Accounting-based versus rating-based performance pricing in bank loan contracts[1]

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Abstract

This paper examines performance pricing (PP) provisions in bank loans issued in US$ between 1993 and 2008 and analyzes when accounting-based rather than rating-based performance measures are employed. We show that PP provisions help to ease agency-related problems of fast growing borrowers. More specifically, we demonstrate that growth-firms with low (high) credit quality use accounting-based (rating-based) PP. Low-quality borrowers need to pledge safe assets as collateral, which leads to underinvestment problems à la John et al. (2003) that appear not to be reflected in the rating. Their PP contracts are therefore based on accounting ratios and allow for strong spread reductions in case of performance improvements, as such alleviating the underinvestment problem. High-quality firms, in contrast, employ rating-based PP with strong spread-increase potential in case of performance deteriorations. This self-commitment device allows to credibly signal the borrower's solid growth capability.

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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 LIBOR, PP provisions link the interest rate to a measure of the firm's credit risk and hence make the spread a function of the borrower's default risk. PP provisions come in two different types: the borrower's credit risk may be measured either by its credit rating (rating-based performance pricing, RBPP henceforth) or by an accounting ratio (accounting-based performance pricing, ABPP henceforth), typically the ratio of total debt to cash-flow.[3] Surprisingly, even though agencies' credit ratings are generally assessed to be the most comprehensive measures of credit risk,[4] a large fraction of rated firms nevertheless issues private debt with ABPP rather than RBPP provisions. In this paper we explore this distinction further and ask whether and, if so, in which way ABPP and RBPP fulfill different functions in debt contracting.

Earlier work has indicated that loan contracts with PP provisions help to reduce the costs of information asymmetries. Asquith et al. (2005) argue that, depending on whether interest rate increases or decreases are stipulated by the contract design, PP provisions are employed when renegotiation is difficult or adverse selection and moral hazard problems loom. Martin (2009) shows that performance sensitive debt with solely interest-decreasing provisions attenuates the negative effect of growth opportunities on leverage that is caused by the informational disadvantage of debtholders vis-à-vis stockholders. Manso et al. (2010) demonstrate that PP may be used as an inexpensive screening device by lenders to filter out performance-improving borrowers. Despite the clear-cut results, these studies do not allow to draw a comprehensive picture of PP provisions, particularly because they take a (deliberately) narrow focus on specific loan types, i.e. they single out loans with only interest-increasing or only interest-decreasing provisions.[5] As a consequence, their results can hardly be seen as representative for the average PP loan contract that typically features both spread increase and decrease potential, albeit rarely in a symmetrical way. More importantly, however, the studies neglect two loan characteristics that we will scrutinize in this paper and show to be closely connected: the type of performance measurement combined with the asymmetry of the loan pricing scheme. In order to evaluate loan

[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.

[3] Appendix A gives an example of each type of loan contract.

[4] Credit agencies possess long-standing experience in evaluating credit risk processes. Furthermore, credit ratings contain private information because rating agencies are exempt from Regulation FD. Regulation Fair Disclosure prohibits U.S. public companies from making selective, non-public disclosures to favored investment professionals. Rating agencies, however, are exempted from this rule, which improves the ratings' informational content according to Jorion, Liu and Shi (2005).

[5] The empirical study by Asquith et al. (2005) effectively counts loans with both interest increasing and decreasing provisions as two loans, one with only spread increase potential, the other with only spread decrease potential. This clearly neglects any interdependencies between the two provisions which, as we will show, is not innocuous.

contracts with PP provisions more comprehensively, we proceed in several steps. We start with an extensive comparison of the use of PP loans vis-à-vis fixed-rate contracts. We then investigate in detail the incentive structures induced by the pricing grids in PP provisions, i.e. the spread-reduction/-increase potential stipulated by the contract design. Subsequently, we examine the effects that the issuance of loans with PP provisions and their corresponding incentive structures have on the borrowing firms. On this basis, we argue that, indeed, accounting-based and rating-based performance pricing fulfill different functions.

Our analysis delivers three main results. First, we find that PP provisions are used for strongly growing borrowers, whereas borrowers with more muted business development draw down loans with fixed interest rates. This result corresponds with a large strand of the literature on loan contracting mechanisms. Generally, this literature shows that contracting details are more important for high-growth firms as these are more likely to face conflicts between stockholders and debtholders (for an overview, see Billett et al. (2007)).

Second, we observe that high-growth firms with good credit quality employ RBPP contracts. We show that these contracts allow for stronger interest rate increases the higher the borrower's growth potential and as such are used to credibly signal the borrower's growth capability. The more pronounced the signaling feature of the pricing scheme is, i.e. the stronger the potential spread increase, the lower turns out to be the initial spread requested, so that credit costs are immediately reduced by the issuance of a loan with strong spread-increasing PP. Eventually, we demonstrate that borrowers with RBPP contracts improve their credit ratings after the loan initiation and reduce their leverages in the medium- to long-term. The rating improvement is moreover the stronger, the larger the signaling feature of the pricing grid, which supports and extends the findings by Manso et al. (2010).

Third, we show that ABPP-contracts are used by high-growth borrowers with weak credit quality. These firms tend to be particularly susceptible to underinvestment problems that arise because managers, acting in the interest of existing shareholders, forego profitable investment opportunities in order to transfer wealth from debtholders to stockholders. According to John et al. (2003), low-quality borrowers' need to pledge safe assets as collateral in order to avoid being credit constrained significantly contributes to this underinvestment problem. Supporting their original argument, we find that the credit rating indeed does not appear to capture the ensuing credit risk from the pledging of collateral. This explains why accounting-based rather than rating-based PP is used for these low-quality borrowers. In order to mitigate the underlying underinvestment problem, the contracts furthermore stipulate strong interest rate reductions in case of performance improvements and almost no spread increases for performance deteriorations. Interestingly, the incentive effects triggered by the pricing grid are supported by particularly long maturities of ABPP-contracts, which reduce the initial spread and, hence, credit

costs even further. This combination of contract features indeed appears to attenuate the underinvestment problem, as borrowers with ABPP contracts show increases in the leverage after the loan initiation that are the stronger the longer the maturity and the larger the spread reduction potential that the contract stipulates.

Our results have several implications. With regard to the design of private debt contracts, we conclude that PP provisions play a vital role in controlling agency conflicts more efficiently. Used in cooperation with other contracting features such as covenants or loan maturity, they may even partly disburden these features from their original purpose and, hence, contribute to their more effective employment. For instance, and in contrast to the existing literature (Gottesmann and Roberts, 2004; Bharath et al., 2011), we demonstrate that loans drawn down by borrowers with low credit quality need not necessarily be short-term despite the information asymmetries underlying the borrower-lender relationship. As the ABPP provision sufficiently controls for the ensuing agency problems, the maturity structure can rather be used to strengthen the incentivizing function of the pricing grid. It may even be the case that the longer maturity is used as a protection against short-term manipulation of accounting data, as such eroding one of the main criticisms afflicting the use of accounting numbers for debt contracting purposes (Christensen and Nikolaev, 2010).

Similarly, RBPP provisions may support or even partly substitute for the function that covenants play in loan contracts. When RBPP provisions and rating-based covenants are employed simultaneously, an interesting insight arises from our analysis: Since (same-variable) financial covenants must necessarily be placed in the performance region "below" the area covered by the pricing grid in PP contracts, the breadth and asymmetry of the pricing grid allows for an alternative measure of covenant "tightness". The stronger the spread-increase potential that the contract stipulates in case of performance decreases, the less tight can the covenant be as the covenant will not be triggered before the pricing grid is fully depleted. The signaling function of RBPP contracts hence automatically reduces same-variable covenant tightness.

Finally, our paper also contributes to an explanation why credit rating agencies appear to be significantly more important for investment-grade rated firms than for sub-investment grade rated firms, over and above any regulatory provisions. Because RBPP is mainly used by borrowers with high credit quality, the rating not only influences these borrowers' costs of public debt but also of private debt and as such has a much stronger impact on any financing decisions. Our paper hence complements recent findings by Gropp et al. (2011) who show that for investment-grade rated borrowers, rating agencies seem to exert more than arm's-length effects. In an event study on the market reaction to M&A-transactions they find that rated acquirers incur higher negative stock price returns than unrated acquirers and argue that credit rating agencies fiercly protect bondholders' interests. Furthermore, they demonstrate that investment-grade rated

firms are even more strongly affected. This fits nicely with our findings as for these firms credit rating agencies appear to not only defend bondholders' interests, but also implicitly those of private debt investors.

The rest of the paper proceeds as follows. Section 2 gives a brief overview of the related literature. Section 3 derives the hypotheses to be tested. Section 4 sketches the data and presents some univariate analyses. Section 5 reports a comparison of the use of fixed-rate contracts and of loans with PP provisions, while section 6 displays a simultaneous equation approach of analyzing the pricing of PP loans, i.e. the asymmetry or the pricing grid and the initial spread requested. Section 7 exhibits an ex-post analysis of the firms issuing PP loan contracts. Section 8 concludes.

2. Literature review

Our study is closely related to the growing body of research on financial contracting, particularly on specific features of debt contracts.[6] While the use of covenants has been analyzed quite extensively in recent years (Berlin and Mester, 1992; Rajan and Winton, 1995; Chava and Roberts, 2008; Garleanu and Zwiebel, 2009; Roberts and Sufi, 2009b), detailed studies of performance pricing both in public and private debt financing remain relatively rare so far.

In one of the first theoretical studies on this topic, Bhanot and Mello (2006) compare the use of rating-based covenants and of rating-based coupon rates in corporate bonds. They show that covenants may help to mitigate the equityholder-bondholder conflict by reducing asset substitution problems, i.e. by avoiding management decisions in favor of high-risk projects. Rating-dependent coupon rates, in contrast, are shown to be inefficient in this respect. Silva and Pereira (2007) contradict this conclusion and prove that rating-related coupon structures can force borrowers to pursue low-risk business strategies, provided that equity holders possess sufficient operational flexibility to influence the firm's risk level. While both studies take the contract design as given, Koziol and Lawrenz (2010) derive the optimal design of rating-related step-up coupon payments. They show that optimal step-up bond designs can help to overcome asset substitution risks and problems of information asymmetry (i.e. signal borrower types).

The earliest empirical reference to PP provisions in private debt contracts has been made by Loomis (1991) in a description of various performance measures as a basis to price credit risk. Asquith et al. (2005) give an extensive overview of different types of loan contracts including PP provisions. Their study relies on a dataset of 8,761 U.S. bank loans issued between 1995 and

[6] For an excellent overview on empirical and theoretical aspects of financial contracting, see Roberts and Sufi (2009a).

1998. They distinguish between interest-increasing provisions and interest-decreasing provisions and find that the two are triggered by different sets of variables. Interest-increasing PP becomes more common when downgrades are more likely and moral hazard costs are higher and lead to a strong reduction in initial spreads. Interest-decreasing provisions are more common when adverse selection costs are higher and when prepayment of the loans is more likely; they are less common when multiple performance measures better predict credit quality. In contrast to our analysis, however, the authors do not differentiate between the type of performance measure used nor do they examine the incentive structures induced by the pricing grids.

Closest to our work are the papers by Manso et al. (2010) and Martin (2009). Manso et al. (2010) analyze performance-sensitive debt in both a theoretical and empirical model and show that making the interest rate contingent on a measure of the firm's performance may serve as a screening device: Firms that choose PP are more likely to display high growth and improve their credit rating within one year after closing the loan than firms with fixed-rate contracts. The authors do not examine in which way the pricing grid imposes costs on the borrower for incorrectly sending a high-growth signal, though – an aspect that this paper focuses on. The empirical study by Martin (2009) analyzes only interest-decreasing PP contracts. She investigates whether such step-down performance sensitive debt allows to mitigate the agency costs of debt. These agency costs from suboptimal investment decisions are particularly high for growth firms because intangible growth opportunities are difficult to contract upon ex-ante and monitor ex-post. As a consequence, high-growth firms choose to use less debt financing in the absence of suitable contracting mechanisms. The inclusion of interest-decreasing provisions in debt contracts, however, reduces a borrower's debt payments when its assets value increases from exercising profitable growth options. On a sample of loan deals between 1990 and 2006, Martin (2009) demonstrates that this contracting feature indeed helps to attenuate suboptimal investment problems by mitigating the negative relation between growth opportunities and leverage.

From a methodological viewpoint, both Manso et al. (2010) and Martin (2009) focus on an ex-post perspective and analyze whether the employment of PP contracts affects a borrower's performance and capital structure in the hypothesized direction. They do not, however, study the particular way in which this effect was achieved. Our work complements these earlier papers by i) controlling for the type of performance measurement and by ii) examining explicitly the incentive effects induced by the respective contract types and pricing grids.

Parallelling the literature on specific contracting mechanisms, there has been some general discussion on the use of accounting data in debt contracting. The debate focuses mainly on the question whether accounting data is sufficiently informative to assess a borrower's credit risk. Ball et al. (2008), for instance, examine the value of accounting information in loan syndicates

and show that lead arrangers will retain a smaller proportion of the syndicated loan when the degree of informativeness of accounting information that is used in the loan deal increases. They also compare the use of accounting ratios vis-à-vis the credit rating in PP provisions and conclude that "[…] the timeliness provided by the accounting information is more important than the informativeness provided by the rating." Quite similarly, Christensen and Nikolaev (2010) demonstrate that profitability-based covenants are preferred over capital structure covenants when accounting information is significantly informative of credit quality. Interestingly, they are also able to show that the employment of accounting data in debt contracting improves firms' use of debt financing and hence increases credit market access. Unfortunately, these papers do not attempt at explaining why accounting data may be more informative in particular circumstances.

One of the few papers delivering an answer to the opposite question why credit ratings may *not* be sufficiently informative statistics in some cases is the work by John et al. (2003). In a theoretical model, they show that the pledging of the least risky assets as collateral may give rise to an underinvestment problem in the form of a neglect of necessary investments into these assets to uphold their value – a form of perquisite consumption. They furthermore report that the practice of "rating notching" to distinguish between the ratings of different liabilities of a firm, starting from the senior unsecured debt issue, does not sufficiently account for the increase in credit risk due to the underinvestment problem triggered by the pledging of collateral. They conclude that this lacking informational ingredient in credit ratings explains why collateralized debt has higher yield than general debt, even after controlling for the credit rating. In the following, we will make use of these insights in order to explain the differences in the employment of accounting-based versus rating-based PP in bank loan contracts.

3. Derivation of hypotheses

Based on the earlier literature, it is straightforward to conjecture that loan contracts with PP provisions are used to reduce agency costs that may arise from information asymmetries and conflicts of interest between equityholders and debtholders. As these agency costs are particularly serious for growth-firms (Jensen and Meckling, 1976; Myers, 1977), we state as our first hypothesis:

Hypothesis 1: PP contracts are more often used for high-growth borrowers.

The agency problems arising from risky debt for firms with valuable future growth opportunities may either be reflected in moral hazard problems due to suboptimal investment decisions or in adverse selection problems as lenders cannot distinguish between borrower types at the time of loan inception. Both types of problem sets would prescribe different contract designs to deal with the arising agency costs. According to Martin (2009), problems of suboptimal investment decisions can be attenuated by loan contracts that allow for spread reductions following performance improvements. Suboptimal investment decisions comprise both the realization of riskier investment projects than initially indicated (asset substitution) and the foregoing of safe investment projects (underinvestment) which may also take the form of managements' consumption of perquisites. Whereas the former requires the availability of risky investment opportunities, the latter may be triggered, as has been shown by John et al. (2003), by the need to pledge collateral. Both problems are increased by high levels of debt as this augments the basic conflict between stockholders and creditors. As such, we phrase the following second hypothesis:

Hypothesis 2: PP contracts that are supposed to reduce the agency costs related to suboptimal investment decisions should feature a pricing grid that allows for spread reductions in case of performance improvements. The interest-decrease potential should be stronger if collateral is pledged or if the borrowing firm disposes of highly volatile investment opportunities. It should also be the stronger the higher the firm's leverage.

Adverse selection problems, in contrast, could be reduced by employing PP provisions as a screening- respectively signaling-device. The signal to be transmitted should capture the borrower's ability to honor the future debt claims and as such should make a statement on both his capability and willingness to repay the debt. In our context, this may be proxied by the longevity and stability of the borrowing firm's growth potential. In order to be credible, however, a cost needs to be imposed on the borrower for sending out an incorrect signal. As a loan contract mainly stipulates the credit costs for the borrower, sending out a false signal should therefore be punished by the request of higher interest payments:

Hypothesis 3: PP contracts that are supposed to operate as screening/signaling-devices should allow for spread increases in case of performance deteriorations. The increase potential should be the stronger the larger the borrower's signaling need, i.e. the more uncertain the borrowing firm's growth potential.

Eventually, if the PP provisions help to reduce agency costs of either category, this should be reflected in a reduction of the initial spread that the borrower needs to pay at the loan's inception. Clearly, the effectiveness of the PP provisions also depends on the ability of the performance measure to appropriately capture the borrower's credit risk:

Hypothesis 4: An appropriate choice of performance measure in combination with the incentive-compatible pricing grid should strongly reduce the initial spread of PP contracts as compared to fixed-rate contracts.

4. Data description and univariate analysis

We obtain data on bank loans from Reuters Loan Pricing Corporation Dealscan database. For our sample, we collect all loans issued between 1993 and 2008 for which the deal amount is available. The sample is restricted to loans denominated in U.S.-Dollars. The original sample consists of 100,043 tranches in 69,714 loan deals.[7] In a first step, we exclude all tranches with missing information on the tranche amount, the maturity, the all-in spread drawn,[8] the senior rating or the securitization status and restrict tranches to have a maturity of 30 years or less. We also delete loans to banks or government-related entities. This leaves us with a raw loan sample of 35,312 tranches in 23,461 deals issued by 11,211 companies.

Table 1 displays the different types of performance measures used in our loan sample. As can be seen, among the accounting-based performance measures, the debt to cash-flow ratio is most frequently employed (57%), while the senior rating as the next-often used measure is applied in 22% of all contracts. Interestingly, the order is reversed when referring to the loan volume: The rating applies to a much larger volume of contracts (54%) than the debt to cash-flow ratio (33%). Taken together, these two performance measures are used for 79% of all loan contracts in our sample and for 86% of the outstanding loan volume. Given the large difference in employment between the debt to cash-flow ratio and the next-often used accounting-based measure (leverage, used in 5% of loans), we refer to the debt to cash-flow ratio as our general proxy for accounting-based performance measures and neglect loans with all other accounting-based measures in the following analysis. Appendix A presents a detailled example of each type of PP provisions.

[7] 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. As a robustness check, we also run our analysis on the single-tranche loans only. The results do not change and are available from the authors upon request.

[8] In the following, we will aways 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.

Table 1: Types of performance measures

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The table presents the absolute number and fractions of different performance measurement types used in the raw data sample, i.e. the types of performance measures that determine the interest spread. The frequency column displays the number of deals and the corresponding percentages. The volume columns provide the loan amount in billion US-dollars that is linked, by contract, to the different performance measurement types. Note that – though uncommon - a loan tranche 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 tranches with performance pricing and to more than the total dollar volume.

Performance measure	Frequency		Volume	
	N	Percentage	Amount (in billion $)	Percentage
Total	16,037	100%	4,859	100%
Debt to cash flow 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%

In a second step, we match the loan sample with borrower-specific information from Compustat. Leaving out the loan deals with large numbers of missing firm-specific characteristics, and refining ourselves to loan contracts with either PP based solely on the debt to cash-flow ratio (ABPP), with PP based on the senior rating (RBPP) and without any PP, i.e. fixed-rate loan contracts (no-PP, henceforth), our final dataset consists of 4,905 loan tranches issued by 1,442 firms.[9]

Table 2 presents the development of the issuance numbers of the three loan types (ABPP, RBPP and no-PP) 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.

[9] The number of observations in the different empirical tests may deviate, depending on the respective borrower characteristics employed. Information on intangible assets, e.g., is not available for all the firms in our sample. Analyses that make use of this item therefore rely on a smaller dataset.

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 displays the major characteristics of our sample. Panel A refers to the borrower characteristics, panel B to the loan characteristics. Borrowers with RBPP loans are seen to be much larger and to have 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. Both borrowers with RBPP and ABPP loans display higher returns on assets and market-to-book ratios than borrowers with no-PP contracts. Furthermore, we find that loans with RBPP provisions are larger than loans with ABPP or with no-PP, 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. As regards the loan pricing, we find that the initial spread in RBPP loans is much lower than in ABPP contracts, while the number of pricing buckets is slightly higher. At the same time, the spread change over the total pricing grid is smaller in RBPP than in ABPP contracts. 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.

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 USD million, maturity in months and the all-in spread in bp. 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												
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
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
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
Market value	1,889	4,620	943	14,328	1,326	1,615	810	2,645	1,690	8,733	4,028	13,268
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			

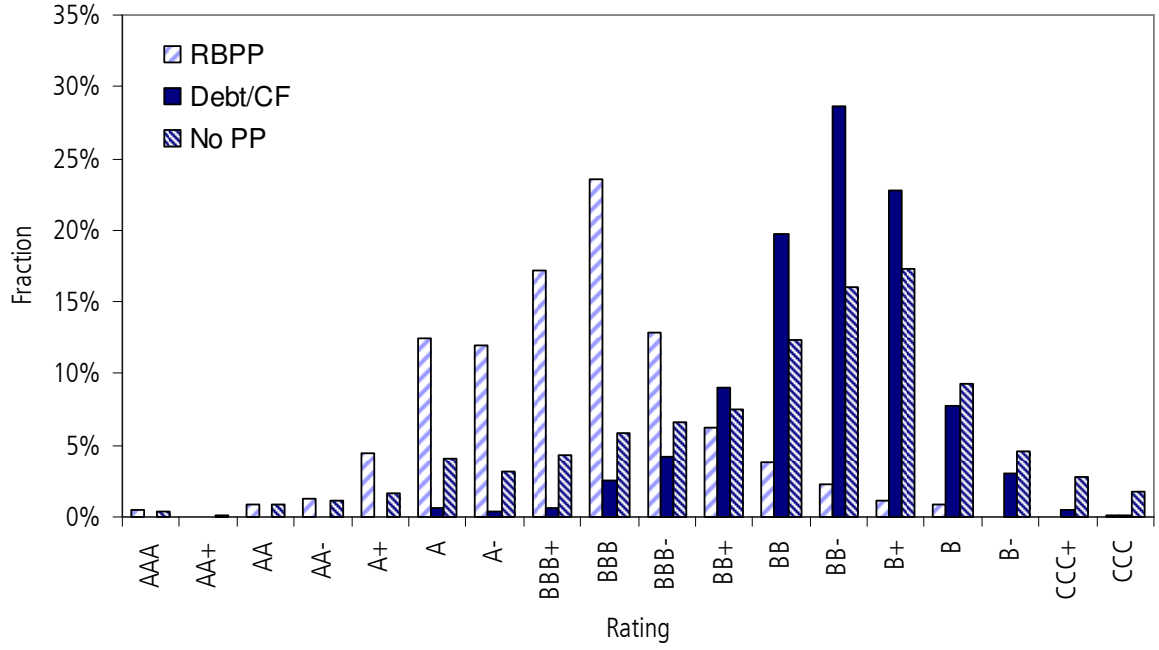
Overall, hence, there seem to be strong differences both with respect to the contract design and regarding the borrower characteristics between the three loan types. As regards the borrower characteristics, particularly obvious are the differences in the borrowers' credit quality – not only between borrowers with PP-contracts and those with fixed-rate contracts, but also between the two types of PP-contracts. Table 4 elaborates on this aspect and shows the distribution of the three loan types according to the senior rating of the borrower at the loan initiation. Immediately noticeable is the strong employment of RBPP for borrowers with an investment-grade rating. The number of loans with RBPP increases with deteriorating rating level within the investment-grade interval and drops strongly when crossing the investment-grade boundary (from BBB to BB). ABPP, in contrast, tends to be used mainly for borrowers with sub-investment grade credit quality.

Table 4: Distribution of deal types by rating classes

S&P senior rating	Total N	No-PP N	No-PP %	ABPP N	ABPP %	RBPP N	RBPP %
AAA	16	7	0.4375	0	0.0000	9	0.5625
AA	80	42	0.5250	0	0.0000	38	0.4750
A	665	164	0.2466	13	0.0195	488	0.7338
BBB	1,311	307	0.2342	97	0.0740	907	0.6918
BB	1,621	655	0.4041	757	0.4670	209	0.1289
B	1,047	568	0.5425	443	0.4231	36	0.0344
CCC	103	92	0.8932	9	0.0874	2	0.0194
CC	11	9	0.8182	2	0.1818	0	0.0000
WR/NR	51	45	0.8825	5	0.0980	1	0.0196

The distribution of loan types along the finer rating scale is also shown in Figure 1. The distribution of borrowers with ABPP contracts is particularly steep and peaks at a BB- rating, i.e. clearly 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 the larger fraction of the density is situated below the investment-grade region.

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



In the following, we will use these differences in borrower and loan characteristics to examine the use of PP provisions in debt financing.

5. Multivariate analysis: differences between ABPP / RBPP and no-PP

To assess the differences in employment between PP contracts on the one hand and fixed-rate contracts on the other, we first run a simple multinomial analysis. Table 5 presents the results of a multinomial logit regression where several borrower and loan characteristics are used to explain the choice of RBPP over no-PP, respectively of ABPP over no-PP. Among the firm-specific factors we consider the firm size (calculated as the natural logarithm of total assets), the leverage (debt in current liabilities plus long-term debt divided by total assets), the rating,[10] the market-to-book ratio (MB), the return on assets (ROA), the volatility of asset returns (calculated over four quarters) and the ratio of intangible assets to total assets. All variables are taken from the quarter before the loan initiation. We also control for the borrowers' industry. Among the loan 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, for loan syndication and for loan collateralization. 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 tranche 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 employed, a brief description of their construction and data source is given in Appendix B.

Clearly, in order to test hypothesis 1 our main focus is on the market-to-book ratio as the most-frequently used proxy of growth potential (Adam and Goyal, 2008). The return on assets delivers information on the profitability of the firm and may hence be seen as a second, albeit less reliable indicator of growth. Intangible assets could also be interpreted as a proxy for growth potential as this item includes patents, copyrights, trademarks or operating licenses that qualify for the interpretation of real options in the sense of Myers (1977). 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. Table 5 presents the results.

[10] The results do not change if we employ rating class dummies instead of measuring the borrower's default risk in a linear form by using the numerical rating values. They are available from the authors upon request.

Table 5: 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 vs no-PP provisions. ***, ** and * indicate significance at the 1%, 5% and 10% level. Standard errors are clustered on the firm level.

	model I		model II		model III	
Explanatory variables	RBPP	ABPP	RBPP	ABPP	RBPP	ABPP
ln total assets	.0511	-.4265***	.0728	-.3650***	.0074	-.4263***
leverage	-.9032**	-.2885	-1.0271**	-.5447	-.7731*	-.1665
rating	-.2780***	-.0632	-.2740***	-.0385	-.3105***	-.0662*
MB	.2726**	.0363				
ROA			3.5112***	2.6590**		
ROA-vola					5.3385**	-7.9222
int assets	-.1981	1.4407***	.0070	1.5669***	-.2324	1.3377***
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
sec dum	-1.4781***	.9105***	-1.4563***	.9356***	-1.5426***	.8810***
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	

Corresponding to the earlier descriptive analysis, we find that borrowers with RBPP contracts have a lower leverage and a better rating, their loans are larger, require a larger number of lenders and contain financial covenants more often, while less often collateral needs to be pledged than in fixed-rate contracts. Interestingly, we also find that RBPP-borrowers are not only better credit quality firms but they 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. This may be taken as an indication that borrowers with RBPP contracts are high-growth firms with good credit quality but nevertheless risky returns. Borrowers with ABPP contracts, in contrast, are smaller firms that display a high ROA and a high fraction of intangible assets, again a hint that high-growth potential drives the choice of PP provisions. Finally, while ABPP contracts involve a larger number of lenders and make use of financial covenants more often than fixed-rate contracts, ABPP contracts also go hand in hand with a longer maturity and the pledging of collateral.

We hence find evidence that both borrowers with ABPP and with RBPP contracts show signs of higher growth than borrowers with fixed-rate contracts, which supports hypothesis 1. Nevertheless, there appear to be strong differences between the two types of PP contracts and also between the growth characteristics of the borrowers. In order to dig deeper into these differences, we run a direct comparison of ABPP and RBPP contracts, controlling for the selection of high-growth borrowers into the PP category via a Heckman correction procedure. Note that we use the ROA as growth indicator in the selection regression as this variable turned out to be significant for both ABPP and RBPP borrowers vis-à-vis borrowers with fixed-rate contracts in the multinomial regression.

Based on the Heckman correction, a probit regression then examines the impact that loan and borrower characteristics have on the choice of RBPP provisions over ABPP provisions. The results are presented in Table 6.[11] We include one further variable here, referred to as "tranche imp". It measures how important the particular loan tranche is for the total financing amount of the company.

We find that RBPP borrowers tend to have a lower leverage and show a higher MB than ABPP borrowers. Models 2 and 3 make very clear that even though ABPP borrowers display higher returns than borrowers with fixed-rate loans, RBPP borrowers have even higher asset returns and also higher ROA-volatility. For the choice of ABPP provisions, in contrast, the fraction of intangible assets appears more decisive and ABPP contracts are much more often secured and have a higher maturity.

[11] Note that the number of observations is higher than in the multinomial regressions in Table 5 as one of the limiting variables, intangible assets, enters only in the second-stage regression.

Table 6: RBPP vs. ABPP selection

The Heckman pre-selection runs a probit regression on the probability of being assigned a loan contract with PP provisions rather than with a fixed spread, the second stage runs a probit regression on the probability of the rating being selected as performance measure if a PP contract is assigned rather than the debt-to-cashflow ratio. ***, ** and * indicate significance at the 1%, 5% and 10% level. Standard errors are clustered on the firm level.

	model 1	model 2	model 3
Heckman selection equation: PP vs. fixed-rate:			
LIBOR	.0740	.0737	.0689
ROA	2.1115***	2.1191***	2.1561***
tranche imp	-.3351*	-.3353*	-.3561*
fincov dum	1.4340***	1.4348***	1.4258***
first deal dum	.0910	.0912	.0904
syn dum	.1958	.1964	.1803
constant	-1.3791**	-1.3830**	-1.3459**
tranche type, loan purpose, year dummies	yes	yes	yes
RBPP vs. ABPP equation:			
ln total assets	.5824***	.5563***	.5261***
leverage	-.5633*	-.5485	-.5821*
MB	.2025***		
ROA		1.4085*	
ROA-vola			6.5611**
int assets	-1.2576***	-1.1401***	-1.2383***
ln tranche amount	.1532*	.1661*	.1809**
maturity	-.0227***	-.0224***	-.0215***
sec dum	-1.6325***	-1.6715***	-1.7071***
# of lenders	-.0080	-.0077	-.0060
constant	-5.1410***	-5.0878***	-5.0361***
No. of observations	3649	3649	3583
No. of uncensored observations	1760	1760	1694
Wald chi^2	361.95	358.49	354.29
Log likelihood	-1994.272	-1998.509	-1964.2
Prob >chi^2	.0000	.0000	.0000

While both types of PP contracts hence seem to be used for borrowers with high-growth potential, the agency conflicts induced by the growth opportunities appear to be different. Borrowers with RBPP contracts display a very volatile return development, 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 particularly strong susceptibility to underinvestment problems à la Myers (1977). In the following, we will therefore scrutinize the pricing grids that the two types of PP contracts stipulate and examine whether the induced incentive structures are appropriate to solve the agency problems as conjectured in hypotheses 2 to 4.

6. Ex-ante pricing effects

Hypotheses 2 and 3 prescribe that a contract's stipulated pricing grid should allow for spread increases or decreases depending on the particular function that the PP provision is supposed to serve. In order to examine this claim, we calculate an index variable that captures the symmetry respectively asymmetry of the pricing grid:[12]

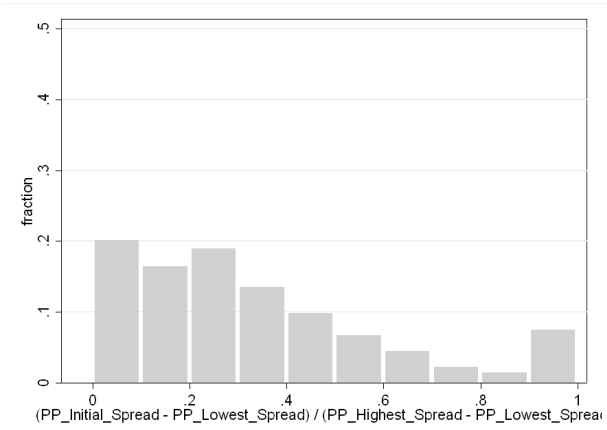
$$reduction\ potential\_spread = \frac{(initial\ \ spread - lowest\ \ spread)}{(highest\ \ spread - lowest\ \ spread)}.$$

The index can take on values between 0 and 1. An index value of 0 (1) indicates that, at the loan's inception, the borrower is located in the pricing bucket with the lowest (highest) spread and, as a consequence, cannot reduce (increase) the spread any further if the performance measure changes. Hence, the higher the index value, the larger are the potential spread reductions relative to potential spread increases that the contract stipulates. If the index value is larger than .5, there is higher potential of spread reductions than of spread increases and vice versa for an index value lower than .5. Figure 2 displays the distribution of the index values, differentiating between contracts with RBPP and ABPP.

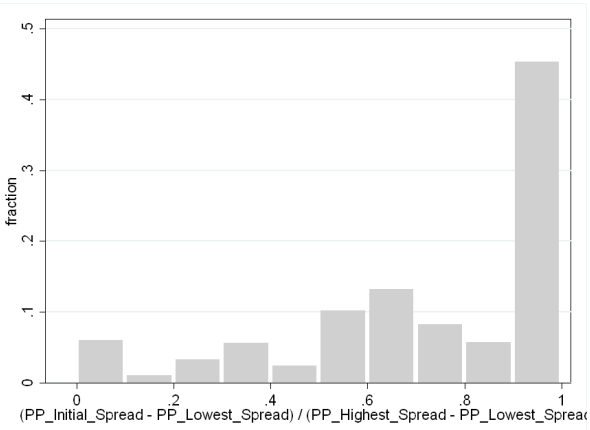
[12] We also calculate an index that refers to the number of pricing classes rather than the spread. It is calculated as (number of initial class – 1)/(total number of classes – 1) and describes how much "room" for spread increases or decreases the contract stipulates. The average index values are .44 for RBPP contracts and .73 for ABPP contracts, which is comparable to the values fort he spread-index. When conducting the estimations with the classes-index rather than the spread-index, we derive very similar results that are available upon request.

Figure 2: Histogram of *reduction potential_spread* index
The left column refers to RBPP contracts, the right column to ABPP contracts. The upper row contains contracts of borrowers from all rating classes, the middle and lower row refer only to contracts whose borrowers have an investment-grade rating, respectively a non-investment grade rating.

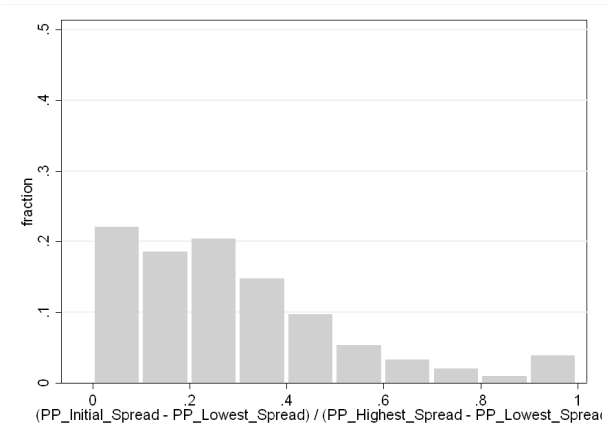
RBPP - all



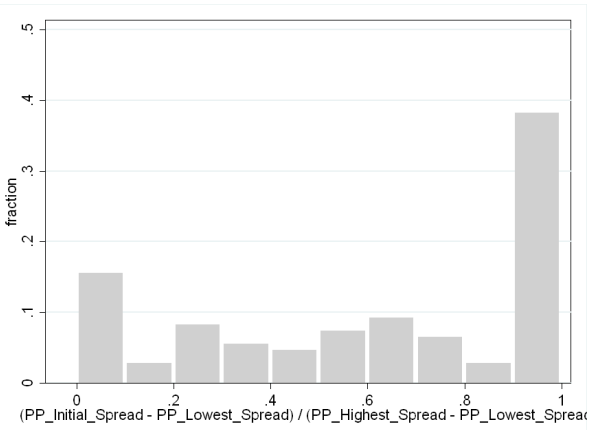
ABPP - all



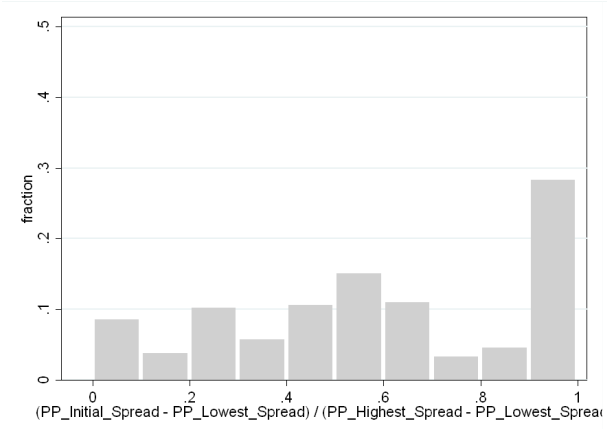
RBPP – investment grade



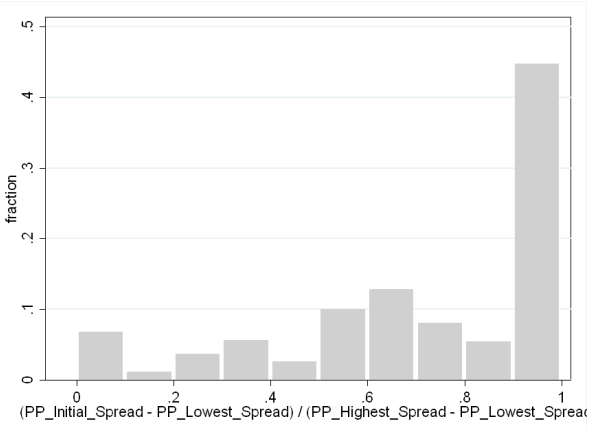
ABPP – investment grade



RBPP – speculative grade



ABPP – speculative grade

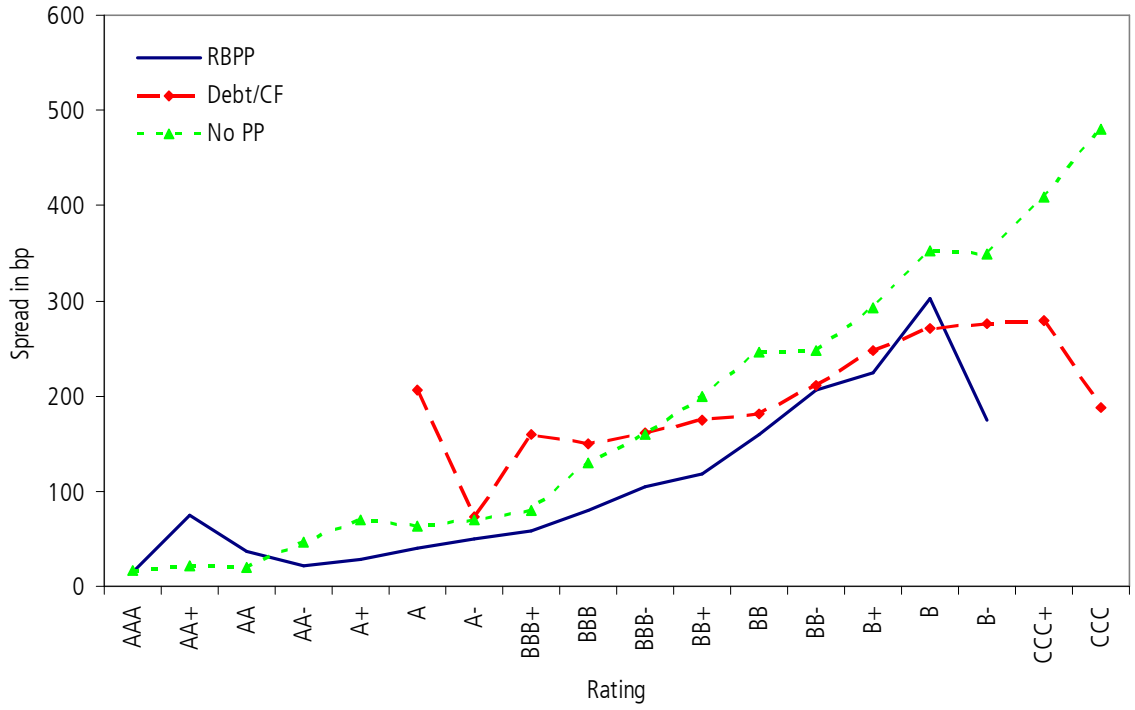


The average index value for borrowers with RBPP provisions is .32, for borrowers with ABPP provisions it is .72. RBPP contracts hence allocate on average more potential to spread increases, while ABPP contracts allow for stronger spread reductions. As can be seen from Figure 2, on average about 20% of the firms with RBPP-contracts are not allowed any spread reductions since they are already placed in the pricing bucket with the lowest spread. With ABPP, in contrast, almost 45% of all firms can only improve their spreads as they are initially already placed in the bucket with the highest spread. Looking at the figures in more detail, it appears that for investment-grade rated borrowers, the RBPP distribution is skewed to the right, while the ABPP distribution is skewed to the left. Altogether, however, we find that highly-rated borrowers with RBPP provisions have a fair chance of both reducing and increasing their spread, while borrowers with ABPP provisions face a much higher chance of spread reductions. A similar tendency can be observed for speculative-grade rated borrowers, though - while both ABPP and RBPP provisions now show a clear skewness to the left, as such allocating more room to spread reductions than to spread increases - the distribution of RBPP provisions nevertheless appears more even.

In an examination of the incentive effects induced by the loan contract, the asymmetry of the pricing grid is only one ingredient. The initial level of the pricing, i.e. the spread requested at the initiation of the loan, is equally important. Table 3 already indicates that contracts with PP provisions are associated with lower initial spreads than fixed-rate contracts. Furthermore, the spread appears to be smaller in contracts with RBPP provisions than with ABPP provisions. Figure 3 displays this effect more explicitly by controlling for the borrower's rating at the origination of the loan. It depicts the mean AISD at loan origination conditional on the borrower's rating, differentiating between ABPP contracts, RBPP contracts and fixed-rate contracts. As can be seen, RBPP loan spreads are indeed lower than spreads in fixed-rate contracts and in ABPP contracts over almost all rating classes.[13] The effect is clearest for firms with ratings above BB-, the clear majority of borrowers in our sample. It is also interesting to note that ABPP contracts feature an equal or even higher spread than fixed-rate contracts for borrowers with investment-grade rating. A spread reduction vis-à-vis fixed-rate contracts is granted with ABPP provisions only for borrowers with non-investment-grade rating, where ABPP contracts are most prevalent, though, as Figure 1 already showed.

[13] 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.

Figure 3: Spreads (AISD) charged at loan initiation, controlled for borrower's rating



Since both the asymmetry of the pricing grid and the initial level of the spread tend to be decided upon simultaneously and as such enter an endogenous relation, we analyze them in a system of simultaneous equations, with the reduction potential_spread and the AISD at loan initiation as endogenous variables.[14] Of particular interest is how the variables that capture the relevant agency problems, i.e. leverage, MB, intangible assets, and collateral, affect these two endogenous pricing variables. We also include several loan-specific variables such as the loan maturity and financial covenants as regressors and treat them effectively as exogenous variables. Though we are aware of the fact that the various loan provisions may well be decided upon simultaneously, 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. Among the control variables, we include dummies for the borrower's rating class, for the loan being a first deal, for the loan purpose and for the number of lenders. All of these variables may be seen as proxies for the borrower's default risk and therefore will be expected to influence both the asymmetry of the pricing grid and the spread initially requested. In sum, we run the following system of two equations:

[14] Note that we use the reduction potential_spread index rather than the index based on the number of classes, so that both equations refer to spreads. Employing the classes-index would not change the results qualitatively, though. The results are not displayed in the paper but available from the authors upon request.

$$red\ pot\_spread = \alpha_0 + \alpha_1 AISD + \alpha_2 RBPP\text{-}dum + \alpha_3 AISD * RBPP\text{-}dum + \alpha_4 leverage + \alpha_5 MB + \alpha_6 int\ assets + \alpha_7 sec\ dum + \alpha_8 sec\ dum * RBPP\text{-}dum + \alpha_9 maturity + \alpha_{10} maturity * RBPP\text{-}dum + \alpha_{11} fincov\ dum + \alpha_{12} fincov\ dum * RBPP\text{-}dum + \boldsymbol{\alpha}_{13} controls + \varepsilon$$

$$AISD = \beta_0 + \beta_1 red\ pot\_spread + \beta_2 RBPP\text{-}dum + \beta_3 red\ pot\_spread * RBPP\text{-}dum + \beta_4 leverage + \beta_5 leverage * RBPP\text{-}dum + \beta_6 MB + \beta_7 int\ assets + \beta_8 sec\ dum + \beta_9 sec\ dum * RBPP\text{-}dum + \beta_{10} maturity + \beta_{11} maturity * RBPP\text{-}dum + \beta_{12} fincov\ dum + \boldsymbol{\beta}_{13} controls + \zeta$$

Note that we interact several explanatory variables with a dummy for RBPP provisions in order to see whether these variables have differential effects in RBPP contracts vis-à-vis ABPP contracts. For the interactions, we chose those variables for which the probit analyses in section 5 showed significant impacts of opposite directions for RBPP vs. ABPP contracts. As an alternative, we also run the equation system individually on the subset of ABPP-contracts and on the subset of RBPP-contracts,[15] which delivers the same qualitative results. Finally, note that we do not – in accordance with the literature – report the R^2 for the estimated equations as these are unreliable test statistics in system estimations (Goldberger, 1991). Table 7 displays the results of the simultaneous estimation procedure.

[15] Results are unreported in the paper. They are available from the authors upon request.

Table 7: Joint determinants of reduction potential and initial spread

The system of two equations jointly estimates the reduction potential_spread index and the all-in spread drawn at loan initiation in a 2SLS-procedure. The number of observations is 1760 in both equations and includes only the loans with PP provisions. ***, ** and * indicate significance at the 1%, 5% and 10% level. Standard errors are clustered on the firm level.

	red pot_spread	AISD
AISD	.0011***	
red pot_spread		-1618.013**
RBPP-dum	.1609	-329.2741**
AISD * RBPP-dum	-.0003	
red pot_spread * RBPP-dum		1646.825***
leverage	.0648	402.5755***
leverage * RBPP-dum		-347.9222**
MB	-.0185**	-38.7891***
int assets	.0224	-65.5580
sec dum	.1506***	474.7508***
sec dum * RBPP-dum	-.1008*	-449.9027**
maturity	.0040***	3.8352**
maturity * RBPP-dum	-.0034***	-3.2495*
fincov dum	-.1202*	-22.3566
fincov dum * RBPP-dum	.1930**	
# of lenders		-.92135
first deal dum		48.2123*
M&A dum		181.0837***
LIBOR		-23.4601***
Constant	-.1956	502.4198*
Rating dummies	yes	yes

From the regression equation on the reduction potential, we find that it is positively affected by the initial spread requested. This may be a simple technical effect, but it nevertheless fits nicely with the descriptive evidence of Fig. 2. There it was shown that borrowers with worse credit quality (i.e. the subsample of firms with sub-investment grade rating) – who consequentially will be charged higher spreads – obtain PP contracts with higher reduction potential, both for ABPP and RBPP provisions. Interestingly and despite the strong overall differences in the reduction potential_spread distribution of ABPP vs. RBPP contracts displayed there, we do not, however, find that the reduction potential_spread is per se determined by the performance measurement: The RBPP-dummy does not display a significant effect. We do observe, though, that the reduction potential is negatively affected by the MB. Hence, the higher the growth potential of the borrower, the more importance the pricing grid gives to spread increases rather than spread reductions. This clearly coincides with the signaling function of Hypothesis 3. Note, however, that this effect is independent of whether ABPP or RBPP provisions are chosen.[16] Nevertheless, the probit analysis in section 5 demonstrated clear distinctions between borrowers with high MB

[16] The interaction term of MB*RBPP-dum can be shown to be not significant.

and those with strong intangible asset holdings. While both may be classified as high-growth firms, the former seem to choose RBPP contracts while the latter settle for ABPP contracts. The positive effect of the MB on the reduction potential_spread may hence be a first indication that particularly RBPP contracts are employed for signaling reasons. The pledging of collateral, the maturity of the loan contract and the inclusion of financial covenants, in contrast, do show clear differential effects, depending on the type of performance measurement. These results help to disentangle the different functions that the two types of PP provisions fulfil further. More specifically, we find that the pledging of collateral increases the reduction potential of the pricing grid strongly, but only for ABPP-contracts.[17] This observation clearly supports the claim made in Hypothesis 2 that a contract trying to alleviate underinvestment problems that may be triggered by the need to pledge collateral makes use of potential spread reductions for performance improvements. Similarly, we find that a longer maturity raises the reduction potential of the pricing grid, but only in ABPP-loans. Interestingly, the inclusion of financial covenants raises the reduction potential of the pricing grid in RBPP contracts but reduces it (with a weak significance) in ABPP contracts.

Note that the results do not change if we replace the MB by the ROA. The ROA-volatility, in contrast, turns out not to be significant. Overall, the results show quite clearly that the asymmetry of the pricing grid is strongly driven by the borrowers' agency problems that appear to be different for borrowers with ABPP and those with RBPP-contracts. Specifically, the inevitable pledging of collateral for high-risk borrowers seems to aggravate underinvestment problems that the use of loan contracts with strong interest reduction potential tries to mitigate. Conversely, borrowers with particularly strong growth potential seem to employ loan contracts that allow for stronger spread increases the higher their growth potential is.

Looking at the AISD in the second equation, one of the most interesting observations is that the reduction potential has a strongly negative impact on the initial spread in ABPP-contracts. Given the highly significant and positive coefficient of the interaction term of the reduction potential spread with the RBPP-dummy, we can conclude that there is almost no effect of red pot_spread on the AISD in RBPP-contracts. Combined with the results from the first equation on the spread reduction potential, this may be taken as indication that loan contracts with ABPP-provisions try to and are perceived as successful in mitigating problems of suboptimal investment that require spread reductions and therefore grant a lower initial spread if the pricing grid stipulates this feature. Contracts with RBPP-provisions, in contrast, grant a (slightly) lower initial spread if the pricing grid stipulates spread increases, which may be interpreted as the successful solution to a signaling/screening problem. As a higher leverage increases the problems of suboptimal

[17] Pledging collateral in ABPP-contracts increases the reduction potential_spread index by 15.06%, while pledging collateral in RBPP-contracts increases the index only by 15.06% - 10.08% = 4.98%, less than a third.

investment but not the need to signal high-growth potential, this may explain why the leverage increases strongly the initial spread for ABPP-contracts but hardly for RBPP-contracts.

Exactly the same explanation holds for the opposite effects that the pledging of collateral and the loan maturity have on the initial spread in ABPP vs. RBPP contracts. Particularly the former effect deserves further examination. At first sight, it may appear intriguing that a borrower needs to pay a higher initial spread after pledging 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 typically afflicts highly levered borrowers and that the credit rating is not able to account for this increase in credit risk. Our analysis extends their findings by showing not only that this argument explains the preference of ABPP over RBPP provisions for the borrowers that need to pledge collateral. Also, we demonstrate that the corresponding pricing grid stipulates interest rate reductions in case of performance improvements that reduce the underinvestment problem and hence allow to decrease the initial spread requested.

Overall, we find that RBPP provisions satisfy the conditions that Hypothesis 3 mentions for the signaling role of debt contracts, while ABPP provisions satisfy those mentioned by Hypothesis 2 for the attenuation of suboptimal investment problems. In order to further assess how effective the two types of PP contracts are in solving the corresponding agency problems, we need to compare the initial spreads in the respective PP contracts with those in otherwise comparable fixed-rate contracts. We therefore run a simple OLS-regression on the AISD on the total sample which includes PP and no-PP contracts. Table 8 displays the results. Note that we cannot account for potential endogeneity between the asymmetry of the pricing grid and the initial spread via simultaneous estimation techniques in this case as the no-PP contracts do not feature a pricing grid.

Table 8: Determinants of the initial spread

OLS-regression on the all-in spread drawn at loan initiation. The sample includes both types of PP-contracts and the fixed-rate contracts. Among the rating classes, AAA-ratings are the omitted category. ***, ** and * indicate significance at the 1%, 5% and 10% level. Standard errors are clustered on the firm level.

	AISD
RBPP-dum	-53.5463***
ABPP-dum	-58.7077***
MB	-10.0772***
int assets	-39.5971***
leverage	40.2057***
AA-dum	5.1611
A-dum	21.3522
BBB-dum	54.4340*
BB-dum	105.2132***
B-dum	170.0328***
CCC or below-dum	261.5271***
sec dum	62.8367***
maturity	-.5304***
fincov dum	11.4646**
# of lenders	-.6964***
LIBOR	-13.3793***
ln tranche amount	-10.7359***
first deal dum	19.5484***
M&A dum	38.5777***
constant	352.8394***
# of observations	2755
adj. R^2	.58
F	198.83
Prob > F	.0000

Interestingly, controlling for credit risk and other borrower characteristics that may trigger agency issues and for loan features meant to mitigate these, we find that contracts with ABPP provisions allow for an even stronger spread reduction vis-à-vis loan contracts with no-PP than contracts 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. As has been argued by John et al. (2003), the fact that – particularly high-risk – borrowers need to pledge collateral in order to obtain credit at all may trigger underinvestment problems in that managers neglect necessary investments in the assets used as collateral. Our analysis supports their further argument that the credit rating does not sufficiently account for this additional credit risk, as the dummy for securitization still has a high, statistically and economically significant effect on the initial spread even after controlling for the borrower's rating. Additionally, we observe that the RBPP-dummy's coefficient is not high enough to

compensate for the large positive impact of the secured dummy, while the ABPP-dummy's coefficient almost totally outweighs it.

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 the spread. Similar effects are obtained for the rating dummies which measure the impact on the AISD relative to the loan of a borrower in the AAA-rating category. While the loan maturity, the number of lenders and the loan size have reducing effects on the spread, the inclusion of financial covenants increases the AISD, however. To capture the economic size of the effects, it may be interesting to note that a BBB-rated borrower, by employing a loan contract with RBPP-provisions rather than with a fixed interest rate is able to reduce the initial spread to a level almost comparable to a AAA-rated borrower (+54.4340 - 53.5463) . However, this comes at the risk of paying higher spreads should his performance decline.

7. Ex-post performance effects

If the two types of PP provisions are effective in mitigating agency problems, we should be able to observe distinctive developments in borrower-specific variables 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 a 2, 4 and 8 quarter period after the loan inception. Additionally, we investigate how the borrowers' returns develop. Note that we run two different 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 variables' development is different for borrowers with RBPP- respectively ABPP-contracts vis-à-vis borrowers with fixed-rate contracts. In the second regression, we examine only observations with PP contracts. This extends the earlier work by Manso et al. (2010) and Martin (2009) as it allows us to employ the reduction potential_spread as an additional regressor and study in which way the incentive structure that the pricing grid stipulates has an influence.

Table 9 presents the results for rating changes. Our test design follows Manso et al. (2010). Rather than running a probit analysis on a variable indicating whether the rating improved, decreased or did not change at all, our regressions use the precise rating change measured in rating notches. Recall that due to the conversion of letter ratings into a numerical scale with higher values for worse ratings, a negative rating change represents a rating improvement. As can be seen from Table 9, even after controlling for borrower and loan characteristics, borrowers with PP provisions improve their ratings over all time horizons. 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 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 show. 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.

Most important for our analysis, however, is the effect that the pricing grid exerts on the borrowing firm's ability to improve its rating: We find that a higer interest reduction potential of the contract leads to rating deteriorations. Economically, the effects are relatively small for ABPP contracts but are extremely strong for RBPP contracts. This corroborates the signaling function of RBPP contracts: The stronger the interest rate increases that the contract stipulates in order to signal a high growth potential, the stronger are the rating improvements in the quarters after the loan initiation. A longer loan maturity supports the rating improvement effect even further, while the pledging of collateral leads to rating deteriorations. Interestingly, the economic size of the collateral's impact on rating changes is smaller if only PP contracts are analyzed. Again, this may be taken as an indication that the incentive effects induced by the pricing grid are effective in reducing agency problems.

Table 9: 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. Standard errors are clustered on the loan deal level. ***, ** and * indicate significance at the 1%, 5% and 10% 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***	-.4129***	-.3148***	-.5119***	-.4251***	-.8518***
ABPP-dum	-.3059***		-.3054***		-.3140***	
red pot_spread		.1194		.2652**		.4624**
red pot_spread * RBPP-dum		.3741***		.4794***		1.0048***
leverage	1.0268***	.2868***	1.3770***	.6626***	1.0233***	.8402***
MB	-.1424***	-.1087***	-.1992***	-.1877***	-.2567***	-.2221***
int assets	-.0380	-.0282	.1220	.0885	.1124	.2010
tranche imp	-.1079	.1890	-.0657	.2328	.1467	.5451**
maturity	-.0086***	-.0031***	-.0105***	-.0040***	-.0034*	-.0073***
sec dum	.2468***	.1544***	.3251***	.2570***	.4127***	.2575**
fincov dum	.0697	-.0918	.2185**	-.0661	.0766	-.1476
constant	1.6193*	.9574	2.3819**	1.8446*	3.1295**	2.3666
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 10 reports the results from a regression on leverage changes. 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 pricing grid exerts. We find that a higher reduction potential significantly raises the leverage for borrowers with ABPP contracts, while the effect for borrowers with RBPP contracts is significantly smaller. This finding coincides with the function of ABPP contracts with regard to resolving problems of suboptimal investment decisions: It shows that high-growth firms are indeed able to increase their leverages after the employment of the appropriate PP loan contract. In the short run, i.e. over the 6 months after loan inception, we also observe that particularly after the pledging of collateral borrowers are able to raise their leverage.

Table 10: 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. Standard errors are clustered on the loan deal level. ***, ** and * indicate significance at the 1%, 5% and 10% 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	-.0028	-.0224***	-.0086	-.0406***	-.0192
ABPP-dum	.0121***		.0093		-.0076	
red pot_spread		0.0164***		.0515***		.0472***
red pot_spread * RBPP-dum		-.0084		-.0318**		-.0212
leverage	-.1564***	-.0667***	-.1993***	-.1188***	-.1900***	-.1812***
MB	.0065***	.0011	.0104***	.0044	.0155***	.0021
int assets	.0022	-.0049	.0023	-.0151	-.0426**	-.0372**
tranche imp	.0405***	.0319***	.0696***	.0624***	.0660***	.0979***
maturity	.0001***	-.00001	.0006***	.00007	.0005***	.000004
sec dum	.0072*	.0051*	.0120	.0033	-.0019	-.0052
fincov dum	-.0013	.0014	-.0010	-.0114	-.0170	-.0303*
constant	.1395***	.0397	.3739***	.1271	.4373***	.1865
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

Finally, Table 11 reports the results from a regression on the changes in borrowers' returns on assets. Supporting our earlier findings on the role of RBPP provisions, we observe that a smaller reduction potential, or stated differently, a higher signaling potential raises the returns on assets solely for borrowers with RBPP contracts but not for those with ABPP contracts. Interestingly, we also find that higher intangible assets increase a borrower's returns.

Table 11: 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. Standard errors are clustered on the loan deal level. ***, ** and * indicate significance at the 1%, 5% and 10% 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***	.0191**	-.0020	.0081	-.0108**	.0142
ABPP-dum	.0003		.0040		.0016	
red pot_spread		-.0089		-.0011		.0157*
red pot_spread * RBPP-dum		.0099		-.0189**		-.0477***
leverage	-.0329***	-.0093	.0087	.0214***	-.0018	.0066
MB	.0136***	.0138***	.0025	-.0023	-.0032	-.0097***
Int assets	.0250***	.0265***	.0197***	.0146**	.0326***	.0396***
tranche imp	-.0190**	-.0267**	-.0402***	-.0341***	-.0512***	-.0363***
maturity	.0000004	-.00001	-.00001	.00003	.00007	.00006
sec dum	-.0014	.0103	-.0063	-.0010	-.0078	-.0059
fincov dum	-.0071	-.0155	-.0069*	-.0008	-.0007	.0085
constant	-.6303***	-.0588	.0119	-.0327	.0703	.0314
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

Overall, our results hence support the conjecture that RBPP contracts are used as a signaling or screening device for firms with high growth potential. 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. ABPP contracts, in contrast, appear to be successful in mitigating the negative relationship between growth potential and leverage due to suboptimal 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 that the contracts stipulate. The combination of performance measurement type with the asymmetry of the pricing grids hence appears vital in resolving two important types of agency problems underlying the debtholder-stockholder relationship. This 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 (ex-post effect).

8. Conclusion

A large fraction of bank loans nowadays include performance pricing provisions, rendering the interest rate charged a smooth function of the borrowing company's default 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 applied to high-growth firms in order to reduce agency costs triggered by debtholder-stockholder conflicts. While rating-based PP provisions serve as a signaling device for high-growth borrowers with good credit quality but risky return development, accounting-based PP provisions are suited to solve the underinvestment problems of borrowers with low credit quality. Both types of PP provisions are effective in reducing the respective agency costs which explains the initial spread reductions as compared to fixed-rate contracts. The ensuing rating improvements of borrowers with RBPP contracts and leverage increases of borrowers with ABPP contracts that are strengthened by the particular designs of the pricing grids are further evidence.

Our results extend some earlier findings that examined specific aspects of PP in loan contracts (Manso et al., 2010; Martin, 2009), so that our work helps to place these findings into a broader perspective. Particularly our results on the use of ABPP contracts coincide with 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, but for high-quality borrowers financial covenants tend to have a substitutable relationship with rating-based PP provisions instead.

Interestingly, our results differ in some important ways from earlier findings by Asquith et al. (2005), who did not account for the type of performance measurement. They mechanically distinguished between interest-increasing and interest-decreasing loan provisions and found 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 spread increase potential. Since the dataset used by Asquith et al. (2005) was confined to the early years of loan issuance with PP provisions (1995 to 1998), this emphasizes that the role of debt contracting features is subject to constant change.

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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 (data 44)	Compustat
leverage	Borrower's debt in current liabilities (data 45) plus long-term debt (data 51) scaled by book value of total assets (data 44)	Compustat
MB	Market-to-Book Ratio: Borrower's Common shares outstanding (data 61) times price at close (data 12) plus total liabilities (data 54) plus preferred stock (annual data 10) scaled by book value of total assets (data 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 (data 21) scaled by book value of total assets (data 44)	Compustat
ROA-vola	Volatility over preceding four quarters of borrower's	Compustat

	ROA	
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)	LPC Dealscan
red pot_spread	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 and the initial spread	own calculation, based on LPC Dealscan
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