPP contracts, which is roughly comparable to the values for the DTI ratio. The average RBPP contract hence stipulates 12% more pricing buckets with higher interest rates than with lower interest rates, while the average ABPP contract stipulates 46% more pricing buckets with lower interest rates than with higher rates. When re-running the estimations of Sections 5.2 and 6 with the DTI_classes ratio instead of the DTI ratio, we derive very similar results that are available upon request.

We also calculate all models interchangeably with the ratings in linearized form (1 for AAA, 2 for AA+, 3 for AA etc.) and with rating dummies. Since these variables serve mainly as control factors, we hardly comment on the respective choice throughout the text. It should be stressed, however, that the particular method of how to account for a borrower's credit quality does not change our results in any way.

Finally, it should be noted that our main analyses focus on the tranche level of the loans. However, since more than half of the loans in our dataset contain more than one tranche, there may be further interdependencies that our econometric methodology fails to detect. We therefore re-run the full analysis on the subset of single-tranche loans. The results do hardly change even though we find a larger number of RBPP contracts in this dataset due to the larger size of these loans. For more information, see also Wiemann (2011).

8. Conclusion

A large fraction of bank loans nowadays include performance pricing provisions. This renders the charged interest rate a smooth function of the borrower's credit risk. Since different types of performance measures may be employed, a critical assessment of their strategic use appears consequential. In this paper, we show that PP provisions are used to solve information asymmetries or mitigate information inefficiencies and that the type of performance

measurement interacts with the asymmetry of the pricing grid: Rating-based PP provisions allow high-growth borrowers with volatile return development to signal their future quality via the threat of strong spread increases; accounting-based PP provisions, in contrast, are suited to solve the underinvestment problems of opaque-growth borrowers by incentivizing appropriate investment decisions via the promise of spread reductions. Both types of PP provisions are effective in mitigating the respective debt-contracting problem which explains the initial spread reductions as compared to fixed-rate contracts. The ensuing rating improvements and return increases of borrowers with RBPP contracts and leverage increases of borrowers with ABPP contracts that are strengthened by the respective asymmetries of the pricing grids are further evidence.

Our results extend earlier findings on the use of PP in loan contracts (Begley, 2012; Manso et al., 2010; Martin, 2009) by focusing on the interaction of two dimensions of the pricing design: the performance measurement and the asymmetry of the pricing scheme. Our work therefore helps to place the earlier findings into a broader perspective. Most notably, our results support findings from the literature on the use of accounting information. Moody's (2000), for instance, states that "EBITDA remains a legitimate tool for analyzing low-rated credits at the bottom of the cycle. Its use is less appropriate, however, for higher-rated and investment grade credits particularly mid-way through or at the top of the cycle." Furthermore, our paper contributes to the literature on the interdependencies of specific loan contracting mechanisms. Costello and Wittenberg-Moerman (2011), for instance, show that following internal control weakness reports, lenders substitute financial covenants with loan collateral. According to our results, this may be still the case for low-quality borrowers that employ ABPP provisions, but for high-quality borrowers financial covenants tend to have a substitutable relationship with rating-based PP provisions instead.

References

Adam, Tim and Vidhan K. Goyal, 2008, The investment opportunity set and its proxy variables, Journal of Financial Research 31(1), 41-63.

Adam, Tim and Daniel Streitz, 2014, Hold-Up and the Use of Performance-Sensitive Debt, mimeo, Humboldt-University Berlin.

Altman, Edward I. and Herbert A. Rijken, 2005, The impact of the rating agencies' through-the-cycle methodology on rating dynamics, Economic Notes 34(2), 127-154.

Asquith, Paul, Anne Beatty and Joseph Weber, 2005, Performance pricing in bank debt contracts, Journal of Accounting and Economics 40, 101-128.

Ball, Ryan, Robert Bushman and Florin P. Vasvari, 2008, The Debt-Contracting Value of Accounting Information and Loan Syndicate Structure, Journal of Accounting Research 46(2), 247-287.

Begley, Taylor, 2012, Signaling, Financial Constraints and Performance Sensitive Debt, mimeo, University of Michigan.

Berlin, Mitchell and Loretta J. Mester, 1992, Debt covenants and renegotiation. Journal of Financial Intermediation 2(2), 95-133.

Billett, Matthew T., Tao-Hsien Dolly King and David C. Maurer, 2007, Growth opportunities and the choice of leverage, debt maturity, and covenants, Journal of Finance 62, 697-730.

Chava, Sudheer and Michael R. Roberts, 2008, How Does Financing Impact Investment? The Role of Debt Covenants. Journal of Finance 63(5), 2085-2121.

Christensen, Hans B. and Valeri V. Nikolaev, 2012, Capital versus performance covenants in debt contracts, Journal of Accounting Research 50, 75-116.

Costello, Anna and Regina Wittenberg-Moerman, 2011, The impact of financial reporting quality on debt contracting: Evidence from internal control weakness reports, Journal of Accounting Research 49(1), 97-136.

Demerjian, P.R., 2011, Accounting standards and debt covenants: Has the "Balance Sheet Approach" led to a decline in the use of balance sheet covenants? Journal of Accounting and Economics 52, 178-202.

Garleanu, N. and J. Zwiebel, 2009, Design and Renegotiation of Debt Covenants, Review of Financial Studies 22, 749-781.

Goldberger, A.R., 1991, A Course in Econometrics, Harvard University Press, Cambridge, MA.

Jensen, M. and W. Meckling, 1976, Theory of the firm: managerial behavior, agency costs, and ownership structure, Journal of Financial Economics 3, 305-360.

John, Kose, Anthony W. Lynch and Manju Puri, 2003, Credit Ratings, Collateral, and Loan Characteristics: Implications for Yield, Journal of Business 76(3), 371-409.

Koziol, Christian and Jochen Lawrenz, 2010, Optimal design of rating-trigger step-up bonds: Agency conflicts versus asymmetric information, Journal of Corporate Finance 16(2), 182-204.

Loomis, Floyd, 1991, Performance-based loan pricing techniques. Journal of Commercial Bank Lending, 7-17.

Manso, Gustavo, Bruno Strulovici, Alexei Tchistyi, 2010, Performance-Sensitive Debt, Review of Financial Studies 23(5), 1819-1854.

Martin, Xiumin, 2009, Growth Opportunities, Suboptimal Investments and Step-down Performance Sensitive Debt, mimeo, Washington University in Saint Louis - Olin School of Business.

McNichols, Maureen, Madhav V. Rahan, Stefan Reichelstein, 2010, Decomposition of the Market-to-Book Ratio: Theory and Evidence, mimeo, Stanford University - Graduate School of Business.

Moody's Investors Service, 2000, Putting EBITDA In Perspective - Ten Critical Failings Of EBITDA As The Principal Determinant Of Cash Flow. Special Comment.

Myers, Stewart C., 1977, Determinants of corporate borrowing, Journal of Financial Economics 5, 147-175.

Rajan, Raghuram and Andrew Winton, 1995, Covenants and Collateral as Incentives to Monitor, Journal of Finance 50(4), 1113-1146.

Rajan, Raghuram and Luigi Zingales, 1995, What do we know about capital structure? Some evidence from international data, Journal of Finance 50, 1421-1460.

Roberts, Michael R. and Amir Sufi, 2009, Renegotiation of financial contracts: Evidence from private credit agreements. Journal of Financial Economics 93(2), 159-184.

Sundaresan, Suresh, Neng Wang and Jinqiang Yang, 2014, Dynamic investment, capital structure, and debt overhang, mimeo, Columbia University.

Wiemann, Markus, 2011, Rating-based performance pricing in loan contracts –
The influence of credit ratings on borrowers in monetary terms, mimeo, Frankfurt School of Finance & Management.

Tables

Table 1: Types of performance measures
The table presents the absolute number and fractions of different performance measurement types used in the initial data sample. The frequency column displays the number of deals and the corresponding percentages. The volume column provides the loan amount in billion US$ that is linked, by contract, to the different performance measurement types. Note that – though uncommon – a loan deal can be bound to more than one performance measure. Therefore, the numbers in the table add up to slightly more than the total number of deals with performance pricing and to more than the total dollar volume.

Performance measure	Frequency		Volume	
	N	Percentage	Amount (in billion US$)	Percentage
Total	16,037	100%	4,859	100%
Debt/EBITDA ratio	9,119	56.86%	1,587	32.65%
senior rating	3,544	22.10%	2,605	53.61%
user condition	1,154	7.20%	256	5.27%
leverage	789	4.92%	177	3.64%
senior debt	625	3.90%	123	2.53%
fixed-charge conversion ratio	433	2.70%	48	0.99%
interest coverage ratio	353	2.20%	61	1.25%
debt to tangible net worth	339	2.11%	31	0.64%
outstandings in %	294	1.83%	53	1.09%
maturity	167	1.04%	77	1.59%
debt service coverage ratio	130	0.81%	7	0.14%
commercial paper rating	16	0.10%	8	0.17%
sub rating	1	0.01%	1	0.02%

Table 2: Distribution of loan types by year

Number of loan inititations in the three loan groups per year.

Year	Total	No-PP	ABPP	RBPP
1993	114	103	2	9
1994	141	96	12	33
1995	145	58	38	49
1996	172	70	42	60
1997	308	111	99	98
1998	290	90	138	62
1999	321	134	106	81
2000	357	110	121	126
2001	376	157	82	137
2002	328	121	72	135
2003	390	146	113	131
2004	469	161	125	183
2005	526	164	137	225
2006	408	146	95	167
2007	406	162	104	140
2008	154	60	40	54
Total	4,905	1,889	1,326	1,690

Table 3: Sample summary statistics

The table reports descriptive statistics for the sample of loans with fixed interest rate, with ABPP provisions and with RBPP provisions. N reports the total number of loans in the respective category, sd refers to the standard deviation. Total assets, market value and tranche amount are reported in US$ million, maturity in months and the all-in spread in basis points. Letter ratings have been converted to a numerical scale, where 1 is equivalent to AAA, 2 to AA+, etc. Delta spread refers to the total spread change that the pricing grid stipulates.

	No-PP				ABPP				RBPP			
	N	mean	median	sd	N	mean	median	sd	N	mean	median	sd
Panel A: Borrower characteristics												
market value	1,889	4,620	943	14,328	1,326	1,615	810	2,645	1,690	8,733	4,028	13,268
total assets	1,889	6,252	1,759	14,805	1,326	2,011	1,035	3,246	1,690	10,265	4,616	17,012
return on assets	1,889	0.11	0.11	0.10	1,326	0.14	0.13	0.07	1,690	0.14	0.13	0.08
return on assets volatility	1,802	0.02	0.01	0.08	1,264	0.01	0.01	0.02	1,600	0.01	0.01	0.02
market-to-book ratio	1,889	1.48	1.28	0.83	1,326	1.58	1.41	0.82	1,690	1.61	1.40	0.96
intangible assets/total assets	995	0.21	0.14	0.22	688	0.29	0.27	0.22	1,072	0.17	0.12	0.17
leverage	1,889	0.45	0.41	0.29	1,326	0.47	0.44	0.25	1,690	0.31	0.30	0.15
S&P senior rating	1,889	12.2	13	3.7	1,326	12.9	13	1.8	1,690	8.5	9	2.3
Panel B: Loan characteristics												
tranche amount	1,889	488	200	1,100	1,326	304	175	473	1,690	799	470	1,380
maturity	1,889	47.8	49	29.2	1,326	61.3	60	18.5	1,690	41.8	59	22.6
number of previous deals	1,889	3.63	3	3.64	1,326	3.44	3	2.70	1,690	4.43	3	3.98
initial all-in spread drawn	1,889	237	225	167	1,326	213	225	78	1,690	80	58	70
no. PP classes					1,326	4.65	5	1.51	1,690	5.14	5	1.10
delta spread					1,326	90.4	87.5	41.0	1,690	72.1	65	38.3
		Fraction				Fraction				Fraction		
secured (1 = secured; 0 = else)		0.7385				0.9208				0.1651		
financial covenants (1 = has f.c.; 0 = else)		0.5823				0.9600				0.9183		
line of credit (1 = Loc; 0 = else)		0.5183				0.6327				0.8710		
first deal (1 = first deal; 0 = else)		0.2319				0.1487				0.1456		

Table 4: Choice of RBPP vs no-PP and ABPP vs no-PP

Multinomial logit regression on the choice of the loan contract featuring RBPP provisions versus no-PP provisions and of ABPP provisions versus no-PP provisions. A full description of the variables can be found in Appendix B. ***, ** and * indicate significance at the 1%, 5% and 10% level. Unreported standard errors are clustered on the firm level.

	model I		model II		model III	
Explanatory variables	RBPP	ABPP	RBPP	ABPP	RBPP	ABPP
rating	-.2780***	-.0632	-.2740***	-.0385	-.3105***	-.0662*
MB	.2726**	.0363				
ROA			3.5112***	2.6590**		
ROA-vola					5.3385**	-7.9222
leverage	-.9032**	-.2885	-1.0271**	-.5447	-.7731*	-.1665
int assets	-.1981	1.4407***	.0070	1.5669***	-.2324	1.3377***
sec dum	-1.4781***	.9105***	-1.4563***	.9356***	-1.5426***	.8810***
ln total assets	.0511	-.4265***	.0728	-.3650***	.0074	-.4263***
ln tranche amount	.2992***	-.0024	.2757**	-.0335	.2931***	-.0181
maturity	.0028	.0239***	.0023	.0228***	.0044	.0237***
# of lenders	.0210**	.0258**	.0199*	.0251**	.0234**	.0264**
first deal dum	.0530	-.0942	.0464	-.0987	.0511	-.0920
fincov dum	3.3035***	3.5389***	3.3066***	3.5199***	3.3762***	3.5214***
syn dummy	-.1788	1.1643	-.2158	1.1350	-.2220	.6700
LIBOR	.1660	.1544	.1711	.1546	.1469	.1599
constant	-2.4474	-17.4675	-1.4554	-17.1818	-1.9595	-16.4403
year dummies	yes	yes	yes	yes	yes	yes
industry dummies	yes	yes	yes	yes	yes	yes
loan type and purpose dummies	yes	yes	yes	yes	yes	yes
N	2755		2755		2640	
pseudo R^2	.44		.45		.44	
log likelihood	-1654.4233		-1650.6216		-1589.787	

Table 5: Joint determinants of DTI ratio and initial spread

The system of two equations jointly estimates the DTI ratio and the all-in spread drawn at loan initiation in a 2SLS-procedure. The number of observations is 1,760 in both equations and includes only the loans with PP provisions. A full description of the variables can be found in Appendix B. Further loan controls include dummies for loan purpose and loan type, the number of lenders, the loan size and a dummy for a first deal. ***, ** and * indicate significance at the 1%, 5% and 10% level.

	DTI
RBPP dum	.3189
AISD	.0022**
leverage	.1301
MB	-.0368**
int assets	.0462
sec dum	.3047***
sec dum x RBPP dum	-.2016*
maturity	.0082***
maturity x RBPP dum	-.0068***
fin cov	-.2409
fin cov x RBPP dum	.3856**
constant	-1.3902***
AA-dum	.0880
A-dum	.2792
BBB-dum	.5303**
BB-dum	.7413***
B-dum	.8054***
CCC or below-dum	.8208***

	AISD
RBPP dum	487.625**
DTI	-821.5928***
DTI x RBPP dum	833.9983***
leverage	408.5113***
leverage x RBPP dum	-348.3594**
MB	-34.5702**
int assets	-66.5905
sec dum	483.0926***
sec dum x RBPP dum	-456.1632**
maturity	3.9287**
maturity x RBPP dum	-3.2383*
fin cov	-21.4982
LIBOR	-24.0622***
constant	-276.0010
further loan controls	yes
rating dummies	yes

Table 6: Quantiative effects on the initial spread

OLS-regression on the all-in spread drawn at loan initiation. No-PP is the omitted category. A full description of the variables can be found in Appendix B. The sample includes both types of PP-contracts and fixed-rate contracts. ***, ** and * indicate significance at the 1%, 5% and 10% level. Unreported standard errors are clustered on the firm level.

	AISD
RBPP dum	-53.4198***
ABPP dum	-59.2268***
leverage	39.6971***
MB	-10.6419***
int assets	-39.6307***
sec dum	62.4879***
maturity	-.5392***
fin cov dum	11.1582*
AA-dum	3.6011
A-dum	20.0851
BBB-dum	52.5814*
BB-dum	103.2132***
B-dum	167.6652***
CCC or below-dum	259.4540***
LIBOR	-13.3469***
constant	348.7524***
loan controls	yes
# of observations	2755
adj. R^2	.58
F	188.89
prob > F	.0000

Table 7: Ex-post effects – Rating changes

OLS regressions on the rating change in notches over the 2, 4 and 8 quarters after loan initiation. The regressions differentiates between the sample of firms with PP only, so that Dummy RBPP takes on a value of 1 if a borrower has been assigned a loan contract with RBPP provisions and a value of 0 if a borrower has been assigned a loan contract with ABPP provisions, and the sample of all firms. In the latter case, the omitted category is the subsample of firms with no-PP contracts. A full description of the variables can be found in Appendix B. ***, ** and * indicate significance at the 1%, 5% and 10% level. Unreported standard errors are clustered on the loan deal level.

Explanatory variables	2-quarter change all lenders	2-quarter change PP only	4-quarter change all lenders	4-quarter change PP only	8-quarter change all lenders	8-quarter change PP only
RBPP dum	-.2510***	-.2259***	-.3148***	-.2722***	-.4251***	-.3497***
ABPP dum	-.3059***		-.3054***		-.3140***	
DTI		.0597		.1325**		.2311**
DTI * RBPP dum		.1842***		.2359***		.4969***
leverage	1.0268***	.2861***	1.3770***	.6616***	1.0233***	.8382***
MB	-.1424***	-.1087***	-.1992***	-.1877***	-.2567***	-.2221***
int assets	-.0380	-.0286	.1220	.0881	.1124	.2000
tranche imp	-.1079	.1893	-.0657	.2332	.1467	.5458**
maturity	-.0086***	-.0031***	-.0105***	-.0041***	-.0034*	-.0074***
sec dum	.2468***	.1547***	.3251***	.2574***	.4127***	.2578**
fin cov dum	.0697	-.0917	.2185**	-.0658	.0766	-.1471
constant	1.6193*	1.0150	2.3819**	1.9744*	3.1295**	2.5960*
rating dummies	yes	yes	yes	yes	yes	yes
tranche type and loan purpose dummies	yes	yes	yes	yes	yes	yes
industry dummies	yes	yes	yes	yes	yes	yes
year dummies	yes	yes	yes	yes	yes	yes
N	2649	1725	2574	1706	2320	1558
adj. R^2	.21	.23	.17	.19	.19	.21
F	17.72	13.30	13.24	10.57	13.65	10.87
prob > F	.0000	.0000	.0000	.0000	.0000	.0000

Table 8: Ex-post effects – Leverage changes

OLS regressions on the leverage change over the 2, 4 and 8 quarters after loan initiation. The regressions differentiates between the sample of firms with PP only, so that Dummy RBPP takes on a value of 1 if a borrower has been assigned a loan contract with RBPP provisions and a value of 0 if a borrower has been assigned a loan contract with ABPP provisions, and the sample of all firms. In the latter case, the omitted category is the subsample of firms with no-PP contracts. A full description of the variables can be found in Appendix B. ***, ** and * indicate significance at the 1%, 5% and 10% level. Unreported standard errors are clustered on the loan deal level.

Explanatory variables	2-quarter change all lenders	2-quarter change PP only	4-quarter change all lenders	4-quarter change PP only	8-quarter change all lenders	8-quarter change PP only
RBPP dum	-.0023	-.0071**	-.0224***	-.0246***	-.0406***	-.0299***
ABPP dum	.0121***		.0093		-.0076	
DTI		0.0082***		.0257***		.0236***
DTI * RBPP dum		-.0043		-.0161**		-.0108
leverage	-.1564***	-.0667***	-.1993***	-.1189***	-.1900***	-.1813***
MB	.0065***	.0011	.0104***	.0044	.0155***	.0021
int assets	.0022	-.0050	.0023	-.0151	-.0426**	-.0373**
tranche imp	.0405***	.0319***	.0696***	.0624***	.0660***	.0979***
maturity	.0001***	-.00001	.0006***	.00007	.0005***	.000004
sec dum	.0072*	.0051*	.0120	.0033	-.0019	-.0052
fin cov dum	-.0013	.0014	-.0010	-.0114	-.0170	-.0303*
constant	.1395***	.0480	.3739***	.1527	.4373***	.2101
rating dummies	yes	yes	yes	yes	yes	yes
tranche type and loan purpose dummies	yes	yes	yes	yes	yes	yes
industry dummies	yes	yes	yes	yes	yes	yes
year dummies	yes	yes	yes	yes	yes	yes
N	2755	1760	2598	1697	2382	1572
adj. R^2	.28	.19	.17	.18	.12	.18
F	25.87	10.84	14.02	9.65	8.90	9.38
prob > F	.0000	.0000	.0000	.0000	.0000	.0000

Table 9: Ex-post effects – Returns on assets-changes

OLS regressions on the change in returns on assets over the 2, 4 and 8 quarters after loan initiation. The regressions differentiates between the sample of firms with PP only, so that Dummy RBPP takes on a value of 1 if a borrower has been assigned a loan contract with RBPP provisions and a value of 0 if a borrower has been assigned a loan contract with ABPP provisions, and the sample of all firms. In the latter case, the omitted category is the subsample of firms with no-PP contracts. A full description of the variables can be found in Appendix B. ***, ** and * indicate significance at the 1%, 5% and 10% level. Unreported standard errors are clustered on the loan deal level.

Explanatory variables	2-quarter change all lenders	2-quarter change PP only	4-quarter change all lenders	4-quarter change PP only	8-quarter change all lenders	8-quarter change PP only
RBPP dum	.0173***	.0242***	-.0020	-.0013	-.0108**	-.0097
ABPP dum	.0003		.0040		.0016	
DTI		-.0045		-.0006		.0079*
DTI * RBPP dum		.0050		-.0094**		-.0236***
leverage	-.0329***	-.0093	.0087	.0215***	-.0018	.0067
MB	.0136***	.0140***	.0025	-.0023	-.0032	-.0097***
int assets	.0250***	.0266***	.0197***	.0146**	.0326***	.0397***
tranche imp	-.0190**	-.0268**	-.0402***	-.0341***	-.0512***	-.0363***
maturity	.0000004	-.00001	-.00001	.00003	.00007	.00006
sec dum	-.0014	.0103	-.0063	-.0010	-.0078	-.0059
fin cov dum	-.0071	-.0156	-.0069*	-.0008	-.0007	.0085
constant	-.6303***	-.0633	.0119	-.0333	.0703	.0395
rating dummies	yes	yes	yes	yes	yes	yes
tranche type dummies	yes	yes	yes	yes	yes	yes
loan purpose dummies	yes	yes	yes	yes	yes	yes
industry dummies	yes	yes	yes	yes	yes	yes
year dummies	yes	yes	yes	yes	yes	yes
N	2667	1726	2507	1645	2266	1498
adj. R^2	.11	.05	.08	.09	.08	.09
F	8.53	3.13	6.39	4.85	5.39	4.37
prob > F	.0000	.0000	.0000	.0000	.0000	.0000

Figures

Figure 1: Distribution of borrowers' rating levels at loan initiation

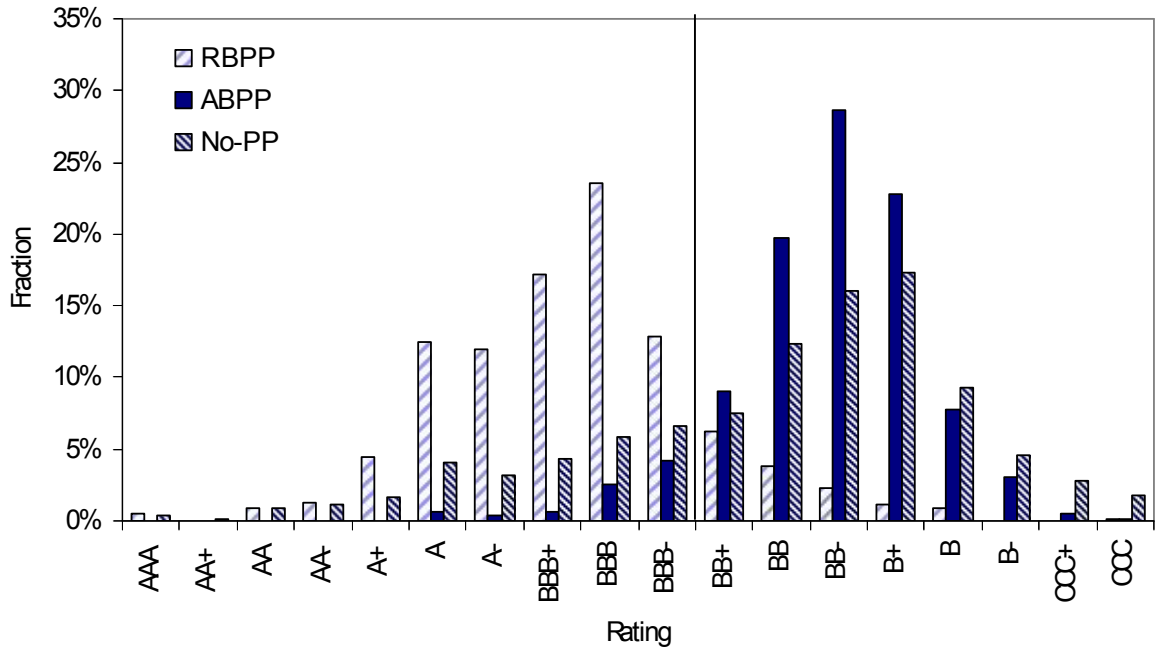


Figure 2: Histogram of DTI ratio

Bar chart of the distribution of the DTI ratio of the 1,760 PP contracts in our sample. The left column refers to RBPP contracts, the right column to ABPP contracts.

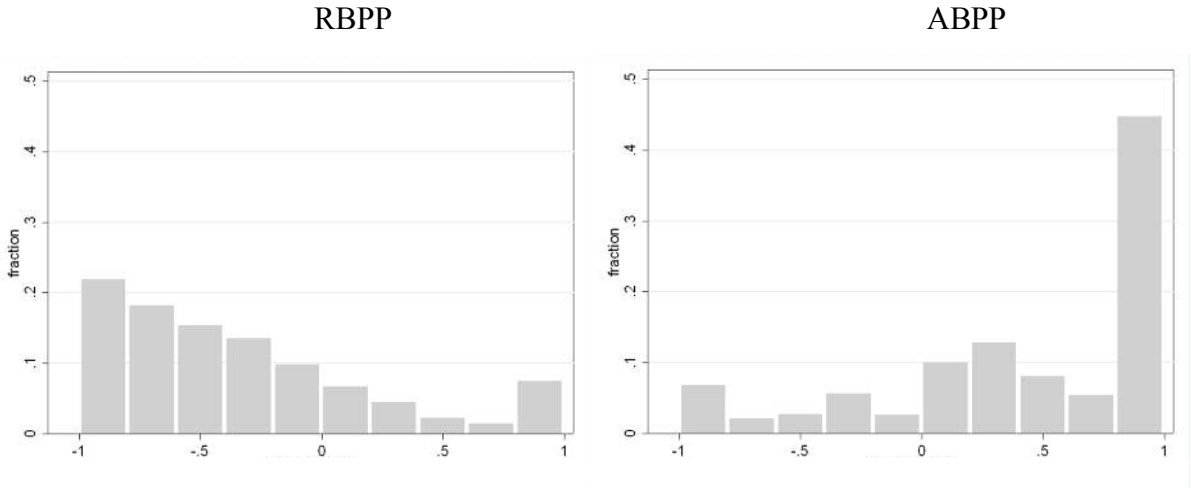
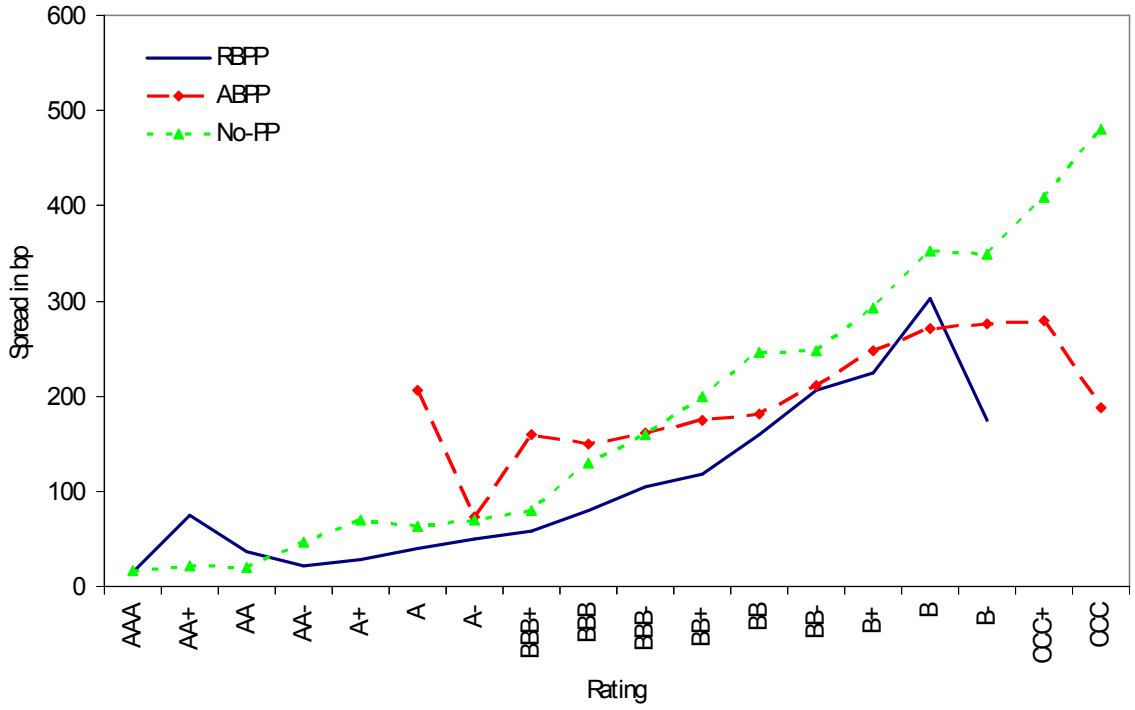


Figure 3: Spreads (AISD) charged at loan initiation, contingent on the borrower's rating



Appendix A

Example 1: Loan contract with ABPP provisions

Amended and restated credit agreement, dated as of March 16, 1998, by and among Shaw Industries, Inc., as Borrower, the Lenders named herein, NATIONSBANK, N.A., as Issuing Bank and Administrative Agent, SUNTRUST BANK, ATLANTA, as Documentation Agent and WACHOVIA BANK, N.A., as Managing Agent

Revolving Commitment $1,000,000,000
L/C Commitment Amount $25,000,000
Swingline Amount $50,000,000

"Applicable Margin" means the percentage rate set forth below for a given Type of Loan corresponding to the Consolidated Funded Debt/EBITDA Ratio of the Borrower in effect at such time:

Consolidated Funded Debt/EBITDA Ratio	Applicable Margin for Base Rate Loans	Applicable Margin for LIBOR Loans
Greater than 3.50 to 1.00	0%	0.75%
Less than or equal to 3.50 to 1.00 but greater than 3.00 to 1.00	0%	0.55%
Less than or equal to 3.00 to 1.00 but greater than 2.50 to 1.00	0%	0.45%
Less than or equal to 2.50 to 1.00 but greater than 2.00 to 1.00	0%	0.35%
Less than or equal to 2.00 to 1.00	0%	0.22%

The Applicable Margin shall be determined by the Administrative Agent on a quarterly basis commencing with the fiscal quarter ending on January 3, 1998. The Consolidated Funded Debt/EBITDA Ratio shall be determined by the Administrative Agent promptly after receipt of the financial statements required to be delivered by the Borrower to the Administrative Agent and the Lenders pursuant to Section 9.1. or 9.2., as applicable. Any adjustment to the Applicable Margin shall be effective on and as of the date (the "Adjustment Date") on which the quarterly (or annual) financial statements are required to be delivered to the Administrative Agent; provided, however, that, with respect to any LIBOR Loans outstanding on the Adjustment Date, no such adjustment shall be made to the Applicable Margin relating to such LIBOR Loan until the end of the Interest Period then in

effect for such LIBOR Loan. Notwithstanding the foregoing, for the period from the Effective Date through and including April 4, 1998, the Applicable Margin for Base Rate Loans shall equal 0% and the Applicable Margin for LIBOR Loans shall equal .55%. Thereafter, the Applicable Margin shall be adjusted from time to time as set forth above.

Example 2: Loan contract with RBPP provisions

364-DAY REVOLVING CREDIT AGREEMENT,Dated as of August 21, 2003,among SOUTH JERSEY INDUSTRIES, INC., as Borrower and THE SEVERAL LENDERS FROM TIME TO TIME PARTY HERETO and WACHOVIA BANK, NATIONAL ASSOCIATION,as Administrative Agent and CITIZENS BANK OF PENNSYLVANIA, JPMORGAN CHASE BANK, and PNC BANK, NATIONAL ASSOCIATION as Co-Syndication Agents, Arranged by: WACHOVIA CAPITAL MARKETS, LLC, Sole Lead Arranger and Book Manager

Revolving Loan: $100,000,000
"L/C Commitment" means Ten Million and No/100 Dollars ($10,000,000).
"Swingline Commitment" means Five Million and No/100 Dollars ($5,000,000).

"Applicable Margin" means, for Loans made to, and Utilization Fees and Letter of Credit Commissions payable by, the Borrower on any date, the rate per annum as set forth below, determined by reference to the Senior Debt Ratings:

Level	Senior Debt Rating	Facility Fee	Applicable Base Rate Margin	Applicable LIBOR Margin	Utilization Fee
I	Greater than or equal to BBB+/Baa1	0.150%	0.00%	0.475%	0.125%
II	BBB/Baa2	0.175%	0.00%	0.700%	0.125%
III	BBB-/Baa3	0.225%	0.00%	0.900%	0.125%
IV	Less than BBB-/Baa3 or no rating	0.250%	0.00%	1.000%	0.250%

Any change in the Applicable Margin will be effective as of the date on which S&P or Moody's, as the case may be, announces the applicable change in the Senior Debt Ratings. The Borrower shall notify the Administrative Agent in writing promptly after becoming aware of any change in the Senior Debt Ratings.

For purposes of the foregoing, (i) if the Senior Debt Ratings established or deemed to have been established by Moody's and

S&P shall fall within different "Levels" and the ratings differential is one level, the higher rating will apply; (ii) if the Senior Debt Ratings established or deemed to have been established by Moody's and S&P shall fall within different "Levels" and the ratings differential is two levels or more, the level one above the lowest of the two ratings will apply; and (iii) if the rating system of Moody's or S&P shall change, or if Moody's or S&P shall cease to be in the business of rating corporate debt obligations, the Borrower, the Administrative Agent and the Lenders shall negotiate in good faith to amend this definition to reflect such changed rating system or the unavailability of ratings from Moody's or S&P, and, pending the effectiveness of any such amendment, the Senior Debt Ratings shall be determined by reference to the Senior Debt Ratings most recently in effect prior to such change or cessation.

Appendix B

Variable	Description	Data Source
Firm-specific variables:		
ln total assets	The logarithm of the firm's total assets (item 44)	Compustat
leverage	Borrower's debt in current liabilities (item 45) plus long-term debt (item 51) scaled by book value of total assets (item 44)	Compustat
MB	Market-to-Book Ratio: Borrower's Common shares outstanding (item 61) times price at close (item 12) plus total liabilities (item 54) plus preferred stock (annual data 10) scaled by book value of total assets (item 44)	Compustat
int assets	Borrower's total intangible assets (annual data 33)	Compustat
rating	Borrower's senior debt rating	Compustat
ROA	Return on Assets: Borrower's operating income before depreciation (item 21) scaled by book value of total assets (item 44)	Compustat
ROA-vola	Volatility over preceding four quarters of borrower's ROA	Compustat
Loan-specific variables:		
RBPP dum	An indicator variable equal to 1 if loan has a RBPP privision	LPC DealScan
ABPP dum	An indicator variable equal to 1 if loan has an ABPP provision	LPC DealScan
AISD	Total annual all-in-spread (in basis points) paid for each dollar drawn under the loan commitment (including fees and interest)	PC DealScan
DTI	Spread Decrease-To-Increase Ratio: Initial spread of the loan minus lowest spread defined in the pricing grid divided by the difference of the highest spread of the pricing grid	own calculation, based on LPC DealScan

	and the initial spread minus 0.5 multiplied by 2	
ln tranche amount	The logarithm of the dollar value of each tranche	LPC DealScan
tranche imp	ln tranche amount / ln total assets	own calculation
maturity	Maturity of the loan in months	LPC DealScan
first deal dum	An indicator variable equal to 1 if it is the borrower's first deal in the sample	LPC DealScan
fincov dum	An indicator variable equal to 1 if the loan has financial covenants	LPC DealScan
sec dum	An indicator variable equal to 1 if the loan is secured	LPC DealScan
syn dum	An indicator variable equal to 1 if it is a syndicated loan	LPC DealScan
dummy M&A	An indicator variable equal to 1 if the loan's purpose is "mergers and acquisitions"	LPC DealScan
# of lenders	The number of lenders	LPC DealScan

Other:

LIBOR	London Interbank Offered Rate	Datastream

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