Accounting-based versus rating-based performance pricing in bank loan contracts – Immediate punishment but gradual reward?[1]

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

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Abstract

We examine the strategic use of rating-based versus accounting-based performance pricing in bank loan contracts. Analyzing a sample of US bank loans between 1993 and 2008, we find that banks tend to employ slowly-reacting ratings as performance measures for borrowers with expected performance improvements and quicker-reacting accounting ratios for firms with expected performance deteriorations. Interestingly, both borrower groups manage to improve their rating in the two years after the loan initiation, though the effect is much stronger for the former group than for the latter. Performance pricing hence appears to exert positive incentive effects, so that the threat of immediate punishment is rarely executed. An analysis of the asymmetry of the pricing grids supports this conclusion.

EFM Classification: 130, 200, 710

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[*] Corresponding author, Frankfurt School of Finance & Management, Finance Department, Sonnemannstr. 9-11, 60314 Frankfurt, Germany, Phone: +49 69 154008 755, Fax: +49 69 154008 4755, E-mail: c.bannier@fs.de

[†] Frankfurt School of Finance & Management, Finance Department, Sonnemannstr. 9-11, 60314 Frankfurt, Germany, E-mail: m.wiemann@fs.de

1. Introduction

Performance pricing (PP) is a nowadays well-established provision in many loan contracts.[2] Whereas traditional bank loans have been priced using a fixed spread over LIBOR or prime, PP links the interest rate charged to a measure of the firm's credit risk and hence makes it a smooth function of default risk. In so doing, it reduces the need to renegotiate the loan for borrowers with improvements in credit quality and automatically charges higher interest rates from borrowers with deteriorating credit quality. PP thus raises contracting efficiency by reducing renegotiation costs and shifting a considerable part of credit risk to the borrower (Beatty, Dichev and Weber, 2002).

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 number (accounting-based performance pricing, ABPP henceforth), typically the ratio of debt to EBITDA or the leverage.[3] Even when analyzing only firms that possess a credit rating, we find that a large fraction of them hold private debt contracts with ABPP rather than RBPP provisions. In this paper we follow this distinction and ask whether and, if so, in which way ABPP and RBPP fulfill different functions in the credit contracting process.

Credit ratings are generally assessed as the most comprehensive and, hence, informative measure of credit risk. They are produced by agencies that possess long-standing experience in evaluating credit risk processes. Furthermore, ratings contain private information because rating agencies are exempt from Regulation FD.[4] Due to the complex and time-consuming rating process and the usually employed rating-through-the-cycle approach, however, they are also relatively stable measures and hence much less volatile than accounting numbers (Altman and Rijken, 2005; Löffler, 2004, 2007). This "stickiness" of credit ratings has often led to the accusation of them being a less timely measure of credit risk than accounting data (Robbe and Mahieu, 2005).

We hypothesize that banks could make use of the tradeoff between reliability and timeliness pertaining to credit ratings on the one hand and accounting data on the other in order to shape PP provisions to their benefit. The interest-increasing provision in loan contracts serves mainly the lending bank as she will be compensated once a credit risk rise is reported. Given the quicker reaction of accounting ratios to changes in credit quality, it may be well conceivable that banks offer ABPP provisions particularly to borrowers for whom they expect a deterioration of credit

[2] Performance pricing provisions are also referred to as performance-sensitive debt (Manso, Strulovici and Tchistyi, 2010) or as step-up bonds (Lando and Mortensen, 2005).

[3] Two examples of contracts with ABPP and with RBPP provisions can be found in the appendix.

[4] 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).

quality over the maturity of the loan. Even if the indicated increase in credit risk via the accounting data should not prove to be substantiated, the interest rate will simply be readjusted downwards once the respective accounting number moves back. By employing ABPP when lending to borrowers with expected deteriorations in credit quality, banks effectively shift both credit risk and information reliability risk to the borrowing firms. The interest-decreasing provision, in contrast, benefits both the borrower and the lender. Both do not need to bear any renegotiation costs, the borrower immediately enjoys lower credit costs and the lending bank no longer needs to fear the loss of a borrower with improving credit quality via prepayment of the loan (Asquith, Beatty and Weber, 2005). By offering a contract with RBPP rather than ABPP to borrowers with expected improvements in credit quality, the bank requires the more reliable, yet less timely credit rating to reflect the reduction in credit risk before the actual interest rate reduction comes into effect. In this case, the borrower will eventually benefit from a reduction in credit risk but needs to bear the risk of a lower timeliness of the performance measure. Altogether, the sketched contracting design offered by the lending bank could be described as "immediate punishment but only gradual reward".

In order to test this hypothesis of the strategic contract design, we conduct several ex-ante and ex-post analyses. From an ex-ante viewpoint, we examine in a Heckman model whether particular borrower or loan characteristics drive the distinctive assignment of fixed-rate contracts vs. contracts with PP provisions and - within the group of PP-contracts - the distinction between RBPP and ABPP provisions. We find that indeed banks assign RBPP contracts to borrowers for whom they expect further credit quality improvements, supporting our main hypothesis. Investigation of the offered pricing grid and the corresponding spreads, however, leads to a modified conclusion. While it seems to be the case that borrowers with RBPP contracts indeed face a pricing grid that allows further spread reductions (but also some spread increases), even more so do ABPP contracts. As such, even though banks may expect that borrowers will experience credit quality deteriorations in the future and therefore assign contracts with ABPP provisions, they still give them the chance to improve their performance and grant lower spreads if they do so. This conclusion also helps to explain the counterintuitive observation that borrowers who are dealt ABPP contracts often face much higher initial spreads than borrowers that are offered RBPP contracts: it reflects the fact that – possibly despite the banks' expectations – borrowers with ABPP contracts still have the option to reduce their spreads while borrowers with RBPP contracts also face an – albeit small - risk of spread increases.

From an ex-post viewpoint, we find that banks' expectations regarding their borrowers' credit quality development are vindicated: Borrowers with RBPP contracts strongly improve their rating, both as compared to borrowers with fixed-rate contracts and to those with ABPP

contracts, over the two years after the loan initiation. We also find that these borrowers reduce their leverage and raise both their cashflows and their market values over this time horizon. Interestingly, we can also show that borrowers with ABPP contracts manage to improve their ratings as compared to borrowers with fixed-rate contracts. Though the improvement is less strong than for borrowers with RBPP contracts, it is significant in both years after the loan initiation. At the same time, however, we observe no change in the leverage and the cashflow level after the first year and only weakly significant changes within the two years after the start of the loan. Lacking a significant short-run development of these two vital variables that usually precipitates rating changes, the immediate rating improvement of these ABPP borrowers is all the more surprising. It may indicate that rating agencies interpret the feature of performance pricing in loan contracts as a positive incentive signal. While we do not want to place undue emphasis on this arguably weak inference, we do want to stress that the choice of RBPP vs. ABPP provisions does not seem to be driven by self-selection of borrower types as the firms with the strongest improvements in rating levels are the ones with comparably slowly reacting RBPP contracts. Rather, it seems to be the case that borrowers who lack the ability to uphold or improve their performance self-select into the fixed-rate loan category.

Summing up, our results indicate that performance pricing in loan contracts is used as a quite complex instrument. While indeed banks tend to assign the more slowly reacting rating as performance measure to borrowers with particularly strong expected and subsequently realized improvements in performance and as such reward these borrowers only late, they need to grant them large spread reductions as compared to fixed-rate contracts in order to induce these borrowers into accepting the loan contract in the first place. More quickly reacting performance measures such as accounting ratios, in contrast, appear helpful in setting incentives for borrowers to improve their performance. As such, even though they could be used in order to punish borrowers quickly, effectively they lead to performance improvements. Credit rating agencies seem to anticipate these beneficial effects from PP provisions on the borrowing firms' performance so that a positive effect on the rating level can be observed even without strong immediate changes in fundamental values.

The rest of the paper proceeds as follows. Section 2 gives a brief overview of the related literature. Section 3 derives the hypothesis to be tested in the following. Section 4 sketches the data and presents univariate analyses. An ex-ante examination of our main hypothesis is conducted in section 5, while section 6 contains the ex-post analysis. Section 7 concludes.

2. Related literature

Our study is closely related to the growing body of research on specific features of debt contracts. 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; Roberts and Sufi, 2009), detailed studies of performance pricing both in bond and loan 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 while covenants may help to mitigate the equityholder-debtholder conflict by reducing asset substitution, rating-dependent coupon rates are inefficient in this respect. Silva and Pereira (2007), however, 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 coupon payments. They show that optimal step-up bond designs can help to overcome both agency conflicts (i.e. mitigate asset substitution by reducing risk) and problems of information asymmetry (i.e. signal borrower types), though the optimal design will be different for the two explanations.

Manso, Strulovici and Tchistyi (2010) analyze performance-sensitive debt in both a theoretical and empirical model and show that making the interest rate contingent on a measure of a 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-interest contracts. The authors do not, however, distinguish between different measures of performance.

The earliest empirical reference to PP provisions in loan contracts has been made by Loomis (1991) in a description of various performance measures as a basis to price credit risk in debt contracts. Asquith, Beatty and Weber (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 1998. They distinguish between interest-increasing provisions and interest-decreasing provisions and find that these two types of PP provisions 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, in contrast, 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.

Closest to our work is the paper by Ball, Bushman and Vasvari (2008). They 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. As a side-effect they compare the use of accounting ratios vis-à-vis the credit rating in PP provisions and report that accounting ratios are preferred if their debt-contracting value, i.e. their degreee of informativeness, is sufficiently high. They conclude that "[…] the timeliness provided by the accounting information is more important than the informativeness provided by the rating." This finding is supported by Christensen and Nikolaev (2010) who report the same for the the use of covenants based on (more stable) capital structure information vis-à-vis covenants based on (more volatile) profitability numbers. Our paper complements these earlier papers by analyzing the *strategic use* of different performance measures that relates to the borrowing firms' characteristics. We furthermore do not restrict our dataset to syndicated loans but analyze more generally the differing employment of RBPP and ABPP provisions in all types of loan contracts.

Finally, our paper also relates to work on the question in which way the design of debt contracts may influence the credit rating process. In this respect, Kraft (2010) investigates whether credit rating agencies announce more favorable ratings for borrowers who are highly sensitive to rating changes because their private debt features rating-based performance pricing. She finds that indeed rating agencies seem to cater to these borrowers' interests by issuing rating adjustments that are more favorable than those for borrowers with accounting-based performance pricing or with fixed-rate debt. Our paper puts these findings into a slightly different perspective. By looking at the firms' performance development in more detail, we are able to distinguish between fundamentally justified rating improvements and biased rating changes that lack the necessary fundamental development. As such, our results extend the findings by Kraft (2010) towards an evaluation of the rating bias following from this conflict of interest that afflicts rating agencies.

3. Derivation of hypotheses

Our study is concerned with the question what drives the distinction between RBPP and ABPP loan provisions. In accordance with the existing literature (Rauh and Sufi, 2010; Sufi, 2009) we presume that it is primarily the lending bank who decides on the specific design of the bank loan, while it remains to the borrower to accept or reject the loan contract.[5] We hence conjecture that the bank chooses either of the two performance measures in order to maximize its risk-adjusted proceeds from the loan relationship, i.e. the return per unit of risk. Whenever the credit risk increases, the lending bank would therefore like to employ a risk measure that reports this step-up in risk as quickly as possible. This may even come at the cost of a potential lower accuracy of this risk measure, as an erroneously increased interest rate may quickly be readjusted downwards once the mistake gets recognized. Whenever the risk decreases, in contrast, the bank would rather use a reliable measure that reflects this risk reduction only if a high degree of accuracy is reached even though this tends to go along with a lower timeliness. Translated to ratings and accounting ratios as performance measures, we would therefore hypothesize that the lending bank offers RBPP provisions that use the less timely but more reliable credit rating as performance measure to borrowers for whom the bank expects performance improvements over the maturity of the loan, while it would offer ABPP provisions that employ more quickly reacting accounting numbers to borrowers with expected performance deteriorations.

This ”immediate punishment but gradual reward” hypothesis should be reflected not only in the different assignment of borrowers to ABPP vs. RBPP contracts as regards their expected performance development but also in the pricing that the loan contracts stipulate. First, if banks use PP provisions in order to benefit from variations in a borrower’s credit risk, then these contracts should offer a discount to the borrowing firm, i.e. the initial interest rate spread should be lower than the spread that borrowers with fixed-rate contracts need to pay. Furthermore, it may be well conceivable that the initial spread reduction vis-à-vis comparable borrowers with fixed-rate contracts will be larger with ABPP, since both credit risk and information reliability risk will be shifted to the borrower, than with RBPP, which imposes only the information timeliness risk on the borrower. Second, if indeed banks assign ABPP provisions to borrowers for whom they expect a future deterioration of credit risk, the pricing grid should be set such that there is room for future deteriorations in the respective accounting measure. In the extreme case, the borrower would start from the bucket with the lowest spread and only spread increases will be covered by the contract. Vice versa, in the extreme case banks would assign RBPP provisions

[5] We may furthermore presume that acceptance rates are particularily high, as such yielding strong contracting power to the lending bank , in situations of tight credit markets, e.g. due to high interest rate levels.

such that the borrower would start from the pricing bucket with the highest spread and only future spread reductions would be covered by the contract. At a minimum, there should be room for spread reductions, i.e. the initial placement of the borrower should not be in the pricing bucket with the lowest spread.

While the aforementioned analyses refer to testing our hypothesis from an ex-ante viewpoint, i.e. prior to the loan contract coming into effect, we will also test whether our hypothesis is confirmed ex post. As such, we will examine whether the lending banks' expectations are confirmed eventually and analyze in which way borrowers with ABPP provisions in their loan contracts fare any differently after the contract conclusion than borrowers with RBPP provisions. According to the "immediate punishment but gradual reward" hypothesis, we should expect to observe performance improvements for borrowers with RBPP contracts but deteriorations for borrowers with ABPP contracts. However, this conjecture relies on the contract design serving solely as a selection device. If, as has been indicated by Koziol and Lawrenz (2010) for the case of corporate bonds, the feature of performance pricing also works as an incentive instrument, we could also expect to observe improvements for borrowers with ABPP contracts as they are effectively threatened by interest cost increases should they not manage to uphold their performance. In any case, though, our main hypothesis should prescribe a different path of development for the two groups of borrowers, since for the ones with RBPP provisions the lending banks already expected a performance improvement even before the loan contract conclusion, while the borrowers with ABPP provisions should only start to improve their performance after the loan initiation.

Additional frictions may blur this relatively clear-cut picture of how PP provisions in loan contracts may be used, though. First, credit ratings essentially represent the confirmation of a third party regarding a borrower's level of credit risk. This "third party confirmation" may be particularly valuable if the loan is syndicated or if the lending bank plans to sell the loan or use it in a securitization process, irrespective of the future development of the borrower's credit quality. The fact that accounting data is much more susceptible to manipulation by the borrowing firm (Beatty and Weber, 2005) may additionally lead a cautious lender to abstain from using ABPP provisions, particularly if only little information on the borrower is available, for instance because there has been no previous lending relationship. In our analyses we will therefore need to control for the existence of previous loan deals as well as for syndicated loans.

Even if manipulation of accounting information were no concern, banks may, second, be likely to employ ABPP provisions simply for borrowers that are young and lack a track record regarding their financial development or whose future development is difficult to assess, e.g. because their returns fluctuate wildly. For these firms it may be important to use a performance

measurement that reacts quickly to any changes in performance and that, hence, allows a very dense monitoring of the borrower. Mature firms with stable returns, in contrast, could easily be offered RBPP provisions as they need a less close monitoring. We will take these aspects into account by explicitly controlling for the volatility in a borrowers' returns on assets.

4. Data and summary statistics

We obtain data on bank loans from Reuters Loan Pricing Corporation's Dealscan database. For our sample, we collect all loans issued by borrowers in the U.S. or Canada 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. Note that we perform our analysis on the tranche level in order not to lose the information incorporated in the tranche design - usually each loan consists of several tranches.[6] This comes at the cost of having to account for interdependencies between the tranches of one loan by applying appropriate econometric techniques where necessary.

In a first step, we exclude all deals with missing information on the tranche amount, the maturity, the all-in spread drawn,[7] the senior rating or the securitization status and restrict deals and tranches to have a maturity of 30 years or less. Furthermore, we exclude deals that do not state which kind of performance measure they use, have erroneous performance pricing spreads or ambiguous performance pricing definitions. In a last step, we exclude loans to banks or government-related entities. This leaves us with a 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 the loan contracts in this raw data 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 is used in 22% of all contracts. It is interesting to note that while a higher number of contracts relies on the debt to cash-flow ratio, the rating applies to a much larger volume of contracts (54%).

[6] 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.

[7] In the following, the spread to be paid will aways refer to the all-in spread drawn.

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 define 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 spreads of tranches can be bound to more than one performance measure. Therefore, the numbers in the table add up to 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%
DSCR	130	0.81%	7	0.14%
CP rating	16	0.10%	8	0.17%
Moody's rating	3	0.02%	0	0.01%
Sub Rating	1	0.01%	1	0.02%

In a second step, we augment the loan data by firm-specific information from Compustat. Leaving out the loan deals with missing firm-specific characteristics, and refining ourselves to loan contracts with either PP based solely on the debt to cash-flow ratio, i.e. the most important accounting-based performance measure, (ABPP, henceforth), with PP based on the senior rating (RBPP, henceforth) and without any PP (i.e. fixed-rate loan contracts), our final dataset consists of 4,905 loan tranches issued by 1,442 firms between 1993 and 2008.

Table 2 displays the major characteristics of our loan sample. The table shows that firms that are dealt RBPP provisions are much larger and have a lower leverage and a better credit rating than companies that are offered ABPP or a fixed-rate contract. 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 values represent worse ratings. Furthermore, we find that loans with RBPP are much larger than loans based on ABPP or without any PP, have a shorter maturity and involve a higher number of previous deals. Also, the initial spread requested from the borrower is much lower than with ABPP, while the number of pricing buckets is slightly higher. On the other hand, the spread change over the total pricing grid is smaller with RBPP than with ABPP contracts. Finally, we observe that loan contracts with RBPP provisions are much less often secured than loans with ABPP or without any PP, but are much 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 without any PP.

Table 2: 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. Delta spread refers to the total spread change that the pricing grid stipulates.

	Without performance pricing				Debt/CF based performance pricing				Rating based performance pricing			
	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
Cash flow by total 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
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 (Secured = 1; 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 3 presents the distribution of the three subgroups of loans over the years 1993 to 2008. As can be seen, the total number of loan initiations in our sample increases steadily until 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 roughly similar – though slightly varying - proportions of ABPP, RBPP and contracts with fixed-rate designs.

Table 3: Distribution of deal types by years

Number of loan inititations per year.

Year	Total	Without performance pricing	Debt/CF based performance pricing	Rating based performance pricing
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

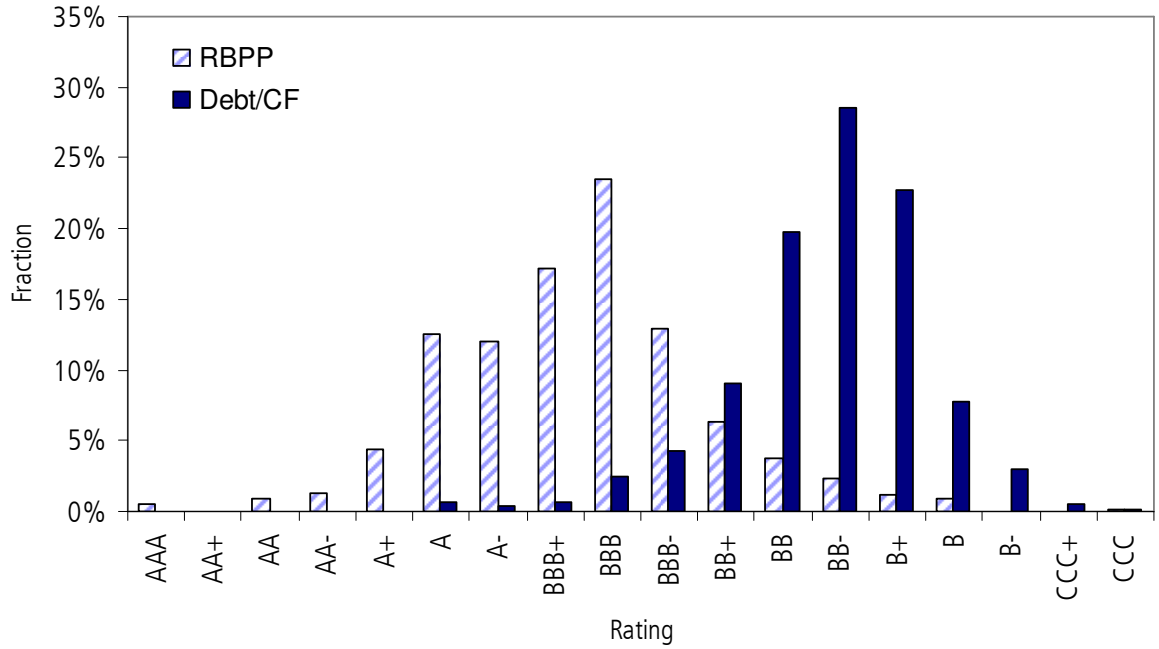
Table 4 shows the distribution of the three subgroups of loans according to the senior rating of the borrower at the time of the loan initation. What is immediately noticeable is the strong employment of RBPP for borrowers with an investment-grade rating. Even more, the fraction of loans with RBPP increases with deteriorating rating level within the investment-grade interval and drops strongly when crossing the investment-grade boundary (BBB-). ABPP, in contrast, tends to be used mainly for borrowers of below investment-grade credit quality.

Table 4: Distribution of deal types by rating classes

By senior rating (from S&P)	Total	Without performance pricing		Debt/CF based performance pricing		Rating based performance pricing	
	N	N	%	N	%	N	%
AAA	14	6	0.4286	0	0.0000	8	0.5714
AA	66	38	0.5758	0	0.0000	28	0.4242
A	618	155	0.2508	11	0.0178	452	0.7314
BBB	1,197	256	0.2139	79	0.0660	862	0.7201
BB	1,535	603	0.3928	738	0.4808	194	0.1264
B	941	515	0.5473	387	0.4113	39	0.0414
CCC	107	99	0.9252	6	0.0561	2	0.0187
CC	10	9	0.9000	1	0.1000	0	0.0000
WR/NR	59	58	0.9831	0	0.0000	1	0.0169

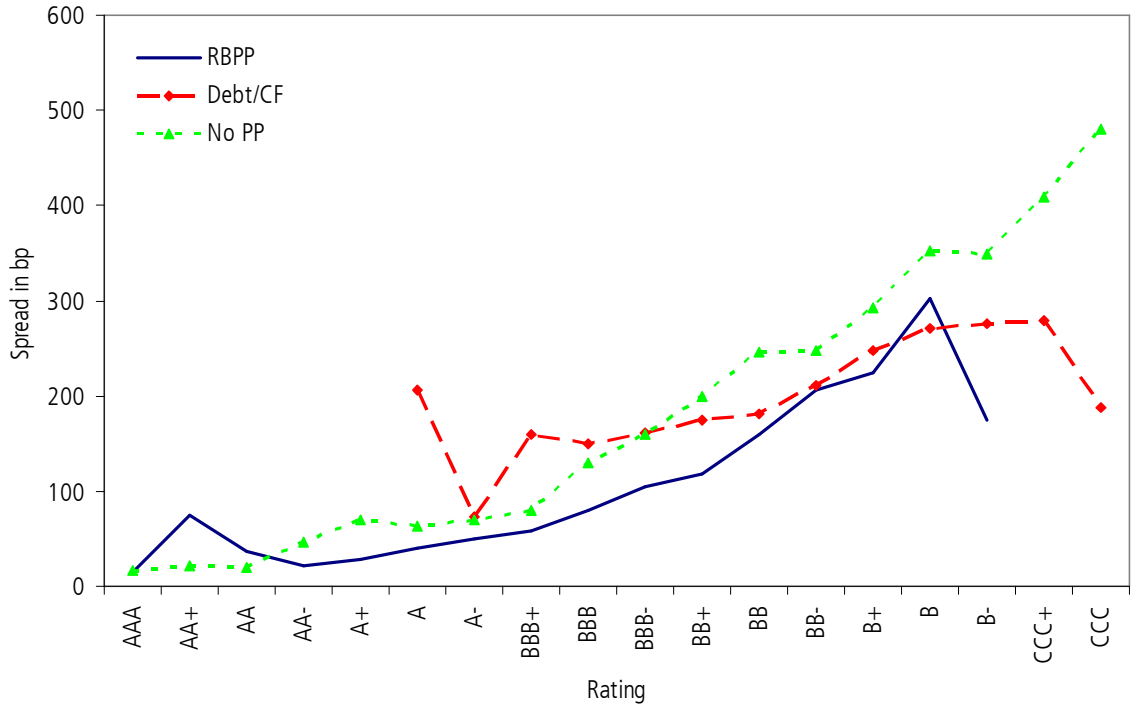
The distribution of rating classes within the RBPP and ABPP subgroups is also shown in Figure 1. The distribution of borrowers with RBPP contracts is slightly flatter and peaks at a BBB rating, while the distribution of borrowers with ABPP contracts peaks at the much lower BB- rating.

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



The introduction of PP provisions in loan contracts typically leads to a reduction in the spread that borrowers need to pay on top of a reference rate (usually LIBOR) as compared to fixed-rate contracts. Table 2 already indicated that the average spread is smaller in contracts with RBPP provisions than in contracts with ABPP provisions. Figure 2 displays this effect more explicitly by controlling for the borrowers' rating at the origination of the loan. It depicts the mean spread at loan origination conditional on the rating, differentiating between borrowers with ABPP contracts, with RBPP contracts and with fixed-rate contracts. As can be seen, loan contracts with RBPP provisions request a lower spread, respectively grant a higher spread reduction in comparison to contracts without PP, than contracts with ABPP over almost all rating classes. The effect is clearest for firms with ratings above BB- and gets blurred for ratings below. The latter can be easily explained, however, by the extremely small number of loans with RBPP in these lower rating classes. It is also interesting to note that contracts with ABPP request 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.

Figure 2: Spreads charged at loan initiation, controlled for borrower's rating



5. Ex-ante differences between ABPP and RBPP

5.1. PP assignment

We address the question which parameters drive the decision to assign a loan contract with ABPP versus RBPP provisions in a simple probit analysis. Given that we observe the distinction between the two types of performance pricing only for those loans that were not categorized as fixed-rate contracts, we need to employ a Heckman correction procedure in order to deal with this pre-selection problem. In a first step, we hence model the decision of whether or not to assign performance pricing to a loan request and, given this pre-selection of loans into the PP category and the fixed-rate category, we examine in a second step which factors drive the decision to use the rating over an accounting measure of firm performance for contracts with performance pricing.

In the pre-selection stage, we take into account firm and loan characteristics and also use some macroeconomic control factors. More specifically, we include the LIBOR and the US-GDP in the quarter of the loan initiation, the firms' size measured by the natural logarithm of total assets and the leverage (total debt divided by total assets) in the quarter before the loan initiation. As regards loan specific factors, we employ the loan size measured by the natural logarithm of the

tranche amount, the maturity, the stated purpose of the loan, e.g. capital structure or working capital reasons, the stated tranche type, e.g. bridge loan, term loan or credit line, and the number of previous deals. Additionally, we account for the importance of the loan to the company by incorporating the ratio of the tranche amount to the total asset amount of the borrower. We also include a dummy variable that takes the value of one if the loan considered is the first loan of the firm (and zero otherwise) and another dummy variable that takes the value of one if the loan contract contains further financial covenants (and zero otherwise). Finally, we also employ year dummies.

The second-step regression eventually examines the distinction between the two different types of PP. Here, we use a probit specification on the probability of being assigned RBPP rather than ABPP provisions. The main variable of interest in this second step is the proxy for the banks' expectations regarding the future development of the borrowers' credit quality. As measures for these expectations are not readily available,[8] we make a simple assumption regarding a bank's expectation formation process: we presume that banks use a linear extrapolation of past observations regarding a borrower's credit quality. As such, we employ the change in the borrower's credit rating over the two, four and eight quarters before the loan initiation as a proxy: Whenever the rating improved prior to the loan initiation, we assume that the bank expects the future credit quality of the borrower to improve as well and vice versa.[9] Further firm-specific factors used in the second-step regression are the firm size, the leverage, the return on assets, the volatility of asset returns, the market-to-book value, and the rating per se. All variables are taken from the quarter before the loan initiation. We also control for the borrowers' industry. As regards the loan characteristics, we take into account the loan maturity, the number of lenders and consider whether or not the loan is syndicated or secured as dummy variables.

Table 5 presents the results.[10] As regards the pre-selection procedure, we find that loans tend to be assigned a performance pricing feature when the interest rate level is high, while the general macroeconomic environment as measured by the GDP does not appear to play a role. As regards the firm characteristics, we observe that a higher credit risk as measured by the rating leads to a smaller probability of being assigned a contract with PP provisions. Surprisingly, large firms are

[8] CDS spreads, for instance, have not been available for the total length of our observation period, particularly not for the early years of our dataset.

9 Table 10 in the appendix contains a robustness check where the change in the z-score has been used instead of the rating change. We employ both the numerical change in the z-score over the 2, 4 and 8 quarter period before the loan initiation and we construct a dummy variable that assigns a value of +1 to those firms in the quartile of highest z-score changes, a -1 to those in the quartile of smallest z-score changes and zero otherwise. Overall, the results hardly change as compared to the results in Table 5. As regards the selection between RBPP and ABPP, we find that the z-score change exerts only a weak effect, however: an improvement in the z-score over the year before the loan initiation makes the offering of RBPP provisions more likely.

[10] Note that the number of observations varies according to the rating change calculation: the rating difference calculation over the 8 quarter horizon, e.g., automatically deletes all loan contracts with a maturity less than 8 quarters.

dealt PP less often than small firms. At the same time, however, large loans receive performance pricing more often, while the relative importance of a loan to the borrower, i.e. the ratio of the loan size to the total asset size of the company, has a negative effect. This may be explained by the fact that if a single loan makes up a large fraction of the borrower's overall financing, the riskiness of the firms credit financing is extremely high, which would also be reflected by a high leverage and, potentially, also a low rating, so that the bank would tend to assign a fixed rate contract. The existence of financial covenants seems to have a positive effect on PP provisions as does the loan's maturity. Finally, an intriguing effect is observed for the loan rank within the history of the borrowing firm's loans. If the loan is the first loan of the company, it is less likely to feature PP. However, with an increasing number of previous loans, it is also less likely to be assigned PP provisions. While the latter effect is only weakly significant, it nevertheless appears to be the case that a minimum of information about the borrower is necessary for the bank to engage in a contract with performance pricing, so that borrowers without any loan history will rather be dealt a fixed-rate contract. However, with increasing depth of the relationship with the borrower, i.e. with an increasing number of previous deals, the information basis gets stale so that it does not contribute any further to the propagation of PP contracts.

Table 5: RBPP vs. ABPP selection, rating change

The Heckman pre-selection runs a probit regression on the probability of being assigned a loan contract with PP provisions, the second stage runs a probit regression on the probability of the rating being selected as performance measure if a PP contract is assigned. The rating change is calculated as the notch change over 2, 4 or 8 quarters before the loan initiation. ***, ** and * indicate significance at the 1%, 5% and 10% level. P-values are reported in parentheses.

Explanatory variables	Model I 2-quarter differences	Model II 2-quarter differences	Model III 4-quarter differences	Model IV 4-quarter differences	Model V 8-quarter differences	Model VI 8-quarter differences
Heckman selection equation: PP vs. fixed-rate						
LIBOR	**.1363*** **	**.1368*** **	**.1364*** **	**.1368*** **	**.1486*** **	**.1491*** **
	(.005)	(.005)	(.005)	(.005)	(.003)	(.003)
GDP	.0002	.0002	.0002	.0002	.0002	.0002
	(.361)	(.368)	(.374)	(.381)	(.405)	(.408)
leverage	**-.2033***	**-.2030*** **	-.1672	-.1669	-.1651	-.1647
	(.055)	(.005)	(.119)	(.120)	(.138)	(.137)
rating	**-.1224*** **	**-.1225*** **	**-.1258*** **	**-.1260*** **	**-.1302*** **	**-.1304*** **
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
ln total assets	**-.1735*** **	**-.1729*** **	**-.1636*** **	**-.1632*** **	**-.1507*** **	**-.1501*** **
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
ln tranche amount	**.1571*** **	**.1562*** **	**.1535*** **	**.1526*** **	**.1551*** **	**.1541*** **
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
tranche importance	**-.5394*** **	**-.5366*** **	**-.5290*** **	**-.5272*** **	**-.5471*** **	**-.5456*** **
	(.004)	(.004)	(.005)	(.005)	(.008)	(.008)
maturity	**.0109*** **	**.0109*** **	**.0106*** **	**.0106*** **	**.0104*** **	**.0104*** **
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
dummy financial covenants	**1.4542*** **	**1.4540*** **	**1.4427*** **	**1.4428*** **	**1.4260*** **	**1.4261*** **
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
dummy first deal	**-.2143*** **	**-.2150*** **	**-.2032*** **	**-.2036*** **	**-.1936*** **	**-.1937*** **
	(.002)	(.002)	(.005)	(.005)	(.009)	(.009)
# previous deals	**-.0179** **	**-.0178** **	**-.0153***	**-.0153***	**-.0158***	**-.0157***
	(.032)	(.033)	(.068)	(.069)	(.064)	(.065)
constant	-4.2964	-4.2469	-4.2098	-4.1619	-4.3286	-4.3005
	(.145)	(.149)	(.157)	(.162)	(.157)	(.160)
tranche type, loan purpose, year dummies	yes	yes	yes	yes	yes	yes

RBPP vs. ABPP equation

rating-difference	**-.2740***	-.2317	**-.3107****	**-.2930***	**-.3736*****	**-.3569*****
	(.074)	(.227)	(.015)	(.071)	(.000)	(.006)
rating	**-.2634*****	**-.1053*****	**-.2604*****	**-.1069*****	**-.2969*****	**-.1487*****
	(.000)	(.001)	(.000)	(.001)	(.000)	(.000)
rating-difference x rating	**.0284*****	**.0191***	**.0301*****	**.0227****	**.0382*****	**.0306*****
	(.004)	(.094)	(.001)	(.026)	(.000)	(.001)
IG-dummy		**.9652*****		**.9442*****		**.8214*****
		(.000)		(.000)		(.000)
IG-dummy x rating-difference		**-1.9496***		-.5732		.0561
		(.097)		(.452)		(.927)
IG-dummy x rating-difference x rating		**.2372***		.0833		.0180
		(.061)		(.312)		(.785)
ln total assets	**.3711*****	**.4041*****	**.3743*****	**.4065*****	**.3695*****	**.4131*****
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
leverage	-.2514	-.2075	-.2726	-.2261	-.1435	-.1641
	(.284)	(.376)	(.259)	(.349)	(.579)	(.526)
RoA	-.1786	.1931	-.6136	-.2001	.8322	1.1167
	(.794)	(.778)	(.387)	(.778)	(.286)	(.153)
RoA volatility	**4.9197***	**4.5938***	**5.9171****	**5.2972****	**6.4411****	**6.2113****
	(.058)	(.074)	(.028)	(.047)	(.023)	(.028)
MTB	.0140	.0034	.0682	.0503	-.0164	-.0178
	(.793)	(.950)	(.244)	(.391)	(.791)	(.772)
dummy syndicated	.6030	.8008	.6399	.7787	.5601	.7185
	(.353)	(.198)	(.325)	(.210)	(.405)	(.261)
dummy secured	**-1.2920*****	**-1.1774*****	**-1.3036*****	**-1.1750*****	**-1.2475*****	**-1.1277*****
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
maturity	**-.0123*****	**-.0123*****	**-.0134*****	**-.0135*****	**-.0142*****	**-.0142*****
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
# of lenders	**-.0075***	**-.0082***	**-.0075***	**-.0081***	-.0059	-.0064
	(.078)	(.067)	(.090)	(.077)	(.202)	(.183)
constant	**1.5987***	-1.0622	**1.5919***	-.9549	**1.8264****	-.6470
	(.057)	(.239)	(.061)	(.295)	(.041)	(.509)
industry dummies	yes	yes	yes	yes	yes	yes
No. of observations	4232	4232	4122	4122	3920	3920
No. of censored observations	1700	1700	1700	1700	1700	1700
Wald chi^2	1018.12	1060.76	936.83	984.23	807.24	850.64
Log likelihood	-2680.749	-2653.98	-2598.734	-2575.394	-2448.43	-2431.72
Prob >chi^2	.0000	.0000	.0000	.0000	.0000	.0000

The second selection between assigning RBPP versus ABPP provisions shows strong support for our hypothesis: a past rating deterioration (measured by a positive rating change) reduces the probability of RBPP as compared to ABPP assignment in all but one regression model. Interestingly, the significance of this variable increases with the length of the period over which the rating change is measured, i.e. a rating change over the two years before the loan initiation has a more significant effect on the type of PP provision than a rating change over only the 6 months before the loan initiation. Furthermore, we find that the rating itself has a highly significant effect as well, so that better ratings lead to a signicantly higher probability of RBPP provisions.

Since it is well conceivable that the effect of the observed past rating change on the banks' choice of PP provision is dependent on the level of the borrower's rating, we also include the interaction term of the two variables. As can be seen, the interaction variable displays a highly significant but positive effect on the probability of RBPP assignment. Obviously, then, the effect that the bank's expectation as proxied by the past rating change has on the probability of RBPP assignment is weaker the worse the rating level. I.e., even though a bank is more likely to assign RBPP if she expects the borrower to improve its credit quality in the future (has observed a past

rating improvement), the likelihood is the smaller the worse the borrower's credit quality. Put differently, a one notch rating improvement for an investment-grade rated borrower has a stronger positive effect on the probability of RBPP assignment than a one notch rating improvement for a speculative-grade rated borrower.

In order to dig even deeper into these "level"-effects, we also introduce a dummy variable for investment-grade rated borrowers and interact it both with the rating change variable and with the interaction term of rating change and rating level in models II, IV and VI. Due to the regulatory use of ratings, the investment-grade cutoff may be expected to exert differential effects on those borrowers rated above as compared to those rated below (Beaver, Shakespeare and Soliman, 2006; Opp, Opp and Harris, 2010). While the investment-grade dummy per se has the expected positive effect on the probability of RBPP assignment, the interaction terms are significant only when rating changes over the six months prior to the loan initiation are considered. For these, we find that only rating changes for borrowers with investment-grade rating have a significant effect on the choice between RBPP and ABPP, while the effect again becomes weaker the worse the rating is (within the investment-grade interval).

Altogether, these results may be interpreted as follows: If a borrower has been able to improve its credit quality over a two year period prior to the loan initiation, this appears as a sufficiently strong signal to the bank supporting an assignment of RBPP provisions. The bank is even more likely to do so, the better the borrower's rating is in the end. If the borrower has showed a rating improvement only over a six-month interval before the loan initiation, the effect of the borrower's rating level becomes even more important, so that the bank is more likely to assign RBPP only if the borrower has reached the investment-grade interval.

Regarding the other variables, we find that larger firms obtain RBPP provisions more often, which is exactly what the descriptive statistics of Table 2 have already indicated. Furthermore, the return volatility displays a significantly positive effect. As such, banks seem to assign RBPP rather than ABPP provisions to firms with highly volatile returns, indicating, potentially, that a close monitoring of these firms is less important than a reduction of the costs of frequent interest rate adjustments. Quite surprisingly, the syndication dummy appears not to exert a significant effect on the distinction between RBPP and ABPP, while the securitization dummy displays a highly significant negative effect. Secured loans are hence more likely to feature ABPP rather than RBPP provisions. Finally, the loan maturity has a negative effect on RBPP assignments as well, as does, though with weak significance, the number of lenders.

5.2 Design of the pricing grid

5.2.1 Number and asymmetry of pricing classes

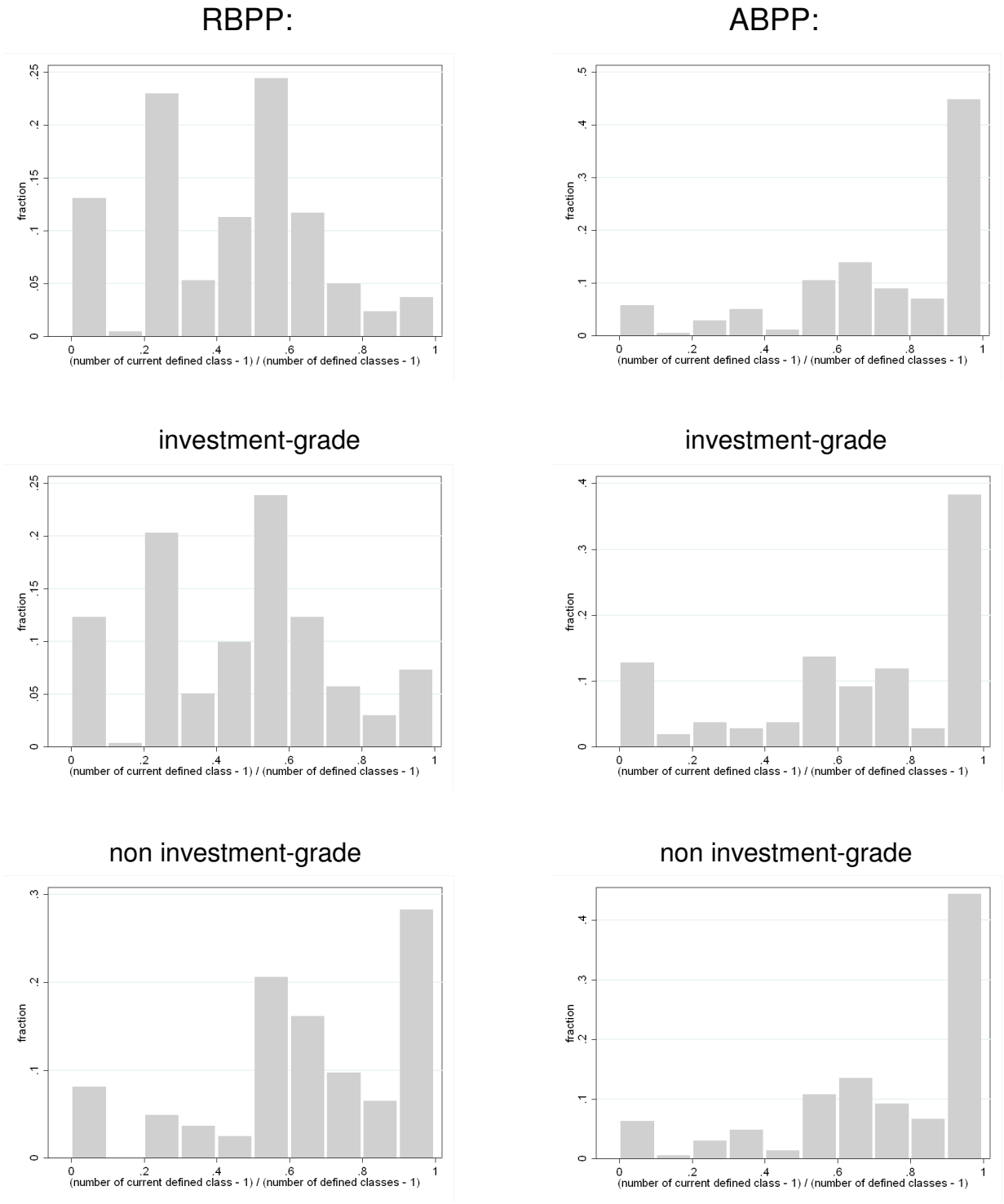
If it is true that banks assign ABPP in order to punish firms quickly for any observed reduction in performance, while RBPP is assigned in order to reward firms slowly for observed improvements in performance, we should find that borrowers with ABPP provisions are dealt contracts whose pricing grids allow primarily for deteriorations in credit quality, i.e. with room for spread increases, while borrowers with RBPP should be dealt contracts with large room for spread reductions. In order to examine this claim, we investigate the symmetry respectively asymmetry of the pricing grids for both RBPP and ABPP provisions and calculate the following index variable:

$$reduction\ \ potential\_classes = \frac{\left(number\ \ of\ \ initial\ \ class - 1\right)}{\left(total\ number\ \ of\ \ classes - 1\right)}$$

The number of the initial class refers to the initial position of the borrower within the pricing grid (i.e. at the moment of loan initiation), where the counting starts with the bucket that assigns the lowest spread. The index *reduction potential_classes* hence takes on values between 0 and 1. By construction, a value of 0 (1) indicates that the borrower starts in the bucket with the lowest (highest) spread and, therefore, can only obtain higher (lower) spreads if the performance measure changes. Hence, the higher the index, the larger the number of pricing buckets that allow spread reductions relative to the number of pricing buckets that lead to spread increases. If the index is larger than .5, there is more room for spread reductions than for spread increases and vice versa for an index value lower than .5. Figure 3 displays the distribution of a borrower's position in the pricing grid at the initiation of the loan, differentiating between contracts with RBPP and ABPP.

The average index value for borrowers with RBPP provisions is .44, for borrowers with ABPP provisions it is .73. RBPP contracts hence allocate on average more room to spread increases, while ABPP contracts allow more room for spread reductions. Further inspection of the total distribution shows even more differences: Overall, the initial placement of borrowers in the pricing grid of RBPP contracts is much more evenly distributed than that of ABPP contracts.

Figure 3: Histogram of *reduction potential_classes* index, differentiating between RBPP and ABPP contracts and between investment-grade and non investment-grade rated borrowers



Interestingly, however, about 12% of the firms with RBPP are not allowed any spread reductions since they are already in the pricing class with the lowest spread. With ABPP, in contrast, more than 40% of all firms can only improve their spreads as they are placed in the class with the highest spread already. Looking at the figures in more detail, it appears that for investment-grade rated borrowers, the RBPP distribution is slightly skewed to the right, while the ABPP distribution is clearly 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 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 assigning a higher likelihood to spread reductions than to spread increases - the distribution of RBPP provisions nevertheless appears slightly more even.

Since the figures do not give information on the total number of classes that the loan contracts stipulate, we run regressions both on the number of assigned pricing classes and on their asymmetry. Table 6 presents the results. The first two columns show the OLS regression on the number of pricing steps within ABPP and RBPP contracts. Interestingly, there seems to be no difference between ABPP and RBPP provisions, as the RBPP dummy does not exert a significant effect. The rating, however, does appear to have an effect: The worse the rating, the smaller is the number of pricing steps in the grid. Yet, this conclusion should be taken with care as the significance of this effect disappears once the interaction term between the rating and the RBPP dummy is taken into account (Model II). Much more important appears to be the borrower's return: The ROA has a highly significant and also in economic terms highly important negative influence on the number of pricing classes. Loans that are secured also seem to feature only a small number of pricing steps, while syndicated loans with a large number of lenders display a high number. The loan maturity shows a negative effect.

Model III finally reports the results of an OLS regression on the index *reduction potential_classes*. As has already been indicated by inspection of Figure 3, the RBPP dummy has a highly significant negative influence on the index, so that a borrower with an RBPP contract tends to start the loan in a class with a relatively low spread and the chance of further spread reductions is relatively smaller than for a borrower with ABPP provisions. Additionally, the better the borrower's rating at loan initiation, the smaller is the index, i.e. the less room is there for spread reductions. While this result prima facie seems to run counter to our basic hypothesis, it is nevertheless quite intuitive since with RBPP the pricing grid is necessarily constrained towards the low-spread end by a AAA rating. As there is no possibility of a further performance improvement beyond this best rating category, it is hardly possible to grant borrowers that are

initially quite close to a AAA rating much further room for improvement and hence spread reductions. As an immediate consequence, if RBPP provisions are predominantly assigned to borrowers with good ratings, then there will necessarily be less room for spread reductions than for borrowers with ABPP provisions. In order to disentangle this effect, we include the interaction term of the rating and the RBPP dummy into the regression. The highly significant positive interaction coefficient proves that indeed the rating and the RBPP provision have a combined effect. Generally, the better a rating, the lower is the *reduction potential_classes* index and the worse a rating, the higher is the *reduction potential_classes* index, but the RBPP dummy additionally intensifies this effect. This means that while borrowers with extremely good ratings are offered less room for spread reductions under RBPP provisions than under ABPP provisions, with deteriorating rating the opposite holds so that borrowers with medium rating levels – e.g. towards the lower end of the investment-grade boundary where RBPP provisions are extremly common – display a higher *reduction potential_classes* index and as such have more room for spread reductions than borrowers with ABPP provisions.

Additionally, we find that a borrower's return on assets has a negative effect on the asymmetry index, so that the higher the return, the lower the room for future spread reductions. The loan maturity, the secured status and the LIBOR at loan initiation, in contrast, have positive effects, as such increasing the opportunity of future decreases in the spread.

Table 6: Pricing grid

The table shows the result of OLS regressions on the number of pricing classes and on the index *reduction potential_classes*. Ratings have been converted into a numerical scale so that higher values represent worse ratings, i.e. higher default probabilities. Standard errors are clustered on the loan deal level. ***, ** and * indicate significance at the 1%, 5% and 10% level. P-values are reported in parentheses.

	Model I	Model II	Model III
Explanatory variables	# of pricing classes	# of pricing classes	Reduction potential_classes
dummy RBPP	-.1150	.1558	**-.2965*** **
	(.250)	(.653)	(.000)
rating	**-.0420****	-.0267	**.0338*** **
	(.012)	(.289)	(.000)
dummy RBPP x rating		-.0236	**.0227*** **
		(.436)	(.001)
ln total assets	-.0087	-.0082	.0096
	(.813)	(.825)	(.291)
MTB	.0420	.0398	-.0068
	(.233)	(.261)	(.410)
ROA	**-1.4582*** **	**-1.4649*** **	**-.2631****
	(.001)	(.001)	(.016)
ROA volatility	.2458	.2641	.1560
	(.865)	(.855)	(.678)
ln tranche amount	.0553	.0562	.0022
	(.148)	(.143)	(.818)
maturity	**-.0030****	**-.0030****	**.0006****
	(.035)	(.038)	(.049)
dummy syndicated	**.7764****	**.7761****	-.0433
	(.020)	(.021)	(.625)
# of lenders	**.0097****	**.0098****	.0002
	(.016)	(.014)	(.761)
dummy first deal	-.0189	-.0199	.0101
	(.825)	(.815)	(.590)
# of previous deals	-.0089	-.0088	.0008
	(.331)	(.334)	(.683)
dummy secured	**-.4814*** **	**-.4732*** **	**.0486****
	(.000)	(.000)	(.031)
dummy financial covenants	.2375	.2469	.0060
	(.124)	(.112)	(.815)
LIBOR	-.0214	-.0206	**.0328****
	(.700)	(.712)	(.014)
constant	**3.8245*** **	**3.5943*** **	.0191
	(.000)	(.000)	(.925)
industry dummies	yes	yes	yes
year dummies	yes	yes	yes
No. of observations	2864	2864	2864
adj. R^2	.12	.12	.37
F	9.36	9.08	44.06
Prob > F	.0000	.0000	.0000

5.2.2 Total change and asymmetry of the pricing spread

Despite the observed differences between ABPP and RBPP pricing grids, the symmetry respectively asymmetry of the pricing grid around the initial position of the borrower is only one ingredient to the analysis. Clearly, the development of the spread over the pricing grid is equally important. Stated differently, even if a borrower is placed near the high-spread end of the pricing grid so that there is ample space for moving to a lower spread class and only small room for a spread increase, if the spread increase is of a much larger size than the spread reduction – even if the latter stretches over a larger number of pricing buckets – then this performance pricing scheme may easily serve to punish the borrower rather than to reward him.

In order to find an anwer to the question how the spread develops over the pricing grid, we conduct an analysis similar to the one on the pricing classes. In particular, additional to the total spread change over the pricing grid, we calculate the index variable:

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

Here the initial spread is the spread that applies at the initiation of the loan, whereas the lowest and highest spread refers to the minimal respectively maximal spread that the pricing grid stipulates. Again, by construction an index value of 0 indicates that the borrower is initially assigned the lowest spread so that a change in performance can only lead to spread increases. An index value of 1, in contrast, represents a borrower that has been assigned a spread in the highest category, so that a change in performance can only lead to a spread reduction.

Table 7 presents the regression results. Again, we start with the simple analysis of the total change of the spread over the pricing grid. As can be seen from model I, the total spread change is strongly negatively affected by the RBPP dummy. Loans with RBPP provisions hence feature a much smaller overall change of the spread than contracts with ABPP provisions. The rating additionally influences this effect, so that a better rating leads to an even stronger reduction in the potential spread change for RBPP contracts as compared to ABPP contracts, while a worse rating reduces the negative effect of RBPP contracts on the total spread change. A negative effect is also exerted by the borrower's return on assets, the loan's maturity and the LIBOR. The securitization status of a loan and the existence of financial covenants, in contrast, lead to an increase in the overall change of the spread over the pricing grid.

The asymmetry of the pricing grid, as measured by the index *reduction potential_spread*, is affected by almost the same variables. Contracts with RBPP provisions lead to a signficantly smaller *reduction potential_spread* index than contracts with ABPP provisions, so that on average RBPP contracts allow for stronger spread increases than ABPP contracts. Nevertheless,

the rating exerts a decreasing effect as well, so that the better the rating, the lower the *reduction potential_spread* index. It may hence again be the case that the negative effect of the RBPP dummy is driven by the strong occurrence of RBPP provisions in loan contracts for highly-rated borrowers. In order to investigate this issue further, we include the interaction term of the RBPP dummy and the rating as a regressor. The interaction term has a highly significant positive effect. As such, a borrower with deteriorating rating will observe an increase in the reduction *potential_spread index*, the more so if this borrower has been assigned a contract with RBPP provisions rather than with ABPP provisions. Hence, provided the borrower is not in the highest rating category of AAA or close to AAA, being assigned RBPP provisions rather than ABPP provisions increases his potential spread reductions offered via his pricing grid the lower his rating is.

While the return on assets reduces the *reduction potential_spread* index, the loan's secured status and the LIBOR increase it. Hence, the lower a borrower's returns, the higher the general interest rate level and the more likely the loan is secured, the higher are potential spread reductions.

6. Ex-post analysis

According to our hypothesis, the differentiation between ABPP and RBPP should be driven by banks' expectations with regard to the future development of their borrowers' credit quality. Measuring these expectations is difficult, though. In the above analysis, we included the past development of the borrowers' ratings (and z-scores, as a robustness check in Table 9) as potential indicators of their future credit quality development. Nevertheless, these proxies do not capture each individual bank's expectations with regard to the individual borrower. Given the shortcomings of the ex-ante approach, it therefore appears worthwhile to conduct an ex-post analysis and test whether the conjectured expectations of banks regarding their borrowers' performance materialized in the end. Therefore, we run regressions on the development of the borrowers' credit ratings after the rating initiation and see whether, indeed, firms with RBPP provisions in their loan contracts show rating improvements, respectively whether firms with ABPP loan provisions feature rating deteriorations. We consider rating changes both over a one-year horizon as well as over a two-year horizon. Note again that an increasing numerical value of the rating represents an increase in the default probability, so that a rating improvement will translate into a negative notch rating change.

Table 7: Spreads

The table shows the result of an OLS regression on the total change of the spread over the pricing grid and on the index reduction potential _spread. Ratings have been converted into a numerical scale so that higher values represent worse ratings, i.e. higher default probabilities. Standard errors are clustered on the loan deal level. ***, ** and * indicate significance at the 1%, 5% and 10% level. P-values are reported in parentheses.

	Model I	Model II
Explanatory variables	total spread change	reduction potential_spread
dummy RBPP	**-53.2258*** **	**-.3197*** **
	(.000)	(.000)
rating	.0248	**.0348*** **
	(.977)	(.000)
dummy RBPP x rating	**4.5004*** **	**.0203*** **
	(.000)	(.004)
ln total assets	-.2662	.0102
	(.812)	(.263)
MTB	-.5370	-.0069
	(.596)	(.396)
ROA	**-48.0160*** **	**-.2441** **
	(.000)	(.031)
ROA volatility	45.2234	.2894
	(.339)	(.425)
ln tranche amount	.0457	-.0030
	(.967)	(.759)
maturity	**-.2253*** **	.0004
	(.000)	(.161)
dummy syndicated	**16.0463***	-.0842
	(.071)	(.286)
# of lenders	.0588	.0001
	(.619)	(.903)
dummy first deal	.0095	.0165
	(.997)	(.395)
# of previous deals	-.1609	.0011
	(.542)	(.577)
dummy secured	**8.3674*** **	**.1164*** **
	(.003)	(.000)
dummy financial covenants	**7.6463** **	-.0071
	(.049)	(.778)
LIBOR	**-4.3984** **	**.0286** **
	(.013)	(.035)
constant	**111.2818*** **	.1007
	(.000)	(.619)
industry dummies	yes	yes
year dummies	yes	yes
No. of observations	2864	2864
adj. R^2	.20	.47
F	17.93	68.68
Prob > F	.0000	.0000

In our tests, we compare firms with RBPP provisions both to those with ABPP provisions (Models I and III) and to those with fixed-rate loan contracts (II and IV). Table 8 presents the results. Supporting our hypothesis, we observe that firms with RBPP improve their rating significantly, both in comparison to firms with ABPP as well as compared to firms with fixed-rate contracts. The positive effect of the RBPP status on the borrowing firms' ratings is particularly strong economically after two years, but is highly significant also after one year. Interestingly, however, models II and IV show that firms with ABPP provisions improve their rating as compared to borrowers with fixed-rate loans as well, even though the improvement is much less strong economically than for borrowers with RBPP provisions. Additionally, we find that the rating improvement will be stronger the larger the borrower, the higher its leverage and, correspondingly, the worse its initial rating. The latter effect may be explained by the fact that the strongest probability for rating transitions is observed in the low rating classes. Furthermore, the return on assets and the market-to-book value have a positive influence on rating improvements, as does the loan maturity.

Overall, it hence seems to be the case that banks indeed assign loan contracts with RBPP provisions to the borrowers that display the strongest rating improvements after the loan initiation. At the same time, however, borrowers who are assigned ABPP provisions appear to be not deterred from trying to increase their performance as well. This finding hence supports the observation in Section 5.2 that contracts with ABPP provisions allow the borrowers to reduce their interest rate costs by considering spread reductions provided these borrowers manage to improve their performance. Since the rating improvement displayed by borrowers with ABPP contracts is less strong than that of borrowers with RBPP contracts, it may well be the case that the banks correctly anticipated the positive development path of the latter group of borrowers and – consequently – assigned them contracts with RBPP provisions, but provided sufficiently strong incentives to the former group by threatening them with potential spread increases that proved effective: after the loan inititation, these borrowers with ABPP contracts did change their behaviour and successfully tried to improve their ratings. Given their later start on this development path, the rating improvement turned out to be less strong than that of borrowers with RBPP contracts, though.

Table 8: Ex-post rating performance

The table shows the result of OLS regressions on the notch rating change over the 4, respectively 8 quarters after loan initiation. The regressions differentiate 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 that did not receive a PP in the first place. Ratings have been converted into a numerical scale so that higher values represent worse ratings, i.e. higher default probabilities. Standard errors are clustered on the loan deal level. ***, ** and * indicate significance at the 1%, 5% and 10% level. P-values are reported in parentheses.

Explanatory variables	Model I Notch rating change after 4 quarters firms with PP only	Model II Notch rating change after 4 quarters all firms	Model III Notch rating change after 8 quarters firms with PP only	Model IV Notch rating change after 8 quarters all firms
Dummy RBPP	**-.4246*** **	**-.4497*** **	**-.5292*** **	**-.7052*** **
	(.000)	(.000)	(.000)	(.000)
Dummy ABPP		**-.1695** **		**-.2662** **
		(.032)		(.017)
ln total assets	**-.1584** **	**-.2259*** **	**-.2304** **	**-.2573*** **
	(.011)	(.004)	(.029)	(.004)
leverage	**.8764*** **	**1.1507*** **	**.9852*** **	**.9766*** **
	(.000)	(.000)	(.002)	(.000)
rating	**-.2522*** **	**-.2389*** **	**-.3143*** **	**-.3432*** **
	(.000)	(.000)	(.000)	(.000)
MTB	**-.1874*** **	**-.1717*** **	**-.2601*** **	**-.3125*** **
	(.000)	(.000)	(.000)	(.000)
ROA	**-2.3424*** **	**-3.8869*** **	**-2.0176** **	**-3.3929*** **
	(.000)	(.000)	(.032)	(.000)
ROA volatility	2.9850*	.2379	1.3310	2.1501
	(.077)	(.740)	(.554)	(.222)
ln tranche amount	.0040	.0484	.0573	-.0206
	(.952)	(.452)	(.592)	(.813)
tranche importance	.0690	.0506	-.0144	.1871
	(.856)	(.850)	(.973)	(.608)
maturity	**-.0032** **	**-.0064*** **	**-.0069* **	**-.0076** **
	(.015)	(.000)	(.054)	(.018)
dummy financial covenants	.1075	.1666	.0909	.0087
	(.366)	(.128)	(.611)	(.949)
constant	**4.1994*** **	**4.8265*** **	**5.2023*** **	**8.6893*** **
	(.000)	(.000)	(.001)	(.000)
tranche type dummies	yes	yes	yes	yes
loan purpose dummies	yes	yes	yes	yes
industry dummies	yes	yes	yes	yes
year dummies	yes	yes	yes	yes
No. of observations	2704	4163	1867	2776
adj. R^2	.22	.19	.21	.23
F	5.30	5.33	-	6.26
Prob > F	.0000	.0000	-	.0000

This interesting finding leads us to investigate the effects at work even further. Generally, a rating improvement may be caused via different channels: the first would be a change in the capital structure such that a lower leverage would improve a borrowing firm's capacity to repay its outstanding debt even with constant revenues. The second would be an improvement in the

firm's revenues so that a constant level of debt can be serviced more easily. In order to see whether borrowers that were assigned RBPP vs. ABPP provisions fare any differently with regard to the variables leverage and cashflow, we ran additional regressions on the ex-post development of these dependent variables in the one respectively two years after loan initiation. We also include an analysis of the market value and on the debt-to-cashflow development, i.e. the accounting ratio that is used in order to price contracts with ABPP provisions, as it may be well conceivable that borrowers with ABPP contracts put particular effort into optimizing the value of this ratio in order to reduce their interest costs. In contrast to the ex-post regression on the change in the rating level, where a one-notch rating movement reflects a substantial change in a borrower's credit quality, we use categorized change variables in these further analyses. I.e., we assign the dummy variable +1 to the quartile with the largest changes with regard to the respective variable, -1 to the quartile with the smallest changes and 0 otherwise and run ordered probit regressions. Table 9 presents the results.

It is immediately noticeable that borrowers with RBPP provisions show a leverage reduction over the one and two year horizon, both as compared to borrowers with ABPP provisions and compared to borrowers with fixed-rate loan contracts. Firms with ABPP provisions, in contrast, show a weakly significant leverage reduction only over the eight quarter horizon. At the same time, we observe that firms with RBPP contracts increase their cashflows vis-à-vis the comparison groups over the two year period after loan initiation, though with only weak significance, while firms with ABPP do not. As regards the borrowing firms' market value, we find that borrowers with RBPP loan provisions display increases vis-á-vis both comparisons groups, both over the first and the two years after loan initiation.

It is hence interesting to note that while borrowers with RBPP show all the vital changes in fundamental values that usually trigger rating improvements, borrowers with ABPP do not or only over the longer, two-year period and only with weak statistical significance. Nevertheless, both types of borrowers are dealt rating improvements with high probability even within the first year after the loan initiation. Our result may thus be an – albeit weak – indication that credit rating agencies indeed perceive the assignment of a loan contract with performance pricing feature as a positive signal. By upgrading both borrowers with ABPP and with RBPP provisions, the agencies essentially acknowledge these contract types' effectiveness in exerting positive incentive effects. However, while the rating improvement may be justified by the spread reduction that borrowers with PP loan contracts typically enjoy as compared to borrowers with fixed-rate contracts, it also tends to reinforce a circularity in the lending banks' expectations with regard to the borrowing firms' credit quality and adds an additional fragility to the information content certified by the credit rating.

Finally, Table 9 also presents evidence that firms that have been assigned ABPP do not seem preoccupied with improving the respective accounting ratio in order to reduce their credit costs. Rather, we observe that the development seems to parallel the development of the leverage: firms with RBPP provisions show weak improvements over the short run and strong improvements over the two years after loan initiation vis-à-vis both comparison groups, while borrowers with ABPP provisions display statistically weaker improvements vis-à-vis borrowers with fixed-rate contracts only over the longer time horizon. As such, it does not appear to be the case that firms with RBPP provisions solely try to improve their rating while firms with ABPP solely try to improve their respective accounting measure. Rather, it seems that borrowers with RBPP provisions indeed massively improve the fundamental, credit-quality relevant variables, which leads to both a rating improvement and an improvement of the debt-to-cashflow ratio. Borrowers with ABPP provisions, in contrast, appear much slower in the development. This may be an indication of the fact that borrowers that have been assigned ABPP contracts did not intend to follow this path of development prior to loan initiation, but were potentially induced to change their development particularly because of their assigned loan type.

Table 9 Ex-post performance of leverage, cashflow, market value and debt-to-cashflow

The table shows the result of odered probit regressions. The dependent variable takes the value of +1 if the firm is in the quartile of borrowers with the highest change with regard to the variables leverage, cashflow, market value and debt-to-cashflow over the 4 or 8 quarters before the loan initiation, - 1 if it is in the quartile of smallest changes and 0 if the variable has not changed at all. The regressions differentiate 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 that did not receive a PP in the first place. Ratings have been converted into a numerical scale so that higher values represent worse ratings, i.e. higher default probabilities. Standard errors are clustered on the loan deal level. ***, ** and * indicate significance at the 1%, 5% and 10% level. P-values are reported in parentheses.

Explanatory variables	leverage change after 4 quarters firms with PP only	leverage change after 4 quarters all firms	leverage change after 8 quarters firms with PP only	leverage change after 8 quarters all firms	cashflow change after 4 quarters firms with PP only	cashflow change after 4 quarters all firms	cashflow change after 8 quarters firms with PP only	cashflow change after 8 quarters all firms	market value change after 4 quarters firms with PP only	market value change after 4 quarters all firms	market value change after 8 quarters firms with PP only	market value change after 8 quarters all firms	debt-to-cashflow change after 4 quarters firms with PP only	debt-to-cashflow change after 4 quarters all firms	debt-to-cashflow change after 8 quarters firms with PP only	debt-to-cashflow change after 8 quarters all firms
Dummy RBPP	**-.2577*** **	**-.1054***	**-.2224****	**-.2157*** **	.0480	.0051	**.1712***	**.1599***	**.1703***	**.1302***	**.2338****	**.1990****	**-.1699***	**-.1206***	**-.2622****	**-.2297*** **
	(.008)	(.092)	(.034)	(.009)	(.600)	(.937)	(.100)	(.071)	(.056)	(.060)	(.030)	(.033)	(.095)	(.075)	(.017)	(.009)
Dummy ABPP		.0445		**-.1433***		.0280		.1156		-.0266		.0193		-.1005		**-.1376***
		(.485)		(.057)		(.678)		(.126)		(.637)		(.782)		(.153)		(.086)
ln total assets	-.0721	**-.0745***	-.0791	-.0209	**-.1401****	-.0592	**-.1197***	.0342	**.1166****	**.0961****	.0016	.0763	-.0220	.0012	-.1017	**-.1244****
	(.219)	(.054)	(.203)	(.637)	(.012)	(.165)	(.077)	(.524)	(.037)	(.028)	(.984)	(.155)	(.709)	(.979)	(.148)	(.020)
leverage	**-1.7075*** **	**-1.4966*** **	**-2.2445*** **	**-1.9211*** **	**.8317*** **	**.6723*** **	**.4969****	**.3577****	-.1340	-.1787	.1452	.0909	**-.6921****	**-.4175*** **	-.3159	-.3187
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.021)	(.024)	(.382)	(.114)	(.454)	(.519)	(.012)	(.009)	(.319)	(.205)
rating	-.0112	.0004	.0136	**.0342*** **	-.0147	-.0108	-.0022	-.0022	**.0392****	**.0323*** **	.0221	.0170	-.0254	.0103	**-.0613*** **	-.0028
	(.502)	(.972)	(.467)	(.010)	(.408)	(.349)	(.906)	(.884)	(.016)	(.006)	(.248)	(.253)	(.165)	(.425)	(.006)	(.866)
MTB	-.0551	-.0055	-.0704	-.0430	**.1725*** **	**.1033*** **	**.1441****	**.0956***	**-.1185*** **	**-.0930*** **	-.0714	-.0826	**-.1418*** **	-.1105	**-.1101****	-.0670
	(.165)	(.874)	(.182)	(.341)	(.000)	(.004)	(.018)	(.061)	(.004)	(.008)	(.212)	(.101)	(.001)	(.001)	(.042)	(.149)
ROA	.6667	-.1250	**1.7352*** **	**1.1343****	**-6.8517*** **	**-4.1160*** **	**-8.0242*** **	**-6.5499*** **	**2.3053*** **	**1.8597*** **	**1.3989****	.7126	**2.0286*** **	**1.5787*** **	**2.5801****	**2.0413****
	(.234)	(.769)	(.008)	(.024)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.036)	(.138)	(.001)	(.000)	(.019)	(.013)
ROA volatility	-1.4544	.5938	-1.4180	-1.6841	**10.2940*** **	-.7625	1.4255	2.2614	.5270	**1.8121*** **	**-2.6372***	-1.0586	**-6.2216*** **	.2880	**-6.1133****	**-5.4366*** **
	(.437)	(.268)	(.350)	(.121)	(.000)	(.433)	(.549)	(.194)	(.774)	(.000)	(.093)	(.285)	(.009)	(.697)	(.011)	(.001)
debt-to-cashflow													**-.0915*** **	**-.0890*** **	**-.1009****	**-.1020*** **
													(.003)	(.000)	(.026)	(.004)
ln tranche amount	.0588	.0396	.0691	-.0071	.1225**	.0645	.0678	-.0123	.0620	.0731*	.1131	.0674	-.0030	-.0134	.0516	**.0833***

	(.315)	(.283)	(.249)	(.865)	(.034)	(.125)	(.299)	(.807)	(.258)	(.074)	(.137)	(.174)	(.958)	(.753)	(.457)	(.096)
tranche importance	.1818	.0792	-.0234	.0307	**-.9912*** **	**-.6612*** **	**-1.0290*** **	-.2720	-.0468	-.0616	-.4083	-.0245	**.6703** **	**.4119***	.5338	-.0343
	(.618)	(.697)	(.948)	(.877)	(.001)	(.002)	(.008)	(.341)	(.840)	(.734)	(.288)	(.908)	(.039)	(.071)	(.139)	(.886)
maturity	.0021	**.0023** **	**.0056** **	**.0064*** **	.0001	-.0007	.0009	-.0001	-.0011	-.0005	-.0033	**-.0034***	**.0028***	**.0047*** **	.0049	**.0048** **
	(.119)	(.028)	(.044)	(.001)	(.937)	(.560)	(.744)	(.964)	(.425)	(.623)	(.205)	(.076)	(.062)	(.000)	(.106)	(.016)
dummy financial covenants	**-.2073***	-.0268	-.0596	**.1734***	**-.2531** **	.0610	-.0634	-.0383	-.2310	-.1187	**-.3027***	**-.2283** **	.0771	-.0079	.0401	.0100
	(.085)	(.736)	(.678)	(.095)	(.047)	(.422)	(.663)	(.679)	(.111)	(.120)	(.090)	(.020)	(.554)	(.923)	(.786)	(.925)
tranche type dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
loan purpose dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
industry dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
No. of observations	2658	4170	1877	2841	2574	4026	1777	2683	2659	4166	1860	2815	2574	4023	1777	2683
pseudo R^2	.10	.08	.13	.11	.10	.07	.09	.08	.08	.07	.13	.11	.12	.11	.10	.10
Wald Chi^2	276.60	278.74	250.06	240.28	248.06	242.28	187.48	217.57	277.65	347.27	953.88	319.84	270.91	261.40	158.05	151.13
Prob > Chi^2	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000

7. 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 useful. In this paper, we investigate whether banks assign accounting-based and rating-based performance pricing provisions so as to punish borrowers rapidly but reward them only late. We hypothesize that banks could achieve this by measuring the performance of borrowers with expected credit quality deteriorations by quickly-reacting accounting ratios, while assigning borrowers with expected credit quality improvements contracts with performance measurement based on more reliable but less timely credit ratings.

We find that banks indeed tend to assign RBPP to borrowers with expected future credit quality improvements and ABPP to borrowers with anticipated deteriorations in credit quality, as such trading-off the timeliness versus reliability of the performance measurement to their benefit. Additionally, in the relevant rating classes, the pricing grids are indeed designed such that borrowers with RBPP contracts tend to benefit more from spread reductions than suffer from spread increases. Contracts with ABPP provisions, though, do allow for significant spread reductions as well and hence exert important effort incentives. Seen from an ex-post viewpoint, we therefore observe that ABPP provisions do not seem to punish borrowers actually. Even though borrowers with RBPP provisions display stronger rating improvements after loan initiation, those with ABPP provisions also manage to somewhat raise their rating as compared to borrowers with fixed-rate contracts. Since the underlying fundamentals – mainly the leverage – improves only very weakly for these borrowers, we conjecture that credit rating agencies interpret loan contracts with PP provisions as positive signals, inducing them to upgrade the rating despite the lack of fundamental change. In this respect, our results extend the findings by Kraft (2010), who reports that rating agencies seem to announce more favorable rating changes for borrowers with rating-based performance pricing. While we confirm that indeed borrowers with RBPP provisions display stronger rating improvements than the two comparison groups, we also show that this difference in performance is grounded in different fundamental paths: paralleling the rating improvement, RBPP borrowers can be shown to reduce their leverage and increase their cash-flow levels as compared to borrowers with ABPP or with fixed-rate contracts. As such, while we cannot refute that the agencies' catering towards borrowers with higher rating sensitivity may play a role, the potential rating biases seem limited as these firms seem to take a very active role towards improving their ratings.

Even though our analysis is focused on the strategic use of different types of PP provisions, our results reconcile several findings of earlier work on related topics. Manso, Strulovici and Tchistyi (2010) examine the choice between fixed-rate contracts and loan contracts with PP, but do not differentiate between different types of PP provisions. Their finding that highly growing firms self-select into the PP category is clearly reconcilable with our result if their data set mainly consists of contracts with RBPP rather than ABPP provisions.

Furthermore, Ball, Bushman and Vasvari (2008) observed that accounting ratios are the preferred performance measure if their degree of informativeness is sufficiently high. We show that ABPP provisions are used for borrowers with low credit qualities and expected further deteriorations in credit quality. It may be well conceivable that the timeliness of information becomes more important in cases of expected performance deteriorations. Moody's (2000), for instance, supports this conjecture by stating 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."

Finally, our paper extends earlier work on the substitutionary effects between financial covenants and collateral in loan contracts. Costello and Wittenberg-Moerman (2009), for instance, show that following internal control weakness reports, lenders substitute financial covenants with loan collateral. According to our results, performance pricing in loan contracts also appears to play a substitutionary role, but only if RBPP is concerned: we observe that loans that are collateralized display a much smaller likelihood of containing RBPP provisions and vice versa. Overall, we hence conclude that PP in loan contracts serves as a very complex instrument that tends to be used in order to incentivize borrowers more often than to scare them and that allows for an efficient use of the available information.

Appendix A

Example of a 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 of a 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

Table 10: RBPP vs. ABPP selection, z-score change

The Heckman pre-selection runs a probit regression on the probability of being assigned a loan contract with PP provision, the second stage runs a probit regression on the probability of the rating being selected as performance measure if a PP contract is assigned. The z-score difference in the second stage is calculated either as the simple z-score change over the two, four or eight quarters before the loan initiation (Models I, III and V), or as a categorized variable that takes the value -1 if the z-score change is among the quartile of smallest changes, the value + 1 if it is among the quartile of largest changes and zero otherwise (Models II, IV and VI). Ratings have been converted into a numerical scale so that higher values represent worse ratings, i.e. higher default probabilities. ***, ** and * indicate significance at the 1%, 5% and 10% level. P-values are reported in parentheses.

Explanatory variables	Model I 2-quarter differences, z-score change	Model II 2-quarter differences, categorized change	Model III 4-quarter differences, z-score change	Model IV 4-quarter differences, categorized change	Model V 8-quarter differences, z-score change	Model VI 8-quarter differences, categorized change
Heckman selection equation: PP vs. fixed-rate						
LIBOR	.1897***	.1897***	.1980***	.1982***	.2007***	.2005***
	(0.001)	(.001)	(.001)	(.001)	(.001)	(.001)
GDP	.0003**	.0003**	.0003	.0003	.0004**	.0004
	(0.181)	(.186)	(.210)	(.215)	(.130)	(.130)
leverage	-.4969***	-.4952***	-.4508***	-.4494***	-.2277	-.2277
	(0.000)	(.000)	(.001)	(.001)	(.104)	(.104)
rating	-.1223***	-.1224***	-.1249***	-.1249***	-.1482***	-.1482***
	(0.000)	(.000)	(.000)	(.000)	(.000)	(.000)
ln total assets	-.3291***	-.3313***	-.3267***	-.3287***	-.3893***	-.3894***
	(0.000)	(.000)	(.000)	(.000)	(.000)	(.000)
ln tranche amount	.2753***	.2774***	.2848***	.2867***	.3006***	.3006***
	(0.000)	(.000)	(.000)	(.000)	(.000)	(.000)
tranche importance	-.9236***	-.9399***	-.9366***	-.9519***	-1.0069***	-1.008***
	(0.001)	(.000)	(.001)	(.000)	(.000)	(.000)
maturity	.0132***	.0132***	.0131***	.0131***	.0123***	.0124***
	(0.000)	(.000)	(.000)	(.000)	(.000)	(.000)
dummy financial covenants	1.4203***	1.4197***	1.4300***	1.4294***	1.4836	1.483***
	(0.000)	(.000)	(.000)	(.000)	(.000)	(.000)
dummy first deal	-.3410***	-.3416***	-.3375***	-.3391***	-.4467***	-.4472***
	(0.000)	(.000)	(.000)	(.000)	(.000)	(.000)
# previous deals	-.0121	-.0121	-.0171**	-.0173	-.0133	-.0134
	(0.244)	(.242)	(.110)	(.106)	(.227)	(.224)
constant	-13.7577	-13.7265	-13.7209	-13.6833	-14.1934	-14.2004
tranche type, loan purpose, year dummies	yes	yes	yes	yes	yes	yes

RBPP vs. ABPP equation

z-score difference	.1276**	.0761	.0771**	.0322	.0042	-.0247
	(0.028)	(.397)	(.030)	(.742)	(.872)	(.800)
z-score	-.0602***	-.0566***	-.0596***	-.0586***	-.0493**	-.0494**
	(0.003)	(.004)	(.004)	(.004)	(.017)	(.017)
rating	-.3117***	-.3119***	-.3188***	-.3224***	-.3433***	-.3438***
	(0.000)	(.000)	(.000)	(.000)	(.000)	(.000)
ln total assets	.4229***	.4135***	.4285***	.4144***	.3655***	.3667***
	(0.000)	(.000)	(.000)	(.000)	(.000)	(.000)
leverage	-.0495	-.1823	.0003	-.1641	-.1209	-.1442
	(0.895)	(.621)	(.999)	(.679)	(.774)	(.729)
RoA	-.4393	-.3040	-.1798	.0618	-.6458	-.6033
	(0.636)	(.746)	(.857)	(.952)	(.552)	(.578)
RoA volatility	8.8743**	8.2320**	10.3331***	9.7447**	14.9100***	14.9439***
	(0.013)	(.022)	(.007)	(.011)	(.000)	(.000)
MTB	.0665	.0607	-.0223	-.0177	-.0305	-.0252
	(0.414)	(.461)	(.805)	(.848)	(.752)	(.796)
dummy syndicated	.0870	.0695	.0130	.0061	-.1150	-.1198
	(0.973)	(.979)	(.996)	(.998)	.961	(.959)
dummy secured	-1.3740***	-1.3531***	-1.4353***	-1.402***	-1.2776***	-1.2777***
	(0.000)	(.000)	(.000)	(.000)	(.000)	(.000)
maturity	-.0097***	-.0095***	-.0084**	-.0080**	-.0035	-.0035
	(0.004)	(.004)	(.017)	(.021)	(.299)	(.317)
# of lenders	.0009	.0024	.0014	.0035	.0035	.0036
	(0.886)	(.708)	(.826)	(.600)	(.606)	(.586)
constant	10.2749	10.4117	10.4858	10.766	10.2458	10.2521
industry dummies	yes	yes	yes	yes	yes	yes
No. of observations	2853	2853	2775	2775	2623	2623
No. of censored observations	1700	1700	1700	1700	1700	1700
Wald chi^2	12766.52	13125.68	10953.51	11409.78	11734.98	
Log likelihood	-1592.551	-1594.891	-1517.454	-1519.923	-1383.12	-1383.105
Prob >chi^2	0.0000	.0000	.0000	.0000	.0000	

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