Do Rating Agencies Cater? Evidence from Rating-Based Contracts

Pepa Kraft *

New York University

Stern School of Business

May 3, 2011

Abstract

I examine whether rating agencies are more likely to cater to borrowers with rating-based performance pricing agreements (PPrating firms). This study uses data from Moody's Financial Metrics on agency adjustments to investigate this prediction and exploits an unexpected adverse shock to firms' credit risk as identification. The evidence is mixed. In the cross-section and for firms experiencing adverse shocks, agency adjustments are more favorable for PPrating firms. However, agency adjustments are less favorable when the agency's reputational costs are high. Agency adjustments for PPrating firms are not associated with incrementally higher bond yields.

*I am very grateful to the members of my dissertation committee: Ray Ball (chair), Phil Berger, Christian Leuz, and Doug Skinner, as well as Ryan Ball, Mary Barth, Alexander Bleck, Marshall Blume, Fabrizio Ferri, Joseph Gerakos, Valeri Nikolaev, Maarten Petermann, Joshua Ronen, Stephen Ryan, Regina Wittenberg, Joanna Wu, Sarah Zechman and Jerry Zimmerman. I also thank participants at the NBER summer session on credit rating agencies and Standard & Poor's Academic Council Meeting as well as participants at accounting workshops at Boston College (Carroll School of Management), Columbia Business School, London Business School, McGill University (Desautels Faculty of Management), New York University (Stern School of Business), Northwestern University (Kellogg Graduate School of Management), University of Chicago (Booth), University of Michigan (Ross School of Business), University of Pennsylvania (Wharton), University of Rochester (Simon Graduate School of Business Administration), University of Toronto, Stanford Graduate School of Business, and Washington University (Olin Business School) for constructive suggestions, questions and feedback. I thank Andrew Tan and Hui Lin Tan for excellent research assistance. I am grateful for the financial support provided by the University of New York Stern School of Business, the University of Chicago Booth School of Business and the Deloitte Foundation. This paper was previously circulated under the title: *The Impact of the Contractual Use of Ratings on the Rating Process - Evidence from Rating Agency Adjustments.* To contact me, email *pkraft@stern.nyu.edu.*

1 Introduction

Private loan agreements increasingly use public debt ratings as manifestations of a borrower's credit risk in order to calibrate pricing. I investigate whether and how the use of credit ratings in loan agreements impacts the rating process. Rating agencies say that they are concerned about the consequences of the contractual use of ratings, such as rating triggers, for borrowers' creditworthiness (Standard and Poor's (2008), Moody's (2001)), but no empirical evidence exists on whether the use of ratings in loan contracts leads to a more favorable or more conservative treatment in the rating process. When loan contracts use credit ratings to enforce restrictions on borrowers, rating changes directly impact borrowers' cash flows through increases in the contractual interest rate or early principal repayment (Nicholls (2005)). The use of ratings in private contracting creates incentives for borrowers to exert increased pressure on rating agencies to cater to borrower incentives by providing understated estimates of credit risk. Under the 'catering' hypothesis, the use of ratings in loan contracts results in more favorable credit risk assessments than the underlying economics justify. Reputational costs — that provide incentives to produce unbiased high-quality ratings — limit potential rating inflation. Under the 'adverse consequences' view, rating agencies might regard such rating-based contracts as risk because rating triggers can have destabilizing consequences for the borrowers that use them as they potentially escalate temporary cash flow shortfalls.

To investigate this question, this study examines the relation between rating-based loan contracts and the rating process. The contracts I focus on are performance pricing (PP) agreements, which are now widespread in loans, and use either ratings or accounting ratios to calibrate pricing grids (Asquith et al. (2005), Beatty and Weber (2005)). To examine the rating process, the study analyzes rating agencies' hard and soft adjustments, which capture various dimensions of borrowers' credit risk. Hard adjustments capture credit risk arising from quantitative factors such as adjusted accounting ratios (Moody's Financial Metrics, Moody's (2007)). The major hard adjustment is the inclusion of off-balance-sheet debt, which results in substantial increases in leverage ratios (Kraft (2010)). Soft adjustments capture credit risk arising from qualitative factors such

as management credibility. This study investigates whether rating-based contracting results in catering as evidenced by biased rating agency adjustments. Issuers may have other incentives to influence the rating process, such as achieving better valuations or gaining access to more liquid markets, but the focus in this study is whether rating-based contracting leads to a too favorable credit risk assessment.

Using a sample of U.S.-domiciled, non-financial firms with information on Moody's Financial Metrics and Dealscan for 2002 through 2008, I find that the use of ratings in contracts has an association with more favorable rating agency adjustments. For example, the average rating agency's assessment of off-balance-sheet debt amounts to 14% of total assets for firms with rating-based performance pricing (PPrating firms) versus 21% for firms whose performance pricing is on the basis of an accounting ratio (PPratio firms). Similarly, the average negative soft adjustment for a PPrating firm is only a fifth of the negative soft adjustment for a PPratio firm. The total adjustment (reflecting both quantitative and qualitative factors) by the rating agency decreases a PPratio firm's rating by 1.30 notches, but only by 0.75 notches for a PPrating firm.[1] The multivariate analysis confirms that the use of ratings in performance pricing has an association with smaller estimates of off-balance-sheet debt and more positive soft and total adjustments.

Certain institutional investors, such as pension funds, have the restriction of investing only in investment grade bonds. Furthermore, prime short-term credit ratings determine the issuance of commercial paper. Hence, some rating thresholds are more important than others because they allow access to more liquid markets. The evidence does not support that rating agencies cater to PPrating firms that are close to rating thresholds: the use of rating-based contracts has in fact an association with more unfavorable rating agency adjustments among firms close to the investment grade cutoff or firms with short-term ratings, which is consistent with the higher reputational costs that the rating agency faces with respect to biased ratings for rating thresholds that act as gateways to more liquid markets.

When firms self-select to contract on performance pricing, they choose whether to contract

[1]The rating scale, running from a high of Aaa to a low of C, comprises 21 notches.

on ratings or accounting ratios. The identification strategy exploits an adverse exogenous and unexpected economic shock to firms. A negative economic shock to the firm decreases the value of total assets and increases the firm's default risk (Jorion and Zhang (2007)). I investigate how rating agencies react to firms experiencing a substantial increase in default risk and test whether the reaction differs for PPrating firms compared with firms without such contracts. Exploiting the market's assessment of the impact of the shock allows me to calculate a benchmark for the expected rating agency adjustment. Consistent with the catering hypothesis, I find a more favorable treatment for PPrating firms, all else being equal. Although, on average, adverse economic shocks have an association with unfavorable rating agency adjustments, I find that PPrating firms that experience adverse economic shocks receive significantly less unfavorable rating agency adjustments than PPratio firms.

Furthermore, I regress bond yield spreads on rating agency adjustments for PPrating firms to assess whether rating agencies' assessments capture default risk or whether the rating agency adjustments are over- or understated relative to the control group of firms without rating-based contracts. The regression results show no evidence of any differential impact for firms using rating-based contracts for soft, hard, and total agency adjustments.

This paper contributes to several literatures. First, we know relatively little about incentive conflicts for rating agencies that arise from rating-based private debt contracts. Under their business model, rating agencies collect fees from the very issuers they rate, which creates a basic conflict between providing accurate ratings or upwardly biased ratings (Partnoy (1999), Bolton et al. (2010), Becker and Milbourn (2010), Mason and Rosner (2007)). Evidence on the ratings of structured finance products is consistent with rating inflation (Mason and Rosner (2007), Benmelech and Dlugosz (2009)). The current debate centers on whether rating inflation is due to active catering for business reasons or whether credit risk is underestimated because of erroneous judgments of non-traditional products (Ashcraft et al. (2010), Coval et al. (2009), Griffin and Tang (2010), He et al. (2010)). Recent research on rating agency incentives (Beaver et al. (2006), Cheng and Neamtiu (2009), Covitz and Harrison (2003), Benmelech and Dlugosz (2009), Ashcraft and

Schuermann (2008)) has not investigated the contracting channel. Although Nicholls (2005) provides a qualitative description of the feedback loop inherent in ratings' use in contracts, this study is the first to provide empirical evidence on the relation between the use of ratings in contracts and the rating process. The results are consistent with the debt covenant hypothesis, according to which borrowers strive to influence the contracting basis to achieve better outcomes ex post (Watts and Zimmerman (1986), Beatty and Weber (2005), Dichev and Skinner (2002)).

Second, the study contributes to the emerging finance literature on hard and soft information (Rajan et al. (2010), Stein (2002), Petersen (2004)). Consistent with Petersen (2004)'s conjecture, I show in this paper and in Kraft (2010) that the credit rating is a mapping of both hard and soft information; that is, while a large part of the rating is a function of reported numbers, qualitative factors enter in as well and have an association with the market's assessment of default risk. Examining rating agency adjustments allows me to investigate where, if any, the conflict of interest manifests itself.

Third, this paper contributes to the literature on the choice between ratings and accounting ratios in performance pricing. Ratings are more comprehensive than accounting ratios (Doyle (2008), Ball et al. (2008)). The finding of a negative correlation between off-balance-sheet debt and the use of ratings in contracts is surprising and contrasts with the findings in Mills and Newberry (2005), whose prior research predicts a positive correlation because higher contracting costs should have a relation to the use of more comprehensive measures (Doyle (2008), Ball et al. (2008)). Contracts based on ratings curtail the use of off-balance-sheet structures ex post, because the intermediary which produces the ratings is able to continually adjust the credit risk assessment process, which allows it to incorporate issuers' attempts at financial engineering. In contrast, the use of accounting-based performance pricing is likely to have an association with greater balance sheet management and cosmetic financial engineering, which results in greater use of off-balance-sheet financing.

2 Hypothesis development

2.1 Performance pricing in loan agreements

A large proportion of private debt contracts use public issuer ratings. Borrowers incorporate surrogate variables, such as ratings, to model their credit risk in future states of the world. As a result of these contracts, rating changes lead to interest rate changes (for discussions of performance pricing in debt see Asquith et al. (2005), Beatty and Weber (2005)), and rating downgrades may trigger early repayment or the posting of collateral (SEC (2003), Nicholls (2005)).[2] Furthermore, parties to over-the-counter financial transactions explicitly or implicitly restrict themselves to dealing with counterparties with ratings above minimum levels (Moody's (2001)). For a recent example, the downgrade of AIG triggered some of its counterparties to demand additional collateral or principal repayments for the over-the-counter contracts.[3] Nonfinancial firms are less sensitive to such explicit rating triggers however, 7% of the firms in my sample — mostly in the energy industry — disclose the existence of rating triggers in their annual 10-K filings.[4] The contracts that this study focuses on are performance pricing agreements, which use either ratings or accounting ratios to calibrate pricing grids (Asquith et al. (2005), Beatty and Weber (2005)). Firms enter into contracts that link their interest rates to future observable events, such as changes in ratings and accounting ratios, to mitigate adverse selection and moral hazard problems (Asquith et al. (2005)) and to diminish incentives to engage in claim dilution (Bhanot and Mello (2006)).

When contracts use credit ratings to enforce restrictions, changes in ratings directly impact firms' cash flows. The issuer is likely to demand favorable treatment by the rating agency. I investigate whether the explicit use of ratings in contracts results in catering; that is, credit risk

[2]Nicholls (2005) lists default and acceleration triggers in loan agreements, pricing grids, security/collateral enhancement triggers, benchmark for triggering restrictive negative covenants, calculation of borrowing base and springing liens, and qualification of permitted assignees as rating triggers.

[3]See "AIG needs to address CDS portfolio to save ratings" by Reuters on February 27, 2009 and "AIG faces cash crisis as stock dives 61%" by Wall Street Journal on September 16, 2009 as well as "Downgrades and Downfall. How could a single unit of AIG cause the giant company's near-ruin and become a fulcrum of the global financial crisis?" by Washington Post staff writers Robert O'Harrow and Brady Dennis on December 31, 2009.

[4]For all firms in the Financial Metrics database with CIKs, a text search based on DirectEdgar identifies 7% of firms disclosing rating triggers in the notes to their annual filings. I thank Sarah Zechman and Jonathan Rogers for providing access to DirectEdgar.

assessments that are more favorable than the underlying economics justify. The reasoning mirrors that of the debt covenant hypothesis: Watts and Zimmerman (1986) argue that debt contracts that make covenant thresholds a function of financial ratios give borrowers incentives to change accounting methods to avoid costly covenant violations. Performance pricing in loan agreements creates a continuous link between accounting ratios and interest rates, and thus performance pricing creates incentives to managers to engage in income-increasing earnings management. Beatty and Weber (2005) find that borrowers whose debt contracts allow them to make accounting changes choose accounting methods that increase earnings. Dichev and Skinner (2002) find that borrowers' accounting ratios are substantially more likely to be just above critical covenant thresholds rather than below, which is consistent with the debt covenant hypothesis. Similarly, performance pricing based on ratings, as opposed to ratios, creates incentives for borrowers to pressure rating agencies to cater to borrower demands. The existence of an external party adds an additional layer of complexity. However, rating agencies are not immune to providing inflated ratings in other contexts (Bolton et al. (2010), Becker and Milbourn (2010), Mason and Rosner (2007), Benmelech and Dlugosz (2009)).

There are two possible mechanisms that result in observed catering. Under explicit catering, the borrower pays an inflated fee to the rating agency. The ongoing business relationship between the borrower and the rating agency results in one-way fee income paid from borrower to agency, for rating as well as advisory business. The rating agency provides a more favorable assessment for those borrowers from which it receives higher fees, holding reputational costs constant. Under implicit catering, the borrower, possibly with the help of a rating advisory consultant, provides optimistic disclosures to the rating analyst, which the rating analyst processes 'at face value'. This results in implicit catering: the rating analyst, by providing too little effort, awards upwardly biased ratings to borrowers that provide such upwardly biased disclosures. (Such an outcome may be sustainable because certified rating agencies enjoy market power due to an SEC-granted quasi-monopoly, in which the rating analyst exerts minimal effort in information collection, and the borrower bears the onus of disclosure.) Empirically, this study cannot disentangle these two

mechanisms. Similarly, the literature on ratings of structured finance products has not resolved the debate whether rating inflation is due to explicit catering for business reasons or whether credit risk is underestimated because of erroneous judgments of non-traditional products (Ashcraft et al. (2010), Coval et al. (2009), Griffin and Tang (2010), He et al. (2010)). In either scenario, catering – a rating process that is too favorable given the underlying economics – would be observed.

To uncover any potential catering in the rating process, lenders need to monitor their borrowers. However, monitoring is not costless. Ex ante, borrower and lender agree to contract on performance pricing because lenders can observe a readily available signal of credit risk in the form of an accounting ratio or a rating. Ratings are viewed as more independent than internally generated accounting ratios. However, the business relationship between the borrower and the rating agency gives rise to a conflict of interest. As part of its relationship with the rating agency, the borrower provides firm-specific disclosures. The lender is not part of this relationship. The lender has the option to assess whether the rating is biased, but this involves a monitoring cost. Hence lenders in PP contracts balance the benefit of receiving interest rate mark-ups with the cost of monitoring whether the contracting basis is biased.

For borrowers, the interest rate sensitivity in private loans' performance pricing is economically meaningful when compared to rating fees, providing incentives for borrowers to influence the rating process. Asquith et al. (2005) document significant potential changes in the interest rate spread charged: they find an average increase in the interest rate of 13.8 basis points for each step in the pricing grid, with an average of 5.1 steps for interest rate increasing performance pricing loans. The potential for interest rate movement is significantly greater than the fees of three to four basis points of the face amount that rating agencies charge for rating corporate debt.[5]

The business model of credit rating agencies creates a basic tension between catering to fee-paying issuers and providing unbiased, high-quality ratings (Partnoy (1999), Bolton et al. (2010),

[5]Standard and Poor's (2009) documents that up to 4.25 basis points are charged for corporate debt, with a minimum fee of USD 70,000. Partnoy (2006) documents fees of 3-4 bps of the face amount for corporate debt, which is subject to minimum fee amounts ranging from USD 30,000 to a maximum of USD 300,000. More is charged for complex deals (up to 10 basis points). High volume issuers receive discounts. Monitoring fees, cancellation fees, and initial confidential rating fees are in the range of USD 20,000 to USD 50,000.

Becker and Milbourn (2010), Mason and Rosner (2007)).[6] The economic role of rating agencies is to provide independent assessments of credit risk (Wakeman (1984)). On behalf of bondholders, rating agencies collect and process information. The delegation of information processing to an intermediary saves on the duplication of such monitoring costs by dispersed bond holders (Wakeman (1984)). Their primary asset is their reputation, which is the basis for their long-term business prospects (Gorton and Winton (2003), Klein and Leffler (1981), Shapiro (1983), Strausz (2005)). Reputational concerns provide incentives to rating agencies to resist catering to issuer's demands. Such a business model leads to conflicts of interest similar to the tradeoff facing other information intermediaries which receive income from their objects of investigation, such as audit firms and investment bank affiliated equity analysts. For audit firms a large literature examines the question of auditor independence (Antle (1984), Larcker and Richardson (2004)). Analysts' economic incentives are associated with earnings adjustments, growth forecasts and recommendations (Lin and McNichols (1998), Ertimur et al. (2011), Baik et al. (2009)).

However, performance pricing might exacerbate cash flow shortfalls when the issuer is downgraded. Rating-based performance pricing creates a direct link between the firm's public debt rating and the contractual interest rate the loan charges. Decreases in the contractual interest rate mitigate the potential for a costly renegotiation if the issuer's credit risk improves. Conversely, step-ups in loan pricing protect the bank from the issuer's deterioration in credit risk. However, ex post such interest rate step-ups exacerbate liquidity strains at the precise moment when an issuer is least able to deal with them (Moody's (2001)). Furthermore, these step-ups can exacerbate a company's ability to comply with its cash flow-based covenants, such as covenants based on total debt/cash flow and senior debt/cash flow ratios. Under the 'adverse consequences' hypothesis, rating agencies might be particularly concerned with issuers who have such rating-based provi-

[6] Ashcraft et al. (2010) find that although ratings of mortgage backed securities contain useful information, ratings exhibit time-variation in their risk adjustments consistent with rating inflation in 2005-2007 and for high-risk and low-documentation loans. Coval et al. (2009) point out that ratings of CDOs are highly unreliable due to models that are highly sensitive to even small errors in economic projections or losses and that underestimate the correlation of risks across various debt securities. Griffin and Tang (2010) find evidence of upward bias in subjective adjustments on AAA-rated CDO tranches relative to their own model. He et al. (2010) find that rating agencies rate large structured product issuers more favorably.

sions in their contracts. Under this view, rating agencies are likely to take extra care in their assessment due to reputational concerns about long-term business prospects (Gorton and Winton (2003), Klein and Leffler (1981), Shapiro (1983), Strausz (2005)) or due to concerns about outside political intervention (Beaver et al. (2006)) and increase their assessments of borrowers' credit risk.

2.2 The rating process: rating agency adjustments

To investigate the impact of incentives on rating agencies, I investigate the relation between the use of ratings in contracts and rating agency adjustments. Examining rating agency adjustments allows me to investigate where, if any, the conflict of interest manifests itself. Soft adjustments are by construction less verifiable and thus more likely to be biased than hard adjustments, because ex post detection for a single firm case is difficult due to the unverifiability. For example, Rajan et al. (2010) find that as incentives for decision makers to collect value-relevant information diminish, market participants rely increasingly on hard factors rather than value-relevant soft factors in the pricing of securitized subprime mortgages, which ultimately leads to an underprediction of default risk in this scenario.

To determine issuers' credit risk, rating agencies undertake hard and soft adjustments to capture quantitative and qualitative factors, respectively, that impact default risk beyond what accounting ratios based on reported amounts can capture (Moody's (2006), Kraft (2010)). See Figure 1 for an illustration of the rating process by Moody's Financial Metrics. A prominent hard adjustment is the estimation and inclusion of off-balance-sheet debt (Kraft (2010)). Soft adjustments are supposed to incorporate factors such as management quality, aggressive accounting, weak controls, governance risk, industry structure, and managerial bondholder friendliness (Moody's (2007)).

See Appendix B for an illustration of the rating process by Moody's Financial Metrics. Moody's assigns each industry group a rating grid that consists of mainly quantitative factors. For example, for the company 3M, the adjusted financials indicate that leverage is higher than that inferred from the reported financials. Debt-book capital and debt/EBITDA ratios increase substantially, and cashflow-debt and interest coverage ratios decrease as a result of the rating agency's adjustments.

Overall 3M's indicated rating on the basis of adjusted ratios is one notch lower than the rating that the reported financials imply. However, in this case, soft adjustments reverse the impact and the rating improves by one notch. More generally, the rating agency makes extensive adjustments to GAAP financials as shown in Kraft (2010): the major hard adjustment includes off-balance-sheet debt, leading to substantially higher leverage ratios. On average, credit-risk increasing hard and soft adjustments have an association with lower ratings and higher bond yields.

3 Empirical approach

3.1 Base model

To investigate catering in the contexts of rating-based contracting, I estimate the association between the use of ratings in performance pricing loan agreements and rating agency adjustments. Rating agency adjustments represent the rating process and include estimates of off-balance-sheet debt, hard adjustments, and soft adjustments.[7] Increases in off-balance-sheet debt increase credit risk. Other hard adjustments and soft adjustments either increase or decrease the rating agency's estimate of credit risk, depending on the underlying firm characteristics and any rating agency bias. The following is the model.

$$ADJ_{fye,i} = \alpha_0 + \alpha_1 PPrating_{fye,i} + \beta_n firmcharacteristics_{fye,i} + \epsilon_{fye,i} \quad (1)$$

The model is estimated using OLS when the dependent variable is the rating agency adjustment to debt. For soft, hard, and total rating agency adjustments an ordered probit model is run. The empirical proxy for rating-based contracts is the presence of a loan with performance pricing that links the contractual interest rate to changes in the issuer's bond rating. The variable of interest is $PPrating$, which equals one if, at fiscal-year end, the borrower has at least one active loan facility

[7]Hard and soft adjustments capture quantitative and qualitative factors that impact issuers' default risk, respectively (Moody's (2006), Kraft (2010)). Hard adjustments primarily comprise adjustments to reported financial statements. The main hard adjustment increases debt by the amount of the estimated off-balance-sheet debt.

outstanding that contains a rating-based performance pricing feature. Rating agency adjustments and firm characteristics are measured at fiscal-year end.

The rating agency's adjustments capture various dimensions of credit risk, but they are also subject to bias or noise in the rating process. The bias is subject to the rating agency's and borrower's incentives to provide a favorable credit risk assessment. Thus, I control for borrower characteristics that determine credit risk and that would be reflected in the rating agency's adjustments, such as leverage, profitability, size, and short-term liquidity. Factors similar to those determining the choice of debt, as well as financial reporting benefits, drive the use of off-balance-sheet finance (Beatty et al. (1995), Mills and Newberry (2005)). The proportion of debt in the capital structure depends on the riskiness of the underlying cash flows and asset tangibility. Empirical studies on the cross-sectional determinants of leverage find that leverage increases with fixed assets, non-debt tax shields, growth opportunities, and firm size (Harris and Raviv (1991), Rajan and Zingales (1995)). Leverage decreases with volatility, advertising expenditures, research and development expenditures, bankruptcy probability, profitability, and product uniqueness. I expect the same determinants to hold for off-balance-sheet debt. I focus on size, profitability, asset tangibility, market-to-book ratio, and book-leverage. I represent the firm characteristics with size (logarithm of revenues), leverage (total balance-sheet-debt divided by total assets), interest coverage (ratio of operating profit to interest expense), operating margin (ratio of operating profit to revenues), return on assets (ratio of operating profit to total assets), tangibility (ratio of inventory and net property, plant and equipment to total assets), and market-to-book ratio (market value of equity to book value of shareholders' equity). Borrowers also choose off-balance-sheet debt to raise external finance because of its financial reporting treatment. The off-balance-sheet treatment results in financial reporting benefits, such as reporting a lower balance sheet-based leverage ratio to comply with covenants or to appear less risky (Mills and Newberry (2005), Beatty et al. (1995), Engel et al. (1999)). The rating agency's estimate of off-balance-sheet debt is based on the borrower's disclosures. By definition, the rating agency adjustment for off-balance-sheet debt is the amount of debt as recognized by the agency, and hence the captured amount of off-balance-sheet

debt does not confer any financial reporting benefits with respect to the rating process. Hence no controls are necessary for expected financial reporting benefits in the rating process. The amount of off-balance-sheet debt may, however, confer financial reporting benefits for complying with debt covenants.

Conceptually, this model needs to control for firm characteristics that give rise to the rating agency's soft adjustments. Empirically, it also needs the same information the rating agency has access to, some of which is private. The main model uses publicly observable firm characteristics to control for credit risk; however, I also exploit a shock to the firms' economic position that allows me to construct a benchmark for the rating agency adjustments.

3.2 Difference-in-difference analysis for rating thresholds

In addition to the contractual use of ratings, regulation also provides incentives for both the issuer and regulated investors to engage in regulatory arbitrage (Bolton et al. (2010), Coval et al. (2009), Opp et al. (2010)). A large proportion of bond investors such as mutual funds, pension funds, and insurance companies use ratings by certified rating agencies to comply with rating-based regulation (Bolton et al. (2010), Coval et al. (2009), Opp et al. (2010)).[8] To comply with regulations, investors desire high ratings. The investment grade cutoff and prime short-term ratings are particularly important thresholds. Prime short-term credit ratings, such as P1 and P2, determine commercial paper issuance. Furthermore, many investors cannot invest in non-investment grade bonds due to restrictions. Hence, issuers desire investment grade ratings to obtain a large investor base and reduce the liquidity component of their cost of debt. If the regulator is myopic in the short-term, an equilibrium with inflated ratings is feasible. Even if managers understand that investors see

[8]Ratings by certified (or NRSRO) agencies are used by the SEC, federal and state legislation, and other regulators in the context of portfolio restrictions and capital adequacy assessments (Standard and Poor's (2006), (SEC (2003)). For example, money market funds can only invest in investment grade bonds. State insurance codes rely on NRSRO ratings to determine appropriate investments for insurers. The Federal Reserve Board and the Federal Home Loan Bank System allow their members (the Federal Reserve System and federally charted savings and loans associations, respectively) to invest in investment grade securities only. The Department of Labor requires pension funds to hold commercial paper rated above A-3. Furthermore, broker-dealers which are subject to the net capital rule use ratings by certified agencies in capital adequacy tests, where the percentage reduction from stated values (securities haircuts) for the purpose of stock margin requirements and for net capital requirements depend on ratings.

through inflated ratings, they might still demand these ratings to help bond investors comply with regulation (Opp et al. (2010), Bolton et al. (2010)).

Under the catering hypothesis, I predict a stronger association between rating-based contracts and the rating agency's adjustment for firms close to important rating thresholds and for firms with prime short-term credit ratings, relative to firms close to these thresholds without a rating-based contract. I conduct a difference-in-difference analysis in order to test whether closeness to an important rating threshold strengthens the catering incentive. On the other hand, reputational costs as well as adverse trigger effects from rating downgrades are substantially higher at these threshold ratings. I estimate the following regression and include an additional indicator variable that equals one if the issuer has a threshold rating (BBB-minus, which is the last rating above the investment grade cutoff) or a short-term rating (P1 or P2, which are prime short-term credit ratings, that are necessary to access the commercial paper market) and a term that interacts the threshold rating and the PPrating indicator variable:

$$\begin{aligned} ADJ_{fye,i} &= \alpha_0 + \alpha_1 PPrating_{fye,i} + \alpha_2 threshold_{fye,i} + \alpha_3 threshold_{fye,i} * PPrating_{fye,i} \\ &\quad + \beta_n firmcharacteristics_{fye,i} + \epsilon_{fye,i} \end{aligned} \tag{2}$$

3.3 Contracting choice

Borrowers choose to link their interest rates to future observable events, such as changes in ratings and accounting ratios, to mitigate adverse selection and moral hazard problems (Asquith et al. (2005)). Contracts that link either payments or the posting of collateral to a deterioration of credit risk mitigate the incentives to engage in claim dilution (Bhanot and Mello (2006)). Ex ante, firms that choose to contract on performance pricing are more opaque than firms raising loans without performance pricing clauses.

Conditional on contracting on performance pricing, firms choose between ratings and accounting ratios. Ratings are a comprehensive measure of default risk, but accounting ratios can be timelier (Beatty and Weber (2005), Ball et al. (2008), Doyle (2008)). The inclusion of restrictions

on managers' behavior helps mitigate agency conflicts between debtholders and managers acting on the behalf of equityholders. For example, financing covenants can be written that restrict the issue of senior debt, the initiation of leases, or the issue of debt-like obligations to restrict managers' ability to dilute existing claims (Smith and Warner (1979)). Contractual adjustments incorporating off-balance-sheet debt are difficult to write and enforce. Writing an explicit contract that contains a negative covenant that prohibits the use off-balance-sheet debt would lead to loopholes and financial engineering (Doyle (2008), Jensen and Meckling (1976)). Leftwich (1983) finds that according to best practice lenders should consider the possibility of 'creative financial arrangements' when writing debt contracts. If left unmonitored, the use of off -balance-sheet financing allows borrowers to dilute claims of existing, on-balance-sheet debtholders, and it leads to higher economic leverage. However, even the best-practice contracts documented in Leftwich (1983) contain vague and difficult-to-enforce language. Ratings are comprehensive measures of credit risk that incorporate a range of factors, which renders them useful for inclusion in contracts (Doyle (2008)).

In the main analysis, I estimate the regression conditional on performance pricing, so I compare firms with rating-based performance pricing to firms with accounting-based performance pricing. The small minority of firms whose performance pricing is based on both accounting ratios and ratings (hybrids) is excluded. Firms that use performance pricing based on ratings are more similar to firms that use performance pricing based on accounting ratios compared to firms that use neither (Asquith et al. (2005)). In the interest of external validity, I also conduct the empirical tests for firms that have private loans without any performance pricing features. Those firms are likely to be less opaque and thus less suitable as a control group, but their inclusion allows me to increase the sample size.

3.4 Shock analysis

Any observed differences in rating agency adjustments can be caused by differences in underlying firm characteristics. To address this selection problem, I exploit an exogenous and unexpected

shock to the firms' economic position. An adverse shock to companies' cash flows, for example, by a drop in consumer demand, decreases the value of total assets and increases a firm's default risk. I investigate the reaction of rating agencies to firms with adverse economic shocks by testing whether the rating agency's reactions differ for firms with rating-based contracts compared with firms without such contracts. Controlling for the size of the shock, I investigate whether any differential reaction exists for firms with rating-based contracts relative to other firms. Under the catering hypothesis, I expect more favorable treatment for firms with rating-based contracts that experience adverse economic shocks, all else being equal. This research design has the advantage of allowing me to calculate a benchmark of the expected adjustment for firms that experience a shock to their default risk. I estimate the following regression where $Shock_{fy}$ equals an extreme change in the market value of public debt during a firm's fiscal year:

$$\begin{aligned} ADJ_{fye,i} &= \alpha_0 + \alpha_1 PPrating_{fye,i} + \alpha_2 Shock_{fy,i} \\ &\quad + \alpha_3 Shock_{fy,i} * PPrating_{fye,i} + \beta_n firmcharacteristics_{fye,i} + \epsilon_{fye,i} \end{aligned} \tag{3}$$

For each bond, I calculate daily returns during the firm's fiscal year. Low (negative) bond returns are a reflection of an adverse economic shock that increases credit risk. I measure the size of the shock by the bottom return decile (the deciles are less likely to be subject to data errors than the minimum daily return during the year). Shocks are measured as changes in the market value of public debt rather than accounting cash flows because they are less subject to accounting discretion and more timely. An adverse economic shock increases default risk and should be reflected equivalently in the increase in the rating agency's risk assessment if the rating agency is neutral for both PPrating and PPratio (or other) firms.

The net increase in default risk, rather than the gross increase in default risk, is relevant for comparison with the rating agency's assessment of default risk. The net adverse shock is the priced reaction to the firm's shock and is measured by a decrease in the market value of public debt. More favorable rating agency adjustments for PPrating firms could also imply that PPrating firms self-

select into PPrating contracts because they are better at dealing with shocks, for whatever reason. In this case, the more favorable adjustments would be economically justified and not consistent with the catering hypothesis. However, this concern is not valid because I measure the priced (net) increase in default risk. If the PPrating firm is better at dealing with the shock, then the net increase in default risk will be less than the gross increase. Hence the priced shock already includes the market's assessment of the PPrating firm's reaction to the shock.

See Appendix C for a hypothetical example. The net shock is relevant to the comparison. In the first scenario where the treatment is random, a PPrating firm is compared to PPratio firm 1. Both should have the same change in the rating agency's assessment of default risk. In the second scenario, where PPrating firms choose to contract on ratings rather than accounting ratios, the priced reaction of the PPrating firm, the net shock, is smaller than the gross shock. Because the market anticipates that the PPrating firm is better at dealing with adverse shocks, the market value of public debt decreases by less. Hence PPrating firm is compared to PPratio firm 2. Both should have the same change in the rating agency's assessment of default risk. Because the net shock is measured by the change in the market's assessment of default risk, any self-selection issue is already priced, and hence a comparison of the rating agency's assessments is meaningful.

3.5 Pricing regressions

The second approach to addressing the selection problem is the use of pricing regressions. In order to assess whether the adjustment largely captures bias or the underlying credit risk arising from off-balance-sheet financing and other hard and soft factors, I test whether variation in the rating agency's estimate of off-balance-sheet debt reflects variation in default risk. If the rating agency does not favor one group over the other, the expectation is that the adjustments will be similarly priced for firms using rating-based contracts and the control group. To test whether rating agency adjustments capture increases or decreases in default risk and whether the estimates capture the adjustment with downward bias, I estimate the following regression model including an interaction

between PPrating and the adjustment. The yield spread of public bonds measures default risk. [9] My model is the following:[10]

$$\begin{aligned} Yieldspread_{fy+1.25,i} &= \alpha_0 + \alpha_1 PPrating_{fye,i} + \alpha_2 ADJ_{fye,i} \\ &\quad + \alpha_3 ADJ_{fye,i} * PPrating_{fye,i} + \beta_n firmcharacteristics_{fye,i} \\ &\quad + \gamma_m issuespecific_{fy+1.25,i} + \epsilon_{fye,i} \end{aligned} \tag{4}$$

If the rating agency shows no systematic bias, I would expect the adjustment to be priced equivalently across the two subsets of PPrating and the control group.

4 Data

To calculate the rating agency's estimate of off-balance-sheet debt (OFFBS), I collect adjusted and reported financial statements from Moody's Financial Metrics database for fiscal years ending during the calendar years of 2002 to 2008. The main variable of interest is OFFBS, which equals the difference between adjusted debt and reported debt, divided by total reported assets. Debt equals the sum of short-term and long-term debt. For a subset of Financial Metric firms, indicated ratings based on reported and adjusted financial numbers are available, which allows me to compute the implied hard, soft, and total adjustments. Figure 1 provides an illustration. The total adjustment is the difference between the actual rating and the hypothetical rating reported financials imply. The total adjustment can be broken down into soft and hard adjustments. The soft adjustment is the difference between the actual rating and the hypothetical rating adjusted financials imply, and the hard adjustment is the difference between the hypothetical rating adjusted financial imply

[9] This measurement is subject to the caveat that in addition to default risk the spread reflects compensation for taxes and a systematic risk premium (Elton et al. (2001)) and a premium for liquidity (Chen et al. (2007)).

[10] Recent models of bond yields, such as in Campbell and Taksler (2003) and Chen et al. (2007), build on results from the rating prediction literature, in particular the rating model in Blume et al. (2006) and to some extent on earlier models such as Horrigan (1966), West (1970), Pogue and Soldofsky (1969), Pinches and Mingo (1973), Kaplan and Urwitz (1979), Ederington (1985), and Blume et al. (2006).

and the hypothetical rating reported financials imply. The rating agency's estimate of off-balance-sheet debt is conceptually part of the hard adjustment. Furthermore, I use the reported numbers to calculate firm characteristics such as leverage, profitability, tangibility, and size. I identify the issuers in Financial Metrics by assigning them Compustat's gvkey identifier, issuer cusip, and fiscal-year end, based on a match by company name.

To measure whether a firm contracts by ratings, an indicator variable (PPrating) equals one if the firm has an active loan facility outstanding with rating-based performance pricing, collected from Dealscan. To link the Dealscan issuers to other data sets, I employ the Dealscan-gvkey linking data set from Chava and Roberts (2008). I merge the firm-year observations from Financial Metrics with loans from Dealscan by gvkey and obtain the Financial Metrics-Dealscan sample (FMDS). An issuer year is assigned zero, one, or several loan facilities. If the facility's start date and end date surround the issuer's fiscal-year end, the study considers it active. For each issuer year, I calculate the number of active facilities and determine those active facilities that include performance pricing features and accounting covenants.

The measurement of an adverse economic shock is a significant change in the market value of traded bonds. I collect bond prices from Trace and extract issue characteristics from FISD Mergent. For each bond's fiscal year, I calculate the bottom decile return on an equal-weighted basis and weighted by trading volume. In order to conduct pricing tests, I collect treasury spreads (offering yield less treasury yield) for public bond offerings and other issue-specific characteristics from FISD Mergent. I merge the FMDS with public bond issues. I match each FMDS issuer year with zero, one, or more bond issues, where the bond is issued during the twelve months beginning three months after the fiscal-year end.

Table 1 Panel A reports that the FMDS sample contains 1,193 issuers and 6,196 issuer years. Most of the observations are evenly split over 2002-2008. Of all rated observations, 44% have an investment grade rating. The highest industry peer group concentrations are energy (11.3% of all firm years) and electric utilities (8.9% of all firm years). Furthermore, Table 1 Panel A reports that 752 issuers in the FMDS sample have available data on bond prices captured in Trace, comprising

2,822 issuer years. The years 2005 to 2008 are more heavily represented because Trace coverage of bond transactions increased substantially in 2005. Out of all Trace issuer years, 49% have an investment grade rating (untabulated). The FISD sample comprises 697 issuers that have data available on bond offerings in FISD Mergent, resulting in 1,507 issuer years.

For each FMDS firm with available bond transaction data, I calculate the magnitude of the most adverse increase in credit risk. For each bond issue, I calculate daily returns and determine the bottom decile return for each bond's fiscal year to measure an abrupt increase in default risk. Table 1 Panel B documents that the 10th percentile daily return for the average issue amounts to -1.2%. The 10th percentile return is negative for more than 75% of the observations, and its minimum is - 41%. While some bonds are actively traded, the average bond only trades 52 days a year, and conditional on trading, only 4.62 times per day (Bessembinder et al. (2009)). I recalculate the shock variable by using daily bond returns based on traded volume. Returns based on equally weighted prices are very similar to those based on prices weighted by transaction volume. The bonds in the Trace sample have an average offering amount of USD 436 million and an offering yield of 5.8% (not tabulated). In the FISD sample, 1,544 observations have nonzero and nonmissing treasury spreads. The average treasury spread equals 240 basis points, the average time to maturity is 12.0 years, the average offering amount equals USD 477 million, and 10% of the FISD observations are senior and secured.

Table 1 Panel C documents that for the FMDS sample, average (median) total assets are USD 8.8 billion (USD 2.9 billion), average leverage is 0.38, average coverage is 7.90, average operating margin is 0.10, return on assets is 0.07, average tangibility is 0.46, and average market-to-book ratio is 4.8 (for those firms with available equity market capitalization). The coverage, quick, and current ratios as well as the operating margin are winsorized at the 1st and 99th percentile. The average (median) adjustment to total debt (OFFBS), scaled by total assets equals 17% (9%). The average total adjustment worsens the rating by 0.96, where a 1.00 point reflects one rating notch. Each rating is assigned a number from 1.0 for AAA to 21.0 for C. On average, both hard and soft adjustments reflect an increase in credit risk.

Table 1 Panel C also reports firm characteristics and rating agency adjustments by type of performance pricing. PPratio firms are smaller and more levered than PPrating firms and have similar profitability and tangibility as PPrating firms. Specifically, compared with the control group of PPratio firms, firms in the PPrating subsample are bigger, with average total assets of USD 11.2 billion (versus USD 3.5 billion), have lower average leverage (0.30 versus 0.46) and higher average interest rate coverage (9.5 versus 5.9), higher average operating margin (0.11 versus 0.08), and similar returns on assets (0.08 versus 0.06), as well as a similar average tangibility of 0.47. The total and soft adjustments for firms with rating-based contracts decrease their ratings by less than those for firms with accounting-ratio-based performance pricing. Hard adjustments are worse for PPrating firms but not enough to offset the impact from the soft adjustments. The average total adjustment for PPrating firms amounts to - 0.75 and is exceeded (in absolute value) by the total adjustment for PPratio firms of -1.30. The rating agency's soft adjustment primarily drives the difference in the adjustment between those two types of firms: PPrating firms' ratings are adjusted downward by only - 0.23, but PPratio firms' ratings decrease by -1.10. The average rating agency's assessment of off-balance-sheet debt (OFFBS) for PPrating observations amounts to 14%, whereas the average ADJ for PPratio observations amounts to 21%. Table 1 Panel C also reports the loan characteristics by issuer year. The average loan has an amount of USD 2,080 million, a maturity of 63 months, a spread of 161 basis points. Consistent with differences in firm charactertistics, loans to PPrating firms have greater offering amounts and lower all-in-drawn spreads.

As shown in Table 2 Panel A, of all issuer years in the FMDS sample, 78% have a performance pricing feature, which is higher than the proportion reported for 1998 in Beatty et al. (2002). I run the tests on this subsample, as well as on the total FMDS sample. Conditional on performance pricing the use of a rating hovers around 53% over all years. Despite the criticism rating agencies received during the period, I find little evidence of variation in the use of ratings versus accounting ratios. If anything, firms and banks were more likely to incorporate ratings rather than accounting ratios at the end of the sample period in 2008.

Table 2 Panel B reports that in most rating-based performance contracts interest rates are

allowed to move up or down (PPutroque), 12% have interest rates with step-up provisions (PPincrease), and 14% have interest rates with step-down provisions (PPdecrease). The sum of the proportions is greater than 100% because each firm year can contain several facilities with different performance pricing schedules. Interest-rate decreasing performance pricing automatically decreases the interest rate charged when the issuer's credit risk improves. This feature lowers renegotiation costs and reduces adverse selection problems (Asquith et al. (2005)). Interest-rate increasing performance pricing automatically increases the interest rate spread charged when the issuer's credit risk deteriorates. This feature reduces moral hazard and adverse selection problems (Asquith et al. (2005)).

In addition, Table 2 Panel B reports the potential change in interest rate spreads over Libor at time of loan inception. MaxLessInitial is the number of basis points between the interest rate charged on the contract at inception of the loan agreement and the maximum rate in the pricing grid. The average difference between the maximum interest rate charged and the initial interest rate is 44 basis points (the maximum difference amounts to 743 basis points). InitialLessMin is the difference in basis points between the initial interest rate spread and the minimum interest rate spread in the pricing grid. The average potential interest rate reduction is 26 basis points (the maximum reduction is 425 basis points). These numbers for the potential interest spread movement are significantly larger than the fees paid to rating agencies on corporate debt of three to four basis points.

Table 3 reports the correlations between the use of ratings in contracts, rating agency adjustments, and firm characteristics. PPrating shows a significant and negative correlation with the rating agency adjustment for off-balance-sheet debt, but PPratio exhibits a significantly positive correlation with OFFBS. Size has a positive correlation with the rating agency's estimate of off-balance-sheet debt. Leverage, coverage, operating margin, and tangibility have a negative correlation with the adjustments for off-balance-sheet debt. For the subset of observations with available data on total, hard, and soft adjustments, PPrating still has a negative association with OFFBS. Furthermore, PPrating has an association with unfavorable hard adjustments but favor-

able soft and total adjustments.

5 Empirical Results

Table 4 Panel A documents the estimates for the OLS parameters from the regression of rating agency's adjustments for off-balance-sheet debt, as well as the estimates for the ordered probit parameters from the regression of soft, hard, and total adjustments respectively, on the presence of a rating-based contract and firm characteristics for the sample of firms with performance pricing (FMDS). Standard errors are clustered by firm and include fixed effects for utilities (electric, public, and water utilities) and energy. I find that, conditional on the presence of a performance pricing feature in the loan, the rating agency's assessment of off-balance-sheet debt and the presence of a rating-based performance pricing clause have a significantly negative correlation. The correlation is negative and statistically significant over a variety of different control variable specifications (models 1-4). Prior research on off-balance-sheet-finance finds that credit-constrained firms are more likely to raise off-balance-sheet debt (Mills and Newberry (2005), Beatty et al. (1995)). Consistent with this claim, I find the rating agency's estimate of off-balance-sheet debt decreases in profitability and increases in asset tangibility. The rating agency adjustment for off-balance-sheet finance has no correlation to size, leverage, coverage, and the market-to-book ratio. The results suggest less profitable and more tangible-asset-intensive firms are more willing and able to raise off-balance-sheet finance, or the rating agency makes more conservative adjustments for these types of firms. Unlike Mills and Newberry (2005), I find a negative association between the amount of off-balance-sheet debt and the use of rating-based performance pricing.

The rating agency's soft and total adjustments have a significantly positive relation with the presence of ratings in performance pricing. Conditional on performance pricing, the use of ratings to adjust the contractual interest rate has a positive association with rating agency adjustments, with the exception of hard adjustments. Hard adjustments are not significantly different from zero in two out of four model specifications and have a weakly negative association with rating-based

performance pricing in the other two model specifications. The results are consistent with the catering hypothesis; unless differences in adjustments are driven by unobservable firm characteristics, the use of rating-based performance pricing has an association with more favorable adjustments, namely significantly lower estimates of off-balance sheet debt, and significantly greater soft and total adjustments. The results for the total FMDS sample in Table 4 Panel B are very similar to the results conditional on performance pricing. The use of rating-based contracting has an association with significantly lower off-balance sheet estimates and significantly greater soft and total adjustments.

Next, I conduct a difference-in-difference analysis to test whether closeness to an important rating threshold strengthens rating agency's catering or whether reputational concerns prevail. The rating thresholds I consider are the BBB-minus ratings as well as the short-term ratings P1 and P2. Table 5 Panel A reports the results from the multivariate analysis for the FMDS sample conditional on performance pricing. The interaction term for BBB-minus rating and PPrating is significant for OFFBS but not for the other rating agency adjustments. Rating-based contracts have an association with a lower estimate of off-balance-sheet debt, but PPrating firms close to the BBB-minus cutoff experience a greater adjustment for their off-balance-sheet debt. Firms with the short-term rating P2 have a higher adjustment for off-balance-sheet debt if they have rating based performance pricing, as well as rating-decreasing soft, hard, and total adjustments. (There is not sufficient data to include P1 rating interactions in this sample.) The results for the FMDS sample in Table 5 Panel B are similar to those for the sample conditional on performance pricing, but statistically weaker. The multivariate evidence is not consistent with increased catering for firms with important short-term rating thresholds. In contrast, the use of ratings in contracts for firms close to rating thresholds has an association with a more unfavorable assessment of credit risk.

So far, the overall results are consistent with rating agencies treating firms with rating-based performance pricing more favorably, except if those issuers are close to important rating thresholds, where rating agencies' reputational costs are higher. The interpretation is subject to the

caveat that unobservable differences in firm characteristics might also drive these differences in adjustments, if the differences in firm characteristics imply less off-balance-sheet debt or less unfavorable qualitative factors for PPrating firms. Hence, I exploit variation from unexpected adverse economic shocks to investigate whether there is a bias in rating agency adjustments.

Among firms that experience an adverse economic shock, I expect more favorable rating agency adjustments under the catering hypothesis for PPrating firms: lower estimates of off-balance-sheet debt and higher soft, hard, and total adjustments. However, such shocks only affect those borrowers whose contractual interest rates can increase under the stipulations of the performance pricing grid. Hence the shock analysis excludes performance pricing decreasing contracts. Table 6 Panel A reports the regression results of rating agency adjustments on adverse economic shocks. A more extreme shock is measured by a smaller 10th percentile daily bond return. The bond level approach is employed to maximize the probability of identifying adverse economic shocks. In the total FMDS sample, the significantly negative coefficient of $Shock_{ret}$ for OFFBS in model 1 is consistent with the interpretation that overall, firms' adjustments for off-balance-sheet debt increase as they experience bigger shocks. The significant positive association between $Shock_{ret}$ and the rating agency's soft, hard, and total adjustments support the view that adjustments worsen credit ratings because these firms experience adverse economic shocks (models 2-4). The coefficient of the interaction term of shock and the indicator for $PPrating_{up}$ is not significantly different from zero for the rating agency's estimate of off-balance-sheet debt (model 1). The coefficient of the interaction term of shock and $PPrating_{up}$ indicator is significantly negative for the rating agency's soft, hard, and total adjustments (models 2-4). Controlling for firm characteristics, lower returns have an association with incrementally more favorable adjustments for PPrating firms, which is consistent with catering to PPrating firms. The results for the subsample of firms with active performance pricing contracts are similar, with the coefficients of $Shock_{ret}$ and the interaction term retaining the same sign (models 5-8).

It is possible that PPrating firms are better able to deal with adverse economic shocks than other firms, thus warranting the favorableness of rating agency adjustments. However, the market

reaction to the shock prices this possibility; for an equally detrimental shock the market reaction for a PPrating firm would be less severe than the market reaction for a control firm. The association between favorable adjustments and the contractual use of ratings is observed, controlling for the size of the market reaction. Empirically, firms that experience adverse economic shocks are not more likely to contract on ratings: the correlation between an adverse economic shock, as measured by the ten percentile daily bond return, and the use of ratings in performance pricing is not significantly different from zero, which supports the assumption that those shocks are exogenous to the setting (untabulated). Table 6 Panel B reports the results for the analysis based on trading volume-weighted bond returns. The results are very similar as those for simple bond returns.

Table 6 Panel C reports the probit regression results of changes in rating agency adjustments (ADJ_{delta}) on adverse shocks, which provides a more stringent test albeit with a loss of data points due to the changes specification. The ADJ_{delta} is an indicator variable that measures whether the change in the adjustment in the fiscal year surrounding the adverse shock increases or decreases credit risk. The shock has an association with an increase in the off-balance sheet adjustment and with decreases in soft, hard, and total adjustments. Conditional on contracting on ratings, this effect is reversed. However, most of these coefficients are no longer statistically significant. Their direction is consistent with the level results in Table 6 Panel A and Panel B. Rating agency adjustments capture increases in credit risk for firms that experience adverse economic shocks. PPrating firms' agency adjustments however to not worsen, compared to the group of firms that does not contract on ratings.

Table 7 reports the results for the pricing regressions. The logarithm of bond offering yield spread is regressed on the rating agency adjustment as well as firm- and issue-specific characteristics. The rating agency's adjustment for off-balance-sheet debt has an association with higher yield spreads. The rating agency's soft adjustments and total adjustments have an association with lower yield spreads. However, no evidence exists of a differential pricing impact on PPrating firms for soft and total adjustments. The incremental pricing impact for the rating agency's adjustment for off-balance-sheet debt for PPrating firms is significantly negative. Furthermore,

when I exclude performance pricing decreasing contracts ($PPrating_{up}$), the results remain the same: no evidence exists of a differential pricing impact for the soft and total adjustments on firms with rating-based increasing performance pricing, and again, the incremental pricing impact of the estimate for off-balance sheet debt for PPrating firms is negative. Overall the results support the view that long-term yield spreads incorporate rating agency adjustments and capture default risk. The market does not discount soft and total rating agency adjustments for PPrating firms, if anything, the market perception is that the estimate for off-balance-sheet debt is less risky for such firms.

6 Conclusion

This study examines whether rating agencies cater to issuers with rating-based contracts. Rating-based contracts link cash payouts to changes in ratings and thus make issuers more sensitive to their public debt ratings. I examine the relation between rating-based debt contracts and rating agency adjustments: the agency's estimate of off-balance-sheet debt, as well as hard adjustments for general quantitative factors and soft adjustments for qualitative factors. I find evidence that rating agencies provide more favorable adjustments to issuers with rating-based contracts relative to issuers with similar contracts based on accounting ratios and other issuers with private loan agreements. The evidence from the difference-in-difference analysis for rating thresholds shows that important rating thresholds, such as the investment grade rating and prime short-term ratings that allow firms access to more liquid markets, do not result in catering for firms with rating-based contracts. In contrast, the adjustments for firms are more unfavorable than for other firms near important rating thresholds. The reputational costs for the rating agency are likely to be more substantial at these important rating thresholds.

To mitigate the possibility that unobserved firm characteristics drive the differences in adjustments, I exploit unexpected adverse economic shocks to firms, and I find a differential reaction by the rating agency, which is consistent with catering to firms with rating-based contracts. Firms

with rating-based contracts receive more favorable rating agency adjustments after experiencing adverse shocks to credit risk, than firms without such contracts. The results from the pricing regressions indicate that rating agency adjustments generally are priced and can thus be interpreted to capture default risk. I can find no evidence of a differential pricing reaction for firms with performance price increasing loan contracts. The interpretation of these results is subject to the assumption that bond prices reflect an unbiased estimate of the credit risk that the rating agency's adjustments are supposed to capture. This assumption might not hold, given the rating agency's access to private information.

A lot of unanswered questions remain. Performance pricing is prevalent among firms that issue private debt. However, rating triggers that link the posting of collateral or trigger early repayment result in an even greater sensitivity of firms' cash flows to changes in ratings. So rating-based performance pricing might not be the most powerful setting to study catering arising from rating-based contracts; however, the performance pricing data are available for a large sample. Furthermore, this study examines only one aspect that could give rise to catering. A higher sensitivity to rating changes could also result from the dependence on the public markets to issue debt to raise external financing, or the existence of a financial subsidiary that relies more heavily on ratings for its business than a firm not active in financial services. However, the incentive conflict that arises from the fact that contracting uses an information intermediary's output-unlike, for example, equity analysts' recommendations or EPS forecasts-adds an additional tension to an already rich setting.

References

Antle, R. (1984). Auditor independence. *Journal of Accounting Research 2*(1), 1–20.

Ashcraft, A., P. Goldsmith-Pinkham, and J. Vickery (2010). MBS ratings and the mortgage credit boom. Working Paper.

Ashcraft, A. B. and T. Schuermann (2008). Understanding the securitization of subprime mortgage credit. Staff Reports 318, Federal Reserve Bank of New York.

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

Baik, B., D. B. Farber, and K. Petroni (2009). Analysts' incentives and street earnings. *Journal of Accounting Research 47*(1), 45–69.

Ball, R., R. M. Bushman, and F. P. Vasvari (2008). The debt-contracting value of accounting information and loan syndicate structure. *Journal of Accounting Research 46*(2), 247–287.

Beatty, A., P. G. Berger, and J. Magliolo (1995). Motives for forming research & development financing organizations. *Journal of Accounting & Economics 19*, 411–442.

Beatty, A., I. D. Dichev, and J. Weber (2002). The role and characteristics of accounting-based performance pricing in private debt contracts. Working Paper.

Beatty, A. and J. Weber (2005). The effects of debt contracting on voluntary accounting method changes. *The Accounting Review 78*(1), 119–142.

Beaver, W. H., C. Shakespeare, and M. T. Soliman (2006). Differential properties in the ratings of certified versus non-certified bond-rating agencies. *Journal of Accounting & Economics 42*(3), 303–334.

Becker, B. and T. Milbourn (2010). How did increased competition affect credit ratings? Working Paper.

Benmelech, E. and J. Dlugosz (2009). The alchemy of CDO credit ratings. *Journal of Monetary Economics 56*(5), 617–634.

Bessembinder, H., K. M. Kahle, W. F. Maxwell, and D. Xu (2009). Measuring abnormal bond performance. *Review of Financial Studies 22*(10), 4219–4258.

Bhanot, K. and A. S. Mello (2006). Should corporate debt include a rating trigger? *Journal of Financial Economics 79*(1), 69–98.

Blume, M. E., F. Lim, and A. C. Mackinley (2006). The declining credit quality of U.S. corporate debt: Myth or reality? *Journal of Finance 53*(4), 1389–1413.

Bolton, P., X. Freixas, and J. Shapiro (2010). The credit ratings game. Working Paper.

Campbell, J. Y. and G. B. Taksler (2003). Equity volatility and corporate bond yields. *Journal of Finance 58*(6), 2321–2350.

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

Chen, L., D. A. Lesmond, and J. Wei (2007). Corporate yield spreads and bond liquidity. *Journal of Finance 62*(1), 119–149.

Cheng, M. and M. Neamtiu (2009). An empirical analysis of changes in credit rating properties: Timeliness, accuracy and volatility. *Journal of Accounting and Economics 47*(1-2), 108–130.

Coval, J. D., J. W. Jurek, and E. Stafford (2009). The economics of structured finance. *Journal of Economic Perspectives 23*(1), 3–25.

Covitz, D. M. and P. Harrison (2003). Testing conflicts of interest at bond ratings agencies with market anticipation: Evidence that repuation incentives dominate. Working Paper.

Dichev, I. D. and D. J. Skinner (2002). Large-sample evidence on the debt covenant hypothesis. *Journal of Accounting Research 40*(4), 1091–1123.

Doyle, J. (2008). Credit risk measurement and pricing in performance-based debt contracts. Unpublished dissertation.

Ederington, L. H. (1985). Classification models and bond ratings. *The Financial Review 20*(4), 237 – 262.

Elton, E. J., M. J. Gruber, D. Agrawal, and C. Mann (2001). Explaining the rate spread on corporate bonds. *Journal of Finance 56*(1), 247–278.

Engel, E., M. Erickson, and E. Maydew (1999). Debt-equity-hybrid securities. *Journal of Accounting Research 37*(2), 249–274.

Ertimur, Y., V. Muslu, and F. Zhang (2011). Why are recommendations optimistic? evidence from analysts' coverage initiations. *Review of Accounting Studies forthcoming*(forthcoming), forthcoming.

Gorton, G. and A. Winton (2003). Financial intermediation. In G. Constantinides, M. Harris, and R. Stulz (Eds.), *Handbook of the Economics of Finance* (1 ed.), Volume 1, Part 1, Chapter 08, pp. 431–552. Elsevier.

Griffin, J. M. and D. Y. Tang (2010). Did subjectivity play a role in CDO credit ratings? Working Paper.

Harris, M. and A. Raviv (1991). The theory of capital structure. *Journal of Finance 46*(1), 297–355.

He, J. J., J. Q. Qian, and P. E. Strahan (2010). Credit ratings and the evolution of the mortgage-backed securities market. Working Paper.

Horrigan, J. O. (1966). The determination of long-term credit standing with financial ratios. *Journal of Accounting Research 4*, 44–62.

Jensen, M. C. and W. H. Meckling (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics 3*(4), 305–360.

Jorion, P. and G. Zhang (2007). Good and bad credit contagion: Evidence from credit default swaps. *Journal of Financial Economics 84*(3), 860–883.

Kaplan, R. S. and G. Urwitz (1979). Statistical models of bond ratings: A methodological inquiry. *Journal of Business 52*(2), 231–61.

Klein, B. and K. B. Leffler (1981). The role of market forces in assuring contractual performance. *Journal of Political Economy 89*(4), 615–41.

Kraft, P. (2010). Rating agency adjustments to GAAP financial statements and their effect on ratings and bond yields. Working Paper.

Larcker, D. F. and S. A. Richardson (2004). Fees paid to audit firms, accrual choices, and corporate governance. *Journal of Accounting Research 42*(3), 625–658.

Leftwich, R. (1983). Accounting information in private markets: Evidence from private lending agreements. *The Accounting Review 58*(1), 23–42.

Lin, H. and M. F. McNichols (1998). Underwriting relationships, analysts' earnings forecasts and investment recommendations. *Journal of Accounting and Economics 25*(1), 101–127.

Mason, J. R. and J. Rosner (2007). Where did the risk go? How misapplied bond ratings cause mortgage backed securities and collateralized debt obligation market disruptions. Working Paper.

Mills, L. F. and K. J. Newberry (2005). Firms' off-balance sheet and hybrid debt financing: Evidence from their book-tax reporting differences. *Journal of Accounting Research 43*(2), 251–282.

Moody's (2001). The unintended consequences of rating triggers.

Moody's (2006). Moody's approach to global standard adjustments in the analysis of financial statements for non-financial corporations - part I.

Moody's (2007). Financial reporting and credit ratings, CARE conference.

Nicholls, C. C. (2005). Public and private uses of credit ratings. In *Credit Rating Agencies: Need for Reform in Canada?* Capital Markets Institute (cmi).

Opp, C. C., M. M. Opp, and M. Harris (2010). Rating agencies in the face of regulation: Rating inflation and regulatory arbitrage. Working Paper.

Partnoy, F. (1999). The Siskel and Ebert of financial markets?: Two thumbs down for the credit rating agencies. *Washington University Law Quarterly 77*(3), 619–712.

Partnoy, F. (2006). How and why rating agencies are not like other gatekeepers. In Y. Fuchita and R. E. Litan (Eds.), *San Diego Legal Studies Research Paper Series No. 07-46*. Brookings Institution Press and the Nomura Institute of Capital Market Research.

Petersen, M. A. (2004). Information: Hard and soft. Working Paper.

Pinches, G. E. and K. A. Mingo (1973). A multivariate analysis of industrial bond ratings. *Journal of Finance 28*(1), 1–18.

Pogue, T. F. and R. M. Soldofsky (1969). What's in a bond rating. *The Journal of Financial and Quantitative Analysis 4*(2), 201–228.

Rajan, R. G. and L. Zingales (1995). What do we know about capital structure? Some evidence from international data. *Journal of Finance 50*(5), 1421–1460.

Rajan, U., A. Seru, and V. Vig (2010). The failure of models that predict failure: Distance, incentives and default. Working Paper.

SEC (2003). Report on the role and function of credit rating agencies in the operation of the securities markets.

Shapiro, C. (1983). Premiums for high quality products as returns to reputations. *The Quarterly Journal of Economics 98*(4), 659–680.

Smith, C. W. and J. B. Warner (1979). On financial contracting: an analysis of bond covenants. *Journal of Financial Economics 7*, 117–161.

Standard and Poor's (2006). Corporate ratings criteria.

Standard and Poor's (2008). Evaluating liquidity triggers in insurance enterprises.

Standard and Poor's (2009). Standard & poor's rating services U.S. ratings fee disclosure.

Stein, J. C. (2002). Information production and capital allocation: Decentralized versus hierarchical firms. *Journal of Finance 57*(5), 1891–1921.

Strausz, R. (2005). Honest certification and the threat of capture. *Journal of Industrial Organization 23*(1-2), 45–62.

Wakeman, L. M. (1984). The real function of bond rating agencies. In M. C. Jensen and C. W. Smith (Eds.), *The Modern Theory of Corporate Finance*. New York, N.Y.: North-Holland Publishing Company.

Watts, R. and J. Zimmerman (1986). *Positive Accounting Theory*. Englewood Cliffs, NJ: Prentice Hall.

West, R. R. (1970). An alternative approach to predicting corporate bond ratings. *Journal of Accounting Research 8*(1), 118–125.

Appendix A
Variable definitions

Variables	Description
Firm characteristics	
Rating	Long-term Moody's rating on filing date
TA	Total assets
Rev	Revenues
Market cap	Market value of equity
leverage	Ratio of total debt to total assets
coverage_w	Ratio of operating profit to interest expense, winsorized at 1%
opmargin_w	Ratio of operating profit to revenues, winsorized at 1%
roa	Ratio of operating profit to total assets
tangibility	Ratio of inventory and net PPE to total assets
quick_w	Ratio of cash, marketable securities, and accounts receivable to current liabilities, winsorized at 1%
current_w	Ratio of current assets to current liabilities, winsorized at 1%
M2B	Ratio of market value of equity to book value of equity
Rating agency adjustments	
OFFBS	Adjusted total debt less reported total debt, divided by total assets
SOFT	Soft adjustment, difference between implied rating from adjusted financials and actual rating
HARD	Hard adjustment, difference between implied rating from reported financials and implied rating from adjusted financials
TOTAL	Total adjustment, difference between implied rating from reported financials and actual rating
Loan characteristics (for each issuer-year with active facility)	
PPfeature	Indicator = 1 if issuer-year has a facility that includes a performance pricing clause
PPrating	Indicator = 1 if issuer-year has a facility that includes a performance pricing clause based on a rating
PPratio	Indicator = 1 if issuer-year has a facility that includes a performance pricing clause based on an accounting ratio
PPratio_accg	Indicator = 1 if issuer-year has a facility that includes a performance pricing clause based on an accounting ratio (excluding user conditions)
CovAccg	Indicator = 1 if loan has an accounting-based covenant
Hybrid	Indicator = 1 if issuer-year has facilities with both performance pricing based on ratings and accounting ratios
Deal amount	Deal amount in millions USD (total for issuer-year)
Facility maturity	Facility maturity (average for issuer-year)
Allindrawn spread	Amount the borrower pays in basis points over LIBOR for each dollar drawn down [sum of the loan spread and any annual (or facility) fee]
Secured	Indicator = 1 if facility is secured
PP_increase	Indicator = 1 if issuer-year has performance pricing clause with initial interest rate equal to minimum interest rate in grid
PP_decrease	Indicator = 1 if issuer-year has performance pricing clause with initial interest rate equal to maximum interest rate in grid
PP_utroque	Indicator = 1 if issuer-year has performance pricing clause with initial interest rate between maximum and minium interest rate in grid
PPrating_up	Indicator = 1 if issuer-year is classified as PP_increase or PP_utroque
MaxLessInitial	The number of basis points between the rate charged on the contract at the inception of the loan agreement and the maximum rate in the performance pricing grid
InitiallessMin	The number of basis points between the rate charged on the contract at the inception of the loan agreement and the minimum rate in the performance pricing grid
Adverse shocks (Trace)	
Shock_ret	Tenth percentile of daily bond return by issuer-year-bond
Shock_ret_w	Tenth percentile of daily bond return by issuer-year-bond (return based on price weighted by trading volume)
Bond characteristics (FISD)	
Yield spread	Difference between offering yield and yield on a comparable treasury security (in basis points)
LN_treasury_spread	Logarithm of yield spread
Maturity	Time till maturity in years
Offering amount	Par value of debt initially offered
Senior and secured	Indicator =1 if the bond is senior and secured

Appendix B
Illustration of rating process

3M as of 12/31/2007	Weight	As reported	As adjusted
Factor 1: Business profile			
Product Diversity	5.0%	Aa	Aa
Customer Diversity	5.0%	Aaa	Aaa
Regional Diversity	5.0%	Aa	Aa
Market Position	5.0%	Aaa	Aaa
End-Market Diversity	5.0%	Aaa	Aaa
Factor 2: Size and stability			
Revenues (billions USD)	5.0%	$24.46	$24.46
Stability of Revenue Growth (STDEV)	5.0%	1.76%	1.76%
Factor 3: Cost position and profitability			
EBITA Margin (3-year Average)	5.0%	25.03%	22.49%
ROA (EBITA / Av. Assets) (3-year Average)	5.0%	26.61%	24.11%
Factor 4: Financial policy			
Debt / Book Capital (3-yr average)	5.0%	24.82%	37.40%
Debt / EBITDA (3-yr average)	10.0%	0.53x	0.95x
Liquidity Assessment	10.0%	A	A
Factor 5: Financial strength			
EBITDA / Interest Expense (3-year Average)	10.0%	46.28x	18.78x
FFO / Debt (3-year Average)	10.0%	120.28%	71.09%
FCF / Debt (3-year Average)	10.0%	48.50%	30.13%
Indicated Rating (reported)		Aa1	
Indicated Rating (adjusted)			Aa2

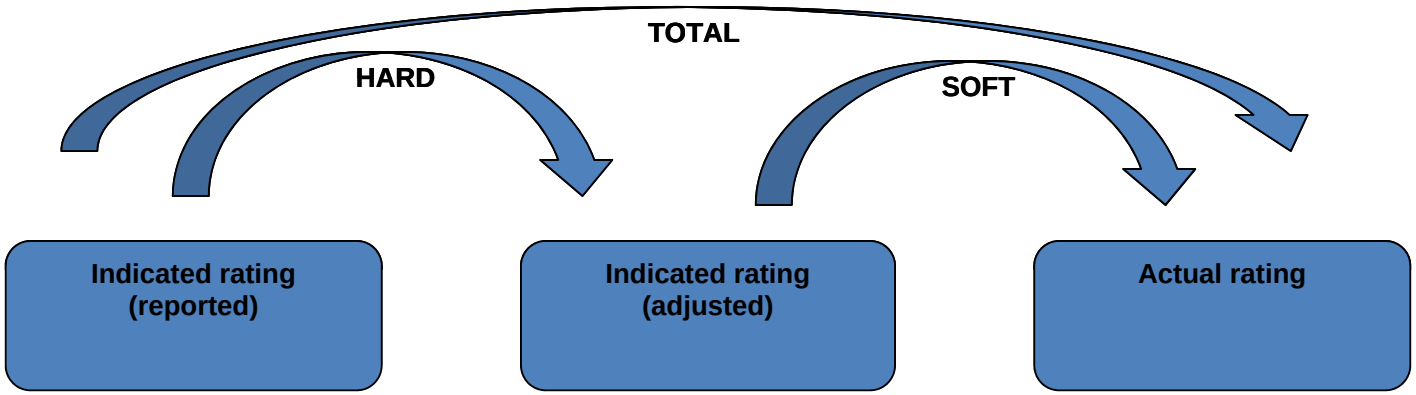
Rating	Letter	Numeric
Indicated Rating (reported)	Aa1	2
Indicated Rating (adjusted)	Aa2	3
Actual rating	Aa1	2
HARD		-1
SOFT		1
TOTAL		0

Source: Moody's Financial Metrics

Appendix C
Shock analysis - hypothetical example

Firm type:	**PPrating firm**	**PPratio firm 1**	**PPratio firm 2**
Shock, gross	-100	-100	-70
If treatment is random			
Shock, net	-100	-100	-70
RA adjustment	X	X	Y<X
If PPrating firm is better at dealing with shock (self-selection)			
Shock, net	-70	-100	-70
RA adjustment	Y	X	Y

Figure 1
Rating process (Moody's)



- Reported financial statements
- Nonfinancial statement data

- Adjusted financial statements
- Nonfinancial statement data

- Adjusted financial statements
- Nonfinancial statement data
- Qualitative factors

Table 1

Sample summary statistics

The table reports the statistics for the FMDS sample, FMDS-Trace sample and FMDS-FISD sample. Industries are classified according to Moody's scheme. Shock_ret equals the tenth percentile of daily bond return by issuer-year-bond. Shock_ret_w equals the tenth percentile of daily bond return by issuer-year bond (return based on price weighted by trading volume).

Panel A

No. observations	FMDS	Trace	FISD
N (issuers)	1,193	752	697
N (issuer years)	6,196	2,822	1,507
N (all obs)	6,196	7,940	2,830

Year	FMDS	Trace	FISD
2002	836	54	315
2003	892	180	278
2004	943	375	209
2005	976	578	198
2006	917	569	215
2007	875	564	193
2008	757	502	99
Total	6,196	2,822	1,507

LT issuer rating	FMDS	Pprating	Ppratio
AAA	36	8	6
AA	107	22	12
A	854	515	245
BBB	1,723	1,293	1,195
BB	1,758	519	1,134
B	1,507	180	124
CCC	194	15	4
CC	13	0	1
C	4	0	0
Total	6,196	2,552	2,721

Industries (top 25)	FMDS
Energy	11.3%
Electric Utilities	8.9%
Manufacturing	7.8%
Retail	7.3%
Services	6.7%
Media	5.6%
Consumer Products	5.2%
Chemicals	4.5%
Healthcare	4.2%
Technology	4.0%
Metals, Mining & Steel	2.7%
Automotive	2.7%
Telecommunications	2.4%
Gaming / Lodging	2.4%
Aerospace / Defense	2.3%
Pharmaceuticals	2.3%
Homebuilding	1.7%
Forest Products	1.6%
Restaurants	1.6%
Packaging	1.4%
Wholesale Distribution	1.2%
Wholesale Power	1.2%
Apparel	1.2%
Rail Roads & Trucking	1.1%
Agriculture	1.1%

Panel B	mean	min	p50	max	N
FMDS-Trace (Excluding hybrids and PP_decrease)					
Adverse shock (returndaily_pct10)					
Shock_ret	-1.2%	-41.0%	-0.9%	20.0%	5,459
Shock_ret_w	-1.2%	-41.0%	-0.9%	20.0%	5,459
FMDS-FISD					
Offering date characteristics: Spreads and issue-specific controls					
treasury spread (bps)	240.0	6.0	185.0	1,654.0	1,544
LN_treasury_spread	5.2	1.8	5.2	7.4	1,544
Maturity (years)	12.0	1.5	10.0	60.0	1,544
offering_amt (mil)	476.7	25.0	350.0	5,000.0	1,544
SeniorSecured	0.1	0.0	0.0	1.0	1,544

Table 1

Sample summary statistics

The table reports the statistics for the FMDS sample. OFFBS equals adjusted total debt less reported total debt, divided by total assets. SOFT (soft adjustment) equals the difference between implied rating from adjusted financials and actual rating. HARD (hard adjustment) equals the difference between implied rating from reported financials and implied rating from adjusted financials. TOTAL (total adjustment) equals the difference between implied rating from reported financials and actual rating. CovAccg equals 1 if loan has an accounting-based covenant. Shock_ret equals the tenth percentile of daily bond return by issuer-year bond. Shock_ret_w equals the tenth percentile of daily bond return by issuer-year bond (return based on price weighted by trading volume).

Panel C	**FMDS**		**PPrating=1**		**PPratio=1**	
	mean	**p50**	**mean**	**p50**	**mean**	**p50**
Firm characteristics (millions USD)						
TA	8,789	2,925	11,236	5,208	3,505	1,481
Rev	7,611	2,410	9,553	4,407	3,370	1,259
Market cap	12,957	3,783	14,740	6,815	4,177	1,869
Ratios						
leverage	0.38	0.33	0.30	0.28	0.46	0.40
coverage_w	7.90	3.40	9.50	4.80	5.90	2.30
opmargin_w	0.10	0.10	0.11	0.11	0.08	0.08
roa	0.07	0.08	0.08	0.08	0.06	0.07
tangibility	0.46	0.46	0.47	0.47	0.45	0.44
quick	0.94	0.81	0.88	0.77	1.00	0.89
current	1.60	1.40	1.60	1.40	1.80	1.60
M2B	4.80	3.20	4.10	3.30	7.90	3.10
Rating agency adjustment for off-balance sheet debt (% of total assets)						
OFFBS	17.0%	9.2%	14.0%	8.6%	21.0%	10.0%
Implied rating agency adjustments (notches)						
HARD	-0.41	0.00	-0.52	0.00	-0.27	0.00
SOFT	-0.55	-1.00	-0.23	0.00	-1.10	-1.00
TOTAL	-0.96	-1.00	-0.75	-1.00	-1.30	-1.00
Loan characteristics						
Deal amount (millions USD)	2,086	1,000	2,644	1,425	1,905	950
Facility maturity (months)	63	60	60	60	67	66
Allindrawn spread (bps)	161.0	145.0	100.0	74.0	226.0	225.0
CovAccg	0.81	1.00	0.95	1.00	0.98	1.00
Adverse return (Shock_ret)						
Shock_ret	-1.2%	-0.9%	-1.1%	-0.9%	-1.4%	-1.1%
Shock_ret_w	-1.2%	-0.9%	-1.1%	-0.8%	-1.4%	-1.0%

Table 2

Performance pricing by year and type

This table reports the statistics for the FMDS sample. PPfeature equals 1 if issuer year has a facility that includes a performance pricing clause. PPrating equals 1 if issuer year has a facility that includes a performance pricing clause based on a rating. PPratio equals 1 if issuer year has a facility that includes a performance pricing clause based on an accounting ratio (including user conditions). Ppratio_accg equals 1 if issuer year has a facility that includes a performance pricing clause based on an accounting ratio (excluding user conditions). Hybrid equals 1 if issuer year has facilities with both performance pricing based on ratings and accounting ratios. CovAccg equals 1 if loan has an accounting-based covenant. PP_increase equals 1 if issuer year has performance pricing clause with initial interest rate equal to minimum interest rate in grid. PP_decrease equals 1 if issuer year has performance pricing clause with initial interest rate equal to maximum interest rate in grid. PP_utroque equals 1 if issuer year has performance pricing clause with initial interest rate between maximum and minium interest rate in grid. MaxLessInitial equals the number of basis points between the rate charged on the contract at the inception of the loan agreement and the maximum rate in the performance pricing grid. InitiallessMin equals the number of basis points between the rate charged on the contract at the inception of the loan agreement and the minimum rate in the performance pricing grid.

Panel A		**PPfeature=1**		**PPrating=1**		**PPratio=1**		**PPratio_accg=1**		**Hybrid=1**		**CovAccg=1**	
Year	**Total obs**	**N**	**Pct of total**	**N**	**Pct of Ppfeat**	**N**	**Pct of Ppfeat**	**N**	**Pct of Ppfeat**	**N**	**Pct of Ppfeat**	**N**	**Pct of Ppfeat**
2002	836	603	72%	321	53%	340	56%	334	55%	58	10%	622	74%
2003	892	653	73%	315	48%	385	59%	368	56%	47	7%	691	77%
2004	943	733	78%	367	50%	424	58%	397	54%	58	8%	766	81%
2005	976	781	80%	398	51%	451	58%	411	53%	68	9%	820	84%
2006	917	749	82%	401	54%	422	56%	373	50%	74	10%	767	84%
2007	875	708	81%	395	56%	388	55%	337	48%	75	11%	724	83%
2008	757	604	80%	355	59%	311	51%	269	45%	62	10%	612	81%
Total	6,196	4,831	78%	2,552	53%	2,721	56%	2,489	52%	442	9%	5,002	81%

Panel B

Performance pricing - by direction (proportion)

	PPrating	**PPratio**
PP_increase	12%	19%
PP_decrease	14%	56%
PP_utroque	90%	66%

Sensitivity to interest rate (bps over Libor)

	mean	**min**	**max**
MaxLessInitial	44	0	743
InitiallessMin	26	0	425

Table 3
Correlation matrix

This table reports the Spearman rank correlation coefficients for the FMDS sample. OFFBS equals adjusted total debt less reported total debt, divided by total assets. SOFT (soft adjustment) equals the difference between implied rating from adjusted financials and actual rating. HARD (hard adjustment) equals the difference between implied rating from reported financials and implied rating from adjusted financials. TOTAL (total adjustment) equals the difference between implied rating from reported financials and actual rating. PPrating equals 1 if issuer year has a facility that includes a performance pricing clause based on a rating. PPratio equals 1 if issuer year has a facility that includes a performance pricing clause based on an accounting ratio. The * denotes significance at the 5% level.

FMDS (obs=6,196)		(1)	(2)	(3)	(4)	(5)	(6)	(7)
OFFBS	(1)	1.0000						
PPrating	(2)	**-0.0594***	1.0000					
PPratio	(3)	**0.1033***	-0.4485*	1.0000				
ln(revenues)	(4)	0.0667*	0.3688*	-0.4147*	1.0000			
leverage	(5)	-0.0690*	-0.2609*	0.2966*	-0.4160*	1.0000		
coverage_w	(6)	-0.0277*	0.2494*	-0.2515*	0.3487*	-0.5998*	1.0000	
opmargin_w	(7)	-0.3286*	0.1186*	-0.1532*	-0.0406*	-0.0555*	0.5366*	1.0000
tangibility	(8)	-0.1294*	0.0287*	-0.0720*	0.0151*	0.1097*	-0.0358*	0.0595*

Subset (obs=1,147)		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
PPrating	(1)	1.0000									
PPratio	(2)	-0.4672*	1.0000								
OFFBS	(3)	**-0.0279***	0.0315*	1.0000							
HARD	(4)	**-0.1344***	0.1580*	-0.3091*	1.0000						
SOFT	(5)	**0.1557***	-0.2610*	-0.0601*	-0.0538*	1.0000					
TOTAL	(6)	**0.0897***	-0.1662*	-0.1936*	0.4015*	0.8673*	1.0000				
ln(revenues)	(7)	0.4168*	-0.4504*	0.0972*	-0.1677*	0.0739*	-0.0113	1.0000			
leverage	(8)	-0.2511*	0.3313*	-0.0083	0.3007*	0.0136	0.1635*	-0.3959*	1.0000		
coverage_w	(9)	0.2936*	-0.3271*	-0.0971*	-0.2399*	-0.0531*	-0.1669*	0.3977*	-0.6669*	1.0000	
opmargin_w	(10)	0.1319*	-0.1580*	-0.3550*	-0.0274*	-0.0135	-0.0254*	-0.0124	-0.1664*	0.5840*	1.0000
tangibility	(11)	-0.0844*	0.0922*	-0.1633*	0.0228*	0.1265*	0.1296*	-0.0902*	0.1116*	-0.0434*	0.0213*

Table 4
Regression analysis

Panel A

The estimates are for the OLS (columns 1-4) and ordered probit (columns 5-16) parameters using the FMDS sample, conditional on having PPfeature and excluding hybrids. OFFBS equals adjusted total debt less reported total debt, divided by total assets. SOFT (soft adjustment) equals the difference between implied rating from adjusted financials and actual rating. HARD (hard adjustment) equals the difference between implied rating from reported financials and implied rating from adjusted financials. TOTAL (total adjustment) equals the difference between implied rating from reported financials and actual rating. PPrating equals 1 if issuer year has a facility that includes a performance pricing clause based on a rating. Robust *t* - and z-statistics in brackets. Standard errors clustered by firm. Industry fixed effects for utilities and energy. The + indicates significance at 10%; the * significance at 5%; the ** significance at 1%.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Regression type	OLS	OLS	OLS	OLS	Oprobit	Oprobit	Oprobit	Oprobit	Oprobit	Oprobit	Oprobit	Oprobit	Oprobit	Oprobit	Oprobit	Oprobit
Dependant variable	OFFBS	OFFBS	OFFBS	OFFBS	SOFT	SOFT	SOFT	SOFT	HARD	HARD	HARD	HARD	TOTAL	TOTAL	TOTAL	TOTAL
Year fixed effects	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No
PPrating	**-0.070****	**-0.065****	**-0.066****	**-0.065****	**1.124****	**1.121****	**1.118****	**1.134****	-0.212+	**-0.215+**	**-0.215+**	-0.193	**0.939****	**0.937****	**0.932****	**0.960****
	[3.29]	**[3.02]**	**[3.04]**	**[3.00]**	**[7.47]**	**[7.96]**	**[7.98]**	**[8.11]**	**[1.72]**	[1.84]	[1.84]	[1.62]	**[6.39]**	**[6.83]**	**[6.79]**	**[7.12]**
ln(revenues)	0.003	0.014*	0.016*	0.013*	-0.199**	-0.169**	-0.185**	-0.164**	-0.004	-0.022	-0.018	-0.029	-0.186**	-0.166**	-0.182**	-0.165**
	[0.49]	[2.17]	[2.31]	[2.02]	[3.56]	[3.62]	[3.93]	[3.55]	[0.07]	[0.54]	[0.46]	[0.74]	[3.25]	[3.49]	[3.83]	[3.52]
leverage	-0.102	0.074	0.060	0.073	0.429	0.543*	0.725**	0.574*	1.592**	1.352**	1.326**	1.380**	1.087**	1.065**	1.209**	1.103**
	[1.53]	[0.78]	[0.66]	[0.78]	[1.36]	[2.15]	[2.98]	[2.31]	[5.37]	[5.65]	[5.61]	[5.73]	[3.18]	[4.05]	[4.71]	[4.24]
coverage_w	0.001	0.001		0.001	-0.008*	-0.010**		-0.010**	0.001	0.002		0.002	-0.007+	-0.009**		-0.009**
	[1.08]	[1.35]		[1.36]	[2.07]	[2.77]		[2.93]	[0.47]	[0.58]		[0.55]	[1.96]	[2.61]		[2.76]
opmargin_w	-0.223**	-0.250**	-0.219**	-0.241**	-0.859+	-0.729	-0.968*	-0.698	0.059	0.071	0.112	0.145	-0.713	-0.623	-0.838+	-0.564
	[5.06]	[5.53]	[5.69]	[5.42]	[1.68]	[1.51]	[2.03]	[1.45]	[0.17]	[0.23]	[0.37]	[0.48]	[1.35]	[1.28]	[1.73]	[1.16]
tangibility	0.145**	0.199**	0.202**	0.200**	0.331	0.533*	0.468+	0.612*	-0.058	-0.294	-0.283	-0.276	0.247	0.351	0.288	0.437+
	[3.52]	[4.40]	[4.45]	[4.44]	[1.19]	[2.12]	[1.89]	[2.44]	[0.23]	[1.25]	[1.21]	[1.17]	[0.86]	[1.39]	[1.15]	[1.73]
quick_w	-0.055**				-0.326**				0.151+				-0.249**			
	[4.64]				[3.81]				[1.68]				[2.84]			
M2B	0.000				0.001**				0.000				0.001**			
	[0.35]				[7.44]				[0.51]				[5.68]			
Constant	0.206+	-0.102	-0.114	-0.062												
	[1.88]	[0.87]	[0.95]	[0.55]												
Observations	3,787	4,389	4,389	4,389	747	842	842	842	748	846	846	846	743	838	838	838
(Pseudo) R-squared	0.110	0.100	0.100	0.100	0.067	0.057	0.052	0.053	0.040	0.045	0.045	0.043	0.055	0.049	0.045	0.045

Table 4 (continued)
Regression analysis

Panel B

The estimates are for the OLS (columns 1-4) and ordered probit (columns 5-16) parameters using the FMDS sample, excluding hybrids. OFFBS equals adjusted total debt less reported total debt, divided by total assets. SOFT (soft adjustment) equals the difference between implied rating from adjusted financials and actual rating. HARD (hard adjustment) equals the difference between implied rating from reported financials and implied rating from adjusted financials. TOTAL (total adjustment) equals the difference between implied rating from reported financials and actual rating. PPrating equals 1 if issuer year has a facility that includes a performance pricing clause based on a rating. Robust t- and z-statistics in brackets. Standard errors clustered by firm. Industry fixed effects for utilities and energy. The + indicates significance at 10%; the * significance at 5%; the ** significance at 1%.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Regression type	OLS	OLS	OLS	OLS	Oprobit	Oprobit	Oprobit	Oprobit	Oprobit	Oprobit	Oprobit	Oprobit	Oprobit	Oprobit	Oprobit	Oprobit
Dependant variable	OFFBS	OFFBS	OFFBS	OFFBS	SOFT	SOFT	SOFT	SOFT	HARD	HARD	HARD	HARD	TOTAL	TOTAL	TOTAL	TOTAL
Year fixed effects	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No
PPrating	**-0.032***	-0.024	**-0.026+**	**-0.024+**	**0.464****	**0.496****	**0.503****	**0.502****	-0.152	-0.155	**-0.164+**	-0.149	**0.385****	**0.413****	**0.419****	**0.419****
	[2.50]	[1.62]	[1.86]	[1.66]	**[4.20]**	**[4.53]**	**[4.54]**	**[4.55]**	**[1.50]**	**[1.58]**	**[1.68]**	[1.53]	**[3.55]**	**[3.87]**	**[3.88]**	**[3.89]**
ln(revenues)	-0.006	0.007	0.009	0.006	0.005	0.017	0.011	0.016	-0.012	-0.020	-0.011	-0.023	-0.009	-0.001	-0.007	-0.003
	[1.10]	[0.89]	[1.07]	[0.79]	[0.12]	[0.43]	[0.29]	[0.43]	[0.30]	[0.58]	[0.33]	[0.69]	[0.21]	[0.03]	[0.17]	[0.08]
leverage	-0.045	0.177	0.162	0.175	0.037	0.241	0.276	0.263	1.468**	1.297**	1.249**	1.317**	0.652*	0.748**	0.779**	0.771**
	[0.84]	[1.28]	[1.22]	[1.27]	[0.15]	[1.14]	[1.32]	[1.24]	[5.70]	[6.14]	[6.07]	[6.17]	[2.39]	[3.28]	[3.48]	[3.36]
coverage_w	0.001	0.001		0.001	0.000	-0.002		-0.002	0.003	0.003		0.003	0.000	-0.002		-0.002
	[1.24]	[1.51]		[1.53]	[0.15]	[0.52]		[0.54]	[1.13]	[1.10]		[1.17]	[0.14]	[0.55]		[0.51]
opmargin_w	-0.244**	-0.260**	-0.223**	-0.253**	-0.890+	-0.790+	-0.839*	-0.684	-0.007	-0.081	-0.002	-0.006	-0.755	-0.709	-0.758+	-0.579
	[6.08]	[6.24]	[6.07]	[6.19]	[1.88]	[1.78]	[2.00]	[1.56]	[0.02]	[0.29]	[0.01]	[0.02]	[1.56]	[1.58]	[1.77]	[1.30]
tangibility	0.165**	0.204**	0.206**	0.204**	0.304	0.431+	0.424+	0.499*	-0.070	-0.259	-0.251	-0.247	0.183	0.241	0.235	0.317
	[4.34]	[4.95]	[4.97]	[4.95]	[1.25]	[1.95]	[1.93]	[2.25]	[0.31]	[1.27]	[1.22]	[1.20]	[0.74]	[1.08]	[1.06]	[1.40]
quick_w	-0.045**				-0.251**				0.058				-0.215**			
	[4.08]				[3.36]				[0.74]				[2.92]			
M2B	0.000				0.001**				0.000				0.001**			
	[0.55]				[6.57]				[0.19]				[5.52]			
Constant	0.294**	-0.030	-0.053	-0.021												
	[3.06]	[0.19]	[0.31]	[0.13]												
Observations	4,902	5,754	5,754	5,754	928	1,036	1,036	1,036	928	1,039	1,039	1,039	922	1,030	1,030	1,030
(Pseudo) R-squared	0.100	0.110	0.110	0.110	0.035	0.025	0.025	0.019	0.034	0.040	0.039	0.036	0.029	0.024	0.024	0.072

Table 5
Difference-in-difference analysis for rating thresholds

Panel A

The estimates are for the OLS (columns 1-2) and ordered probit (columns 3-8) model parameters using the FMDS sample, conditional on having PPfeature and excluding hybrids. OFFBS equals adjusted total debt less reported total debt, divided by total assets. SOFT (soft adjustment) equals the difference between implied rating from adjusted financials and actual rating. HARD (hard adjustment) equals the difference between implied rating from reported financials and implied rating from adjusted financials. TOTAL (total adjustment) equals the difference between implied rating from reported financials and actual rating. PPrating equals 1 if issuer year has a facility that includes a performance pricing clause based on a rating. BBBminus equals 1 if rating = BBB-, and 0 otherwise. P2 equals 1 if rating = P2, and 0 otherwise. The interaction term THRESHOLD*PPrating measures the diff-in-diff. Robust t- and z-statistics in brackets. Standard errors clustered by firm. Industry fixed effects for utilities and energy. + significant at 10%; * significant at 5%; ** significant at 1%.

	1	2	3	4	5	6	7	8
Regression type	OLS	OLS	Oprobit	Oprobit	Oprobit	Oprobit	Oprobit	Oprobit
Dependant variable	OFFBS	OFFBS	SOFT	SOFT	HARD	HARD	TOTAL	TOTAL
PPrating	-0.079**	-0.056*	1.158**	1.292**	-0.177	-0.051	0.991**	1.120**
	[3.55]	[2.11]	[7.51]	[4.74]	[1.32]	[0.22]	[6.55]	[4.44]
BBBminus	**-0.073***		0.204		0.154		0.290	
	[2.16]		[0.58]		[0.58]		[1.08]	
BBBminus*PPrating	**0.095***		-0.319		-0.292		-0.474	
	[2.58]		[0.78]		[0.94]		[1.40]	
P2		**-0.103***		**1.386****		**1.217****		**1.819****
		[2.14]		**[4.06]**		**[3.36]**		**[5.22]**
P2*PPrating		**0.149****		**-1.562****		**-1.340****		**-2.023****
		[2.68]		**[3.86]**		**[3.03]**		**[4.94]**
ln(revenues)	0.004	0.004	-0.200**	-0.168*	-0.005	-0.029	-0.188**	-0.176*
	[0.65]	[0.57]	[3.60]	[2.32]	[0.10]	[0.41]	[3.32]	[2.44]
leverage	-0.107	-0.121+	0.457	0.633	1.618**	1.958**	1.131**	1.468**
	[1.59]	[1.74]	[1.45]	[1.41]	[5.33]	[3.58]	[3.30]	[2.79]
coverage_w	0.001	0.000	-0.008*	-0.003	0.001	0.002	-0.008*	0.000
	[1.11]	[0.26]	[2.09]	[0.41]	[0.37]	[0.49]	[2.03]	[0.06]
opmargin_w	-0.220**	-0.195**	-0.890+	-0.867	0.029	0.050	-0.755	-0.701
	[5.01]	[3.16]	[1.73]	[1.22]	[0.08]	[0.11]	[1.43]	[0.98]
tangibility	0.143**	0.082+	0.336	0.419	-0.053	-0.368	0.257	0.099
	[3.51]	[1.71]	[1.20]	[0.91]	[0.21]	[0.94]	[0.89]	[0.20]
quick_w	-0.055**	-0.047**	-0.320**	-0.279+	0.156+	0.349+	-0.241**	-0.093
	[4.64]	[2.78]	[3.68]	[1.83]	[1.73]	[1.90]	[2.70]	[0.56]
M2B	0.000	0.000	0.001**	0.008	0.000	0.015	0.001**	0.019
	[0.33]	[1.21]	[7.59]	[0.69]	[0.55]	[1.19]	[5.82]	[1.36]
Constant	0.198+	0.186						
	[1.82]	[1.63]						
Observations	3,787	1,444	747	295	748	293	743	292
(Pseudo) R-squared	0.110	0.100	0.068	0.067	0.040	0.481	0.056	0.052

Table 5 (continued)
Difference-in-difference analysis for rating thresholds

Panel B

The estimates are for the OLS (columns 1-3) and ordered probit (columns 4-12) model parameters using the FMDS sample, excluding hybrids. OFFBS equals adjusted total debt less reported total debt, divided by total assets. SOFT (soft adjustment) equals the difference between implied rating from adjusted financials and actual rating. HARD (hard adjustment) equals the difference between implied rating from reported financials and implied rating from adjusted financials. TOTAL (total adjustment) equals the difference between implied rating from reported financials and actual rating. PPrating equals 1 if issuer year has a facility that includes a performance pricing clause based on a rating. BBBminus equals 1 if rating = BBB-, and 0 otherwise. P1 equals 1 if rating = P1, and 0 otherwise. P2 equals 1 if rating = P2, and 0 otherwise. The interaction term THRESHOLD*PPrating measures the diff-in-diff. Robust t- and z-statistics in brackets. Standard errors clustered by firm. Industry fixed effects for utilities and energy. The + indicates significance at 10%; the * significance at 5%; the ** significance at 1%.

	1	2	3	4	5	6	7	8	9	10	11	12
Regression type	OLS	OLS	OLS	Oprobit	Oprobit	Oprobit	Oprobit	Oprobit	Oprobit	Oprobit	Oprobit	Oprobit
Dependant variable	OFFBS	OFFBS	OFFBS	SOFT	SOFT	SOFT	HARD	HARD	HARD	TOTAL	TOTAL	TOTAL
PPrating	-0.038**	-0.027	-0.034*	0.487**	0.719**	0.533**	-0.142	-0.230	-0.104	0.415**	0.528**	0.436*
	[2.85]	[1.44]	[2.17]	[4.19]	[3.42]	[2.74]	[1.29]	[1.36]	[0.58]	[3.61]	[2.75]	[2.31]
BBBminus	**-0.036+**			0.448			-0.195			0.342		
	[1.74]			[1.59]			[0.79]			[1.54]		
BBBminus*PPrating	**0.055***			-0.452			0.084			-0.412		
	[2.13]			[1.34]			[0.29]			[1.40]		
P1		**-0.075****			**1.402****			0.029			**1.212****	
		[3.08]			**[4.70]**			[0.11]			**[4.55]**	
P1*PPrating		**0.048+**			**-0.937****			0.217			**-0.702***	
		[1.86]			**[3.01]**			[0.70]			**[2.46]**	
P2			-0.019			0.496			0.049			0.452
			[0.91]			[1.29]			[0.18]			[1.23]
P2*PPrating			**0.067****			-0.696			-0.183			-0.685+
			[2.63]			[1.63]			[0.55]			[1.67]
ln(revenues)	-0.005	0.006	0.002	0.004	-0.056	0.037	-0.011	0.003	0.005	-0.010	-0.058	0.021
	[1.03]	[1.01]	[0.31]	[0.08]	[0.93]	[0.70]	[0.29]	[0.06]	[0.10]	[0.23]	[1.04]	[0.39]
leverage	-0.048	-0.045	-0.026	0.077	-0.168	-0.384	1.458**	1.580**	1.589**	0.689*	0.590	0.373
	[0.89]	[0.80]	[0.50]	[0.32]	[0.57]	[1.37]	[5.62]	[3.57]	[3.60]	[2.47]	[1.47]	[1.02]
coverage_w	0.001	0.001	0.001	-0.001	-0.005	0.001	0.003	0.004	0.004	-0.001	-0.003	0.002
	[1.26]	[1.25]	[0.88]	[0.19]	[1.09]	[0.35]	[1.13]	[1.13]	[1.26]	[0.20]	[0.69]	[0.66]
opmargin_w	-0.243**	-0.209**	-0.243**	-0.875+	-1.100+	-0.663	-0.035	-0.278	-0.187	-0.752	-0.955+	-0.541
	[6.08]	[3.69]	[4.06]	[1.87]	[1.86]	[1.10]	[0.11]	[0.70]	[0.47]	[1.56]	[1.65]	[0.92]
tangibility	0.164**	0.164**	0.168**	0.310	0.758+	0.448	-0.072	-0.264	-0.318	0.188	0.441	0.146
	[4.34]	[3.26]	[3.30]	[1.27]	[1.95]	[1.20]	[0.31]	[0.76]	[0.93]	[0.75]	[1.11]	[0.37]
quick_w	-0.045**	-0.030*	-0.028+	-0.258**	-0.322*	-0.398**	0.064	0.334*	0.327*	-0.218**	-0.151	-0.222
	[4.07]	[2.01]	[1.88]	[3.47]	[2.52]	[3.13]	[0.80]	[2.31]	[2.26]	[2.97]	[1.11]	[1.63]
M2B	0.000	0.000	0.000	0.001**	-0.002	-0.001	0.000	0.000	0.000	0.001**	-0.002	-0.001
	[0.55]	[0.02]	[0.05]	[6.64]	[0.80]	[0.46]	[0.15]	[0.05]	[0.04]	[5.57]	[0.42]	[0.17]
Constant	0.292**	0.085	0.127									
	[3.04]	[0.85]	[1.28]									
Observations	4,902	2,046	2,046	928	398	398	928	396	396	922	394	394
(Pseudo) R-squared	0.100	0.110	0.100	0.034	0.065	0.041	0.035	0.044	0.042	0.029	0.040	0.022

Table 6
Regression analysis with adverse shocks

Panel A

The estimates are for the OLS (columns 1, 5) and ordered probit (columns 2-4, 6-8) model parameters using the FMDS-Trace sample, both conditional on having PPfeature and for total FMDS sample (always excluding hybrids). OFFBS equals adjusted total debt less reported total debt, divided by total assets. SOFT (soft adjustment) equals the difference between implied rating from adjusted financials and actual rating. HARD (hard adjustment) equals the difference between implied rating from reported financials and implied rating from adjusted financials. TOTAL (total adjustment) equals the difference between implied rating from reported financials and actual rating. PP_rating_up equals 1 if issuer year is classified as PP_increase or PP_utroque. Shock_ret equals the tenth percentile of daily bond return by issuer-year bond. The interaction term Shock_ret*PPrating_up measures the diff-in-diff. Robust t- and z-statistics in brackets. Standard errors clustered by firm. Industry fixed effects for utilities and energy. The + indicates significance at 10%; the * significance at 5%; the ** significance at 1%.

	FMDS				Conditional on PPfeature=1			
	1	2	3	4	5	6	7	8
Regression type	OLS	Oprobit	Oprobit	Oprobit	OLS	Oprobit	Oprobit	Oprobit
Dependant variable	**OFFBS**	**SOFT**	**HARD**	**TOTAL**	**OFFBS**	**SOFT**	**HARD**	**TOTAL**
PPrating_up	-0.003	-0.162	-0.283	-0.256	-0.031	**0.791***	-0.192	**0.629+**
	[0.21]	[1.01]	[1.44]	[1.52]	[1.62]	**[2.53]**	[0.82]	**[1.94]**
Shock_ret	**-0.924+**	**21.471****	**18.065****	**26.711****	-0.322	**21.062***	**16.122***	**25.165***
	[1.92]	**[3.62]**	**[3.19]**	**[4.37]**	[0.82]	**[2.07]**	[2.54]	**[2.56]**
Shock_ret*PPrating_up	0.817	**-21.209****	**-21.247****	**-27.830****	0.142	-16.463	**-18.834***	**-22.228+**
	[1.52]	**[2.64]**	**[2.73]**	**[3.35]**	[0.30]	[1.41]	**[2.36]**	**[1.93]**
ln(revenues)	-0.003	0.053	-0.029	0.043	0.002	-0.145	-0.073	-0.15
	[0.45]	[0.92]	[0.52]	[0.72]	[0.35]	[1.62]	[0.93]	[1.60]
leverage	0.008	0.382	1.015+	0.881+	-0.077	1.326*	1.378	1.950*
	[0.14]	[1.01]	[1.75]	[1.89]	[0.89]	[2.28]	[1.38]	[2.26]
coverage_w	-0.001**	0.001	0.006	0.004	-0.001**	0.002	0.004	0.004
	[3.44]	[0.26]	[1.52]	[1.17]	[2.69]	[0.31]	[0.80]	[0.80]
opmargin_w	-0.110*	-0.162	0.402	0.234	-0.099*	-0.495	0.862	0.196
	[2.27]	[0.26]	[0.81]	[0.41]	[2.05]	[0.69]	[1.58]	[0.30]
tangibility	0.097**	0.877**	0.003	0.756+	0.086*	1.128**	-0.053	0.947+
	[2.71]	[2.78]	[0.01]	[1.95]	[2.19]	[2.80]	[0.10]	[1.89]
Constant	0.118				0.078			
	[1.08]				[0.66]			
Observations	5,459	1,301	1,297	1,294	3,748	932	927	925
(Pseudo) R-squared	0.110	0.033	0.028	0.030	0.100	0.047	0.035	0.053

Table 6 (continued)
Regression analysis with adverse shocks

Panel B

The estimates are for the OLS (columns 1, 5) and ordered probit (columns 2-4, 6-8) model parameters using the FMDS-Trace sample, both conditional on having PPfeature and for total FMDS sample (always excluding hybrids). OFFBS equals adjusted total debt less reported total debt, divided by total assets. SOFT (soft adjustment) equals the difference between implied rating from adjusted financials and actual rating. HARD (hard adjustment) equals the difference between implied rating from reported financials and implied rating from adjusted financials. TOTAL (total adjustment) equals the difference between implied rating from reported financials and actual rating. PPrating_up equals 1 if issuer year is classified as PP_increase or PP_utroque. Shock_ret_w equals the tenth percentile of daily bond return by issuer-year bond (return based on price weighted by trading volume). The interaction term Shock_ret_w*PPrating_up measures the diff-in-diff. Robust t- and z-statistics in brackets. Standard errors clustered by firm. Industry fixed effects for utilities and energy. The + indicates significance at 10%; the * significance at 5%; the ** significance at 1%.

	FMDS				Conditional on PPfeature=1			
	1	2	3	4	5	6	7	8
Regression type	OLS	Oprobit	Oprobit	Oprobit	OLS	Oprobit	Oprobit	Oprobit
Dependant variable	**OFFBS**	**SOFT**	**HARD**	**TOTAL**	**OFFBS**	**SOFT**	**HARD**	**TOTAL**
PPrating_up	-0.003	-0.157	-0.266	-0.244	**-0.029**	**0.774***	-0.207	**0.606+**
	[0.17]	[1.00]	[1.37]	[1.46]	**[1.57]**	**[2.45]**	[0.91]	**[1.86]**
Shock_ret_w	**-1.003***	**20.038****	**17.862****	**25.432****	-0.469	**22.201***	**19.017****	**27.688****
	[2.05]	**[3.36]**	**[3.09]**	**[4.09]**	[1.10]	**[2.11]**	**[2.89]**	**[2.68]**
Shock_ret_w*PPrating_up	0.867	**-20.774****	**-19.657***	**-26.757****	0.261	-18.473	**-20.424***	**-24.843***
	[1.61]	**[2.62]**	**[2.57]**	**[3.22]**	[0.52]	[1.54]	**[2.55]**	**[2.05]**
ln(revenues)	-0.003	0.055	-0.029	0.045	0.002	-0.146	-0.075	-0.152
	[0.45]	[0.96]	[0.51]	[0.75]	[0.35]	[1.63]	[0.96]	[1.62]
leverage	0.008	0.397	1.035+	0.903+	-0.078	1.364*	1.428	2.010*
	[0.14]	[1.05]	[1.80]	[1.95]	[0.89]	[2.36]	[1.45]	[2.37]
coverage_w	-0.001**	0.001	0.006	0.004	-0.001**	0.002	0.004	0.004
	[3.44]	[0.27]	[1.53]	[1.19]	[2.68]	[0.34]	[0.83]	[0.86]
opmargin_w	-0.109*	-0.148	0.411	0.249	-0.098*	-0.494	0.859	0.194
	[2.26]	[0.24]	[0.83]	[0.44]	[2.03]	[0.69]	[1.58]	[0.30]
tangibility	0.097**	0.872**	0.001	0.750+	0.085*	1.116**	-0.061	0.934+
	[2.71]	[2.76]	[0.00]	[1.93]	[2.19]	[2.77]	[0.12]	[1.87]
Constant	0.117				0.076			
	[1.08]				[0.64]			
Observations	5,459	1,301	1,297	1,294	3,748	932	927	925
(Pseudo) R-squared	0.110	0.023	0.028	0.029	0.100	0.048	0.036	0.054

Table 6 (continued)
Regression analysis with adverse shocks

Panel C

The estimates are for the probit model parameters using the FMDS-Trace sample (excluding hybrids). OFFBS_delta equals 1 if OFFBS at fiscal-year-end is smaller than OFFBS at prior fiscal-year end and 0 if it is greater. SOFT_delta equals 1 if SOFT at fiscal-year-end is greater than SOFT at prior fiscal-year end and 0 if it is smaller. HARD_delta equals 1 if HARD at fiscal-year-end is greater than HARD at prior fiscal-year end and 0 if it is smaller. TOTAL_delta equals 1 if TOTAL at fiscal-year-end is greater than TOTAL at prior fiscal-year end and 0 if it is smaller. PPrating_up equals 1 if issuer-year is classified as PP_increase or PP_utroque. Shock_ret equals the tenth percentile of daily bond return by issuer-year bond. The interaction term Shock*PPrating_up measures the diff-in-diff. Robust z-statistics in brackets. Standard errors clustered by firm. Industry fixed effects for utilities and energy. The + indicates significance at 10%; the * significance at 5%; the ** significance at 1%.

	Bond returns				Bond returns, weighted by volume			
	1	2	3	4	5	6	7	8
Regression type	Probit	Probit	Probit	Probit	Probit	Probit	Probit	Probit
Dep.variable: ADJ_δ	**OFFBS_δ**	**SOFT_δ**	**HARD_δ**	**TOTAL_δ**	**OFFBS_δ**	**SOFT_δ**	**HARD_δ**	**TOTAL_δ**
PPrating_up	0.073	0.125	-0.258	0.027	0.073	0.099	-0.236	0.01
	[0.75]	[0.43]	[0.87]	[0.10]	[0.75]	[0.34]	[0.80]	[0.04]
Shock_ret	-2.736	12.123	**39.611****	**28.776****	-2.756	17.363	**38.775****	**31.432****
	[1.47]	[0.92]	**[3.18]**	**[2.72]**	[1.49]	[1.31]	**[3.00]**	**[2.92]**
Shock_ret*PPrating_up	2.28	-6.459	**-26.708+**	**-23.854+**	2.338	-9.628	**-25.817+**	**-26.395+**
	[0.69]	[0.40]	**[1.90]**	**[1.75]**	[0.72]	[0.60]	**[1.78]**	**[1.94]**
ln(revenues)	-0.023	0.025	0.047	0.087	-0.023	0.021	0.047	0.086
	[0.61]	[0.26]	[0.52]	[1.00]	[0.61]	[0.22]	[0.53]	[0.99]
leverage	0.442+	1.607*	0.765	1.367*	0.443+	1.681*	0.813	1.450*
	[1.84]	[2.30]	[1.22]	[2.38]	[1.85]	[2.38]	[1.29]	[2.49]
coverage_w	-0.004	0.007	0.01	0.006	-0.004	0.008	0.01	0.007
	[1.40]	[1.25]	[1.46]	[1.01]	[1.40]	[1.32]	[1.48]	[1.06]
opmargin_w	-0.497	0.093	-0.369	1.293	-0.498	0.066	-0.353	1.287
	[1.26]	[0.10]	[0.35]	[1.46]	[1.26]	[0.07]	[0.33]	[1.45]
tangibility	-0.689**	0.36	0.494	0.664	-0.689**	0.362	0.483	0.655
	[2.64]	[0.63]	[0.86]	[1.21]	[2.65]	[0.63]	[0.85]	[1.20]
Constant	-0.338	-0.891	0.029	-1.748	-0.337	-0.797	0.011	-1.737
	[0.53]	[0.53]	[0.02]	[1.17]	[0.53]	[0.47]	[0.01]	[1.17]
Observations	5,287	697	687	683	5,287	697	687	683
Pseudo R-squared	0.068	0.070	0.085	0.142	0.068	0.049	0.084	0.144

Table 7
Pricing regression

The estimates are for the OLS model parameters using the FISD sample. OFFBS equals adjusted total debt less reported total debt, divided by total assets. SOFT (soft adjustment) equals the difference between implied rating from adjusted financials and actual rating. HARD (hard adjustment) equals the difference between implied rating from reported financials and implied rating from adjusted financials. TOTAL (total adjustment) equals the difference between implied rating from reported financials and actual rating. PPrating equals 1 if issuer year has a facility that includes a performance pricing clause based on a rating. PPrating_up equals 1 if issuer year is classified as PP_increase or PP_utroque. The interaction term ADJ*PPrating measures the diff-in-diff. For further variable definitions, see Appendix A. Robust t-statistics in brackets. Standard errors clustered by firm. Industry fixed effects for utilities and energy. The + indicates significance at 10%; the * significance at 5%; the ** significance at 1%.

	PPrating				**PPrating_up**			
	1	2	3	4	5	6	7	8
Regression type	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Dependant variable	LN_spread	LN_spread	LN_spread	LN_spread	LN_spread	LN_spread	LN_spread	LN_spread
PPrating	-0.077	-0.118+	-0.158*	-0.116				
	[1.57]	[1.75]	[2.19]	[1.62]				
PPrating_up					-0.077	-0.143*	-0.181**	-0.148*
					[1.59]	[2.20]	[2.64]	[2.12]
OFFBS	**0.640****				**0.648****			
	[4.41]				**[4.42]**			
OFFBS*PPrating (_up)	**-0.436***				**-0.469***			
	[2.02]				**[2.25]**			
SOFT		**-0.066****				**-0.066****		
		[2.93]				**[3.01]**		
SOFT*PPrating (_up)		0.007				0.003		
		[0.21]				[0.08]		
HARD			0.014				0.034	
			[0.22]				[0.51]	
HARD*PPrating (_up)			-0.052				-0.084	
			[0.70]				[1.14]	
TOTAL				**-0.064****				**-0.060***
				[2.65]				**[2.52]**
TOTAL*PPrating (up)				0.009				-0.001
				[0.28]				[0.04]
Size	-0.217**	-0.215**	-0.226**	-0.215**	-0.218**	-0.218**	-0.230**	-0.217**
	[10.53]	[9.60]	[9.10]	[9.61]	[10.66]	[9.83]	[9.61]	[9.88]
leverage	0.721**	0.542	0.529	0.568	0.715**	0.546	0.552	0.581
	[4.70]	[1.47]	[1.40]	[1.46]	[4.70]	[1.47]	[1.48]	[1.48]
coverage_w	0	-0.001	-0.002	-0.001	0	-0.001	-0.001	-0.001
	[0.34]	[0.52]	[0.62]	[0.24]	[0.32]	[0.53]	[0.59]	[0.25]
opmargin_w	-1.164**	-1.094**	-1.348**	-1.062**	-1.167**	-1.129**	-1.394**	-1.101**
	[4.13]	[3.30]	[3.88]	[3.13]	[4.14]	[3.49]	[4.13]	[3.34]
roa	-0.458	-0.655	-0.232	-0.787	-0.457	-0.591	-0.148	-0.72
	[0.72]	[0.99]	[0.36]	[1.10]	[0.72]	[0.91]	[0.24]	[1.03]
Maturity	0	0.002	0.001	0.002	0	0.002	0.001	0.002
	[0.25]	[1.08]	[0.72]	[0.95]	[0.29]	[1.13]	[0.78]	[1.01]
offering_amt	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**
	[5.24]	[7.67]	[7.48]	[7.86]	[5.23]	[7.62]	[7.53]	[7.77]
SeniorSecured	0.026	0.581**	0.657**	0.568**	0.023	0.578**	0.657**	0.563**
	[0.34]	[3.83]	[4.27]	[3.88]	[0.30]	[3.77]	[4.17]	[3.77]
Constant	9.383**	8.190**	8.544**	8.345**	9.396**	8.251**	8.591**	8.389**
	[27.04]	[18.83]	[18.72]	[19.17]	[27.30]	[19.16]	[19.41]	[19.66]
Observations	1,544	304	303	303	1,544	304	303	303
R-squared	0.50	0.57	0.55	0.57	0.50	0.58	0.55	0.58