Do Rating Agencies Cater? Evidence from Rating-Based Contracts

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Abstract

I study the use of credit ratings in debt contracts. When debt contracts use credit ratings rather than accounting ratios to enforce restrictions on borrowers, rating changes directly impact borrowers' cash flows, there is likely to be increased pressure on rating agencies to cater to borrower incentives. On the other hand, ex post rating triggers increase credit risk. I investigate whether the explicit use of ratings in contracts affects rating agencies' incentives to issue more or less favorable credit risk assessments. I focus on performance pricing agreements which are now widespread in lending agreements and which use either ratings or accounting ratios to calibrate pricing grids. I examine whether, ceteris paribus, rating agencies are more likely to cater to borrowers when performance pricing agreements use ratings. I use data from

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Moody's Financial Metrics on rating agency adjustments to investigate this prediction and exploit an unexpected adverse shock to firms' credit risk as identification. In the cross-section and for firms experiencing adverse economic shocks, the rating agency adjustments are more favorable for PPrating firms. Rating agency adjustments are more unfavorable however for PPrating firms if their ratings are close to the investment grade cutoff or allow access to the commercial paper market. The rating agency adjustments for PPrating firms mostly capture default risk similarly to other firms.

1 Introduction

Credit agreements increasingly use public debt ratings as manifestations of issuers' credit risk to calibrate pricing. I investigate whether and how the use of credit ratings in debt contracts impacts the rating process. Rating agencies say that they are concerned with rating trigger effects arising from the contractual use of ratings (Standard and Poor's (2008), Moody's (2001)), but there is no empirical evidence whether the use of ratings in debt contracts leads to a more favorable or more conservative treatment in the rating process. When debt contracts use credit ratings to enforce restrictions on borrowers, rating changes directly impact borrowers' cash flows (Nicholls (2005)). The use of ratings in contracts creates incentives for issuers to demand understated estimates of credit risk, and borrowers are likely to exert increased pressure on rating agencies to cater to borrower incentives. Under the catering hypothesis, the explicit use of ratings in contracts affects rating agencies' incentives to issue more favorable credit risk assessments than justified by the underlying economics. On the other hand, the rating agency faces potential reputational costs which provide incentives to produce unbiased high-quality ratings. Under the alternative view, rating agencies may be fully aware of such contracts, and view them as risky because rating triggers can have destabilizing consequences for the issuers that use them as they potentially escalate temporary liquidity shortfalls. The contracts I focus on are performance pricing ("PP") agreements, which are now widespread in lending contracts, and which use either ratings or accounting ratios to calibrate pricing grids (Asquith et al. (2005), Beatty and Weber (2005)).The use of issuer ratings in contractual agreements adds another tension to the existing incentive conflicts. The relative effects of the two forces — reputation and catering — has not been studied

in the context of borrowers with rating-based contracts.

Rating agencies undertake extensive hard and soft adjustments. Hard adjustments capture credit risk arising from quantitative factors such as adjusted accounting ratios (Moody's Financial Metrics, Moody's (2007)).[1] The major hard adjustment is the inclusion of off-balance sheet debt, which results in substantial increases of leverage ratios (Kraft (2010)). Soft adjustments capture credit risk arising from qualitative factors such as management credibility. I find that the use of ratings in contracts is associated with more favorable rating agency adjustments: smaller rating agency's estimates of off-balance-sheet debt and more positive soft adjustments. The average rating agency's assessment of off-balance-sheet debt amounts to 14% (adjustment for off-balance-sheet debt in percent of total assets) for firms with rating-based performance pricing ("PPrating firms"), whereas the average estimate for off-balance-sheet debt for firms whose performance pricing is based on an accounting ratio ("PPratio firms") amounts to 21%. 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. The multivariate analysis confirms that the use of ratings in performance pricing is associated with smaller rating agency's estimates of off-balance-sheet debt and more positive soft adjustments, conditional on the firm having a performance pricing clause embedded in the loan and controlling for firm characteristics.

Some rating thresholds are more important than others because they allow access to liquid markets. Certain institutional investors, such as pension funds, are restricted to investing in investment grade bonds. Furthermore, the issuance of commercial paper is tied to prime short-term credit ratings. The evidence is not consistent with catering to PPrating firms that are close to rating thresholds: the use of rating-based contracts is in fact associated with more unfavorable rating agency adjustments among firms close to the investment grade cutoff or firms with short-term ratings, which is consistent with higher reputational costs the rating agency faces with respect

[1] See Appendix B for an illustration.

to biased ratings for rating thresholds that act as gateways to more liquid markets.

Firms elect to contract on ratings, based on their characteristics. The identification strategy exploits an adverse exogenous and unexpected economic shock to firms. Furthermore, I use a pricing test to assess whether the underlying credit risk changes and whether the rating agency over- or underestimates the amount of credit risk. A negative economic shock to the firm decreases the value of total assets and increases the firm's default risk. I investigate how rating agencies react to firms experiencing a substantial increase in default risk and test whether the reaction differs for firms with rating-based contracts compared with firms without such contracts. Under the catering hypothesis, I would expect a more favorable treatment for firms using ratings in their contracts, everything else equal. Exploiting the priced reaction to the shock allows me to calculate a benchmark of the expected rating agency adjustment. I find that PPrating firms experiencing adverse economic shocks receive more favorable rating agency adjustments than PPratio firms. Although, on average, adverse economic shocks are associated with unfavorable rating agency adjustments, the incremental effect of having a rating-based contract is to receive a less unfavorable rating agency adjustment. The evidence is consistent with rating agencies catering more to PPrating firms that experience distress than to firms experiencing similar shocks without such contracts.

In the last analysis, I run pricing regressions to investigate whether rating agencies' assessments capture default risk or whether the rating agency adjustments are over- or unstated relative to the control group of firms without rating-based contracts. The regression results reveal no evidence of any differential impact for firms using rating-based contracts.

This paper contributes to several literatures. First, we know relatively little about incentive conflicts for rating agencies that arise from rating-based contracts. Under their business model, rating agencies collect fees from the very issuers they rate, creating a basic tension between providing accurate and upward biased ratings (Partnoy (1999), Bolton et al. (2010), Becker and Milbourn (2010), Mason and Rosner (2007)). Evidence on 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 for non-traditional products (Ashcraft et al. (2010),Coval et al. (2009), Griffin and Tang (2010), He et al. (2010).[2] 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)) examines rating agency conflicts; however, the literature 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 rating agency adjustments.

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 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 function of reported numbers, qualitative factors enter as well, and are associated 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), in that prior research predicts a positive correlation because higher contracting costs should be related to the use of more cost-efficient comprehensive measures (Doyle (2008), Ball et al. (2008)). However, conditional on the existence of such contracts, contracting on ratings curtails the use of off-balance sheet structures ex post, because ratings are produced by an intermediary

[2]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.

that is able to continually adjust the credit risk assessment process and that utilizes subjective information above and beyond accounting ratios, which allows the rating agency to incorporate issuers' attempts at financial engineering. In contrast, the use of accounting-based performance pricing is likely to be associated with greater balance sheet management and cosmetic financial engineering, resulting in greater use of off-balance sheet financing.

2 Hypothesis Development

Public issuer ratings are used in private debt contracts. Firms incorporate surrogate variables, such as ratings, to model issuers' credit risk in future states of the world. Ratings are explicitly incorporated into lending contracts where rating changes affect the interest rate charged (for discussions of performance pricing in debt see Asquith et al. (2005), Beatty and Weber (2005)) or where rating downgrades trigger early repayment or require the posting of collateral (SEC (2003), Nicholls (2005)).[3] 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 under the over-the-counter contracts.[4] Non-financial firms are less sensitive to such rating downgrades; however, rating triggers are disclosed for 7% of firms in my sample, mostly in the energy industry.[5] The contracts I focus on are performance pricing agreements, which use either ratings or accounting ratios to calibrate pricing grids (Asquith et al. (2005), Beatty and Weber (2005)).

When contracts use credit ratings to enforce restrictions, changes in ratings directly impact firms' cash flows. The issuer is likely to demand a favorable treatment by the rating agency. I

[3]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.

[4]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.

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

investigate whether the explicit use of ratings in contracts results in catering, that is credit risk assessments that are more favorable than justified by the underlying economics. Watts and Zimmerman (1986) argue that debt contracts which 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 EM. Beatty and Weber (2005) find that borrowers whose debt contracts allow them to make accounting changes chose accounting methods that increase earnings. Similarly, performance pricing based on ratings creates incentives for borrowers to pressure rating agencies to cater to borrower demands.

However, 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. Delegating information processing to an information intermediary saves on 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)). Due to reputational concerns, rating agencies may resist catering to issuer's demands.

Under an alternative view, performance pricing may exacerbate liquidity shortfalls when the issuer is downgraded. Rating-based performance pricing creates a direct link between the firm's public debt rating and the interest rate charged on the loan. 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. Such interest rate step-ups exacerbate liquidity strains at the precise moment when an issuer is least able to deal with it (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 the accounting ratios total debt/cash flow and senior debt/cash flow. Because the rating agency may be particularly concerned with issuers who have such rating-based provisions in their contracts, they 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)).

Asquith et al. (2005) document significant potential changes in the interest rate spread charged: they find an average increase in interest rate of 13.8 basis points for each step, with an average of 5.1 steps, for interest-rate increasing performance pricing. The potential interest rate sensitivity is economically meaningful when compared to rating fees of 3-4 basis points of the face amount for corporate debt.[6]

2.1 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, as 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 diminished to collect value-relevant information, market participants relied increasingly on hard factors rather than soft factors in pricing of securitized subprime mortgages, which ultimately led to an underprediction of default risk.

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 can be captured by accounting ratios that are based on amounts reported in the balance sheet and income statement (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

[6]Standard and Poor's (2009) documents that up to 4.25 basis points are charged for corporate debt, with a minimum fee of USD70,000. Partnoy (2006) documents fees of 3-4 bps of the face amount for corporate debt, which is subject to minimum fee amounts ranging from USD30kto a maximum of USD300,000. 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 USD20,000 to USD 50,000.

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. Each industry group is assigned a rating grid, consisting of mainly quantitative factors. For example, for the company 3M the adjusted financials reveal that leverage is higher than could be inferred from reported financials. Debt-book capital and debt/EBITDA ratios increase substantially, EBITDA-interest expense, cashflow-debt ratios decrease as a result of the rating agency's adjustments. Overall the indicated rating based on adjusted ratios is one notch lower than the rating implied by reported financials. However, in this case, soft adjustments reverse the impact and the rating improves by one notch. More generally, rating agency makes extensive adjustments to GAAP financials (Kraft (2010): the major hard adjustment includes off-balance sheet debt, leading to substantially higher leverage ratios. On average, hard and soft adjustments are associated with lower ratings and are priced on bond yields.

3 Empirical Approach

3.1 Base model

To investigate the impact of incentives on rating agencies, I estimate the correlation between the use of ratings in contracts and rating agency adjustments. Rating agency adjustments proxy for the rating process and include estimates of off-balance-sheet debt, hard adjustments, and soft adjustments. 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 estimated off-balance sheet debt. 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. Adjustments to debt are analyzed separately from hard adjustments because significantly

more data on rating agency's adjustments to the balance sheet and income statement are available than data to calculate hard and soft adjustments. The following OLS regression is estimated.

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

The empirical proxy for rating-based contracts is the presence of a loan embedded with performance pricing which 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 issuer has at least one active loan facility 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 any bias or noise in the rating process. The bias is subject to the rating agency's and issuer's incentives to provide a favorable credit risk assessment. Thus I control for firm characteristics that determine credit risk and, hence, 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 proxy for 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).

Conceptually, I need to control for firm characteristics that gives rise to the rating agency's soft adjustments. Empirically, I need 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 soft adjustment.

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 (Beaver et al. (2006), Partnoy (1999), SEC (2003)).[7] To comply with regulations, investors desire high ratings. The investment grade cutoff and prime short-term ratings are particularly important thresholds. Commercial paper issuance is tied to prime short-term credit ratings such as P1 and P2. Furthermore, many investors are restricted from investing in non-investment grade bonds. 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, an equilibrium with inflated ratings is feasible. Even if managers understand that investors see through inflated ratings, they will still demand such ratings to help bond investors comply with regulation (Opp et al. (2010), Bolton et al. (2010)).

[7]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 (SEC (2003)). For example, money market funds can only invest in investment grade bonds (SEC (2003)). State insurance codes rely on NRSRO ratings to determine appropriate investments for insurers (SEC (2003)). 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 (Standard and Poor's (2006)). The Department of Labor requires pension funds to hold commercial paper rated above A-3 (Standard and Poor's (2006)). Furthermore, broker-dealers which are subject to the net capital rule use ratings by certified agencies in capital adequacy tests (SEC (2003)), where the percentage reduction from stated values (securities haircuts) for the purpose of stock margin requirements and for net capital requirements depend on ratings (Standard and Poor's (2006)).

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 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:

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

3.3 Contracting choice

Firms 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 less transparent than firms raising loans without performance pricing clauses.

Conditional on contracting on performance pricing, firms face the choice between ratings and accounting ratios. Ratings are a comprehensive measure of default risk, but accounting ratios are considered to 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 best practice in contracting recommends to give thought to and to incorporate "creative financial arrangements" into debt contracts, however, even the best practice contracts contain vague and difficult-to-enforce language. If left unmonitored, the use of off - balance sheet financing allows managers to dilute claims of existing, on-balance-sheet debtholders, and it leads to higher economic leverage. 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 because firms 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)). 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 more transparent and thus less suitable as control group (Asquith et al. (2005)), but their inclusion allows me to increase the sample size.

3.4 Shock analysis

Any observed differences in rating agency adjustments may 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 the firm's default risk. I investigate the reaction of rating agencies to firms with adverse economic shocks by testing whether the rating agency's reaction differs 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 a more favorable treatment for firms with rating-based contracts experiencing adverse economic shocks, everything else equal.

This research design has the advantage of allowing me to calculate a benchmark of the expected adjustment for firms experiencing 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 the fiscal-firm-year:

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

For each bond, I calculate daily returns during the fiscal-firm-year. An adverse economic shock that increases credit risk is reflected in low (negative) bond returns. 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).[8] Adverse economic shock increases default risk and it should be reflected equivalently in the increase in the rating agency's risk assessment if 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 the comparison between rating agency's assessment in default risk. The net adverse shock is the priced reaction to the firm's shock and is measured by a decrease in 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.

[8]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.

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 net increase in default risk. If the PPrating firm is better at dealing with the shock, the net increase in default risk will be less than the gross increase. Hence the shock, as I measure it, 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 in the comparison. In the first scenario, where the treatment is random, 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 PPrating firm, the net shock, is smaller than the gross shock. Because the market anticipates that 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. As the net shock is measured by the change in the market's assessment of default risk, any self-selection issue would be already priced, and hence a comparison of the rating agency's assessments is meaningful.

3.5 Pricing regressions

The second approach to address 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 explains variation in default risk. I would expect the adjustments to be similarly priced for firms using rating-based contracts and their control group, if the rating agency does not favor one group over the other. 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 OLS regression for both PPrating firms as well as the control group. The yield spread of public bonds measures default risk. My model is

such:[9]

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

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

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 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 rating adjusted financials imply, and the hard adjustment is the difference between the rating adjusted financial imply and the 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

[9]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).

assigning them Compustat's gvkey identifier, issuer cusip, and fiscal-year-end, based on a match by company name.

To measure whether a firm has contracted on 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 datasets, I employ the Dealscan-gvkey linking dataset Chava and Roberts (2008) provide. I merge the firm-year observations from Financial Metrics with loans from Dealscan by gvkey. 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, it is identified as 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.

An adverse economic shock is measured as a significant change in the market value of traded bonds. I collect bond prices and bond yields from Trace, extract issue characteristics from FISD Mergent and combine those bond issue and transactions data with the FMDS sample. 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 Mergent FISD. I merge the Financial Metrics-Dealscan sample with public bond issues. I assign FMDS issuer-years zero, one, or more bond issues, where the bond is issued during the twelve months beginning three months after fiscal-year end.

Table 1 Panel A reports that the overlapping Financial Metrics-Dealscan sample ("FMDS") 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-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 re-calculate the shock variable 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 USD436 million and an offering yield of 5.8% (not tabulated). In the Fisd sample, 1,544 observations have non-zero and non-missing treasury spreads. The average treasury spread equals 240 basis points, the average time to maturity is 12.0 years, the average offering amount equals USD477 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 USD8.8 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 descriptive 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. More specifically, compared with the control group of PPratio firms, firms in the PPrating subsample are bigger, with average total assets of USD11.2 billion (versus USD3.5 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 return on assets (0.08 versus 0.06), as well as 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, whereas 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 is USD 2,080 million, a maturity of 63 months, a spread of 161 basis points.

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 sub-sample, 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. Most rating-based performance contract' 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 may contain several facilities with different performance pricing schedules. Interest-rate decreasing per-

formance 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)).

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). Those numbers for potential interest spread movement are significantly larger than the fees paid to rating agencies on corporate debt of 3-4 basis points.

Table 3 reports the correlations between the use of ratings in contracts, rating agency adjustments, and firm characteristics. PPrating is significantly negatively correlated with the rating agency adjustment for off-balance-sheet debt, whereas PPratio exhibits a significantly positive correlation with OFFBS. Size is positively correlated with the rating agency's estimate of off-balance-sheet debt. Leverage, coverage, operating margin, and tangibility are negatively correlated with the adjustments for off-balance-sheet debt. For the subset of observations with available data on total, hard, and soft adjustments, PPrating is still negatively associated with OFFBS. Furthermore, PPrating is associated with unfavorable hard adjustments but favorable soft and total adjustments.

5 Empirical Results

Table 4 Panel A documents the results from the regression of rating agency's adjustments — for off-balance-sheet debt, soft, hard, and total adjustments — on the presence of a rating-based contract and firm characteristics, for the sample of firms with performance pricing. 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 are significantly negatively correlated. 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 found 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 is decreasing in profitability and increasing in asset tangibility. The rating agency adjustment for off-balance-sheet finance is not correlated with 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 are significantly positively related with the presence of ratings in performance pricing. Conditional on performance pricing, the use of ratings to adjust the contractual interest rate is positively associated 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 weakly negatively associated 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 is associated with more favorable adjustments, namely significantly lower estimates of off-balance sheet debt, and significantly greater soft and total ad-

justments. 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 is associated 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. The rating thresholds I consider are the BBB-minus ratings as well as the short-term ratings P1 and P2. Table 6 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 are associated with a lower estimate of off-balance-sheet debt, but PPrating firms close to BBB-minus cutoff experience a greater adjustment for their off-balance-sheet debt. Firms with 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.) 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 is associated with a more unfavorable assessment of credit risk.

So far, the overall results are consistent with rating agencies treating firms rating-based performance pricing more favorably, except if those issuers are close to important rating thresholds. The interpretation is subject to the caveat that unobservable differences in firm characteristics may also drive those differences in adjustments, if those differences in firm characteristics would 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 rating agency adjustments are biased.

Among firms that experience an adverse economic shock, under the catering hypothesis I expect more favorable rating agency adjustments for PPrating firms: lower estimates of off-balance-sheet

debt and higher soft, hard, and total adjustments. However, because firms whose performance pricing does not include interest rate step-ups are not adversely affected by increasing interest rates, performance pricing decreasing contracts are excluded in the shock analysis. 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 are consistent with the view that adjustments worsen the credit rating as those 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 are associated with more favorable adjustments, 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 is consistent with 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 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. ADJ_{delta} measures the change in the adjustment in the fiscal-year surrounding the adverse shock. The shock is associated 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 5 Panel A and Panel B.

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 estimate of off-balance-sheet debt is associated with higher yield spreads. The rating agency's adjustment for off-balance-sheet debt is associated with higher yield spreads. The rating agency's soft adjustments and total adjustments are associated with lower yield spreads. However, there is no evidence of a differential pricing impact for PPrating firms for soft and total adjustments. The rating agency's adjustment for off-balance-sheet debt for PPrating firms is not related to the yield spread. Furthermore, when I exclude performance pricing decreasing contracts ($PPrating_{up}$), the results remain the same: there is no evidence of differential pricing impact for the soft and total adjustments done for firms with rating-based increasing performance pricing, and again, the estimate for off-balance sheet debt for PPrating firms is not associated with yield spreads. Overall the results are consistent with the view that rating agency adjustments are priced on long-term yield spreads and capture default risk. The market does not discount rating agency adjustments for PPrating firms, if anything the estimate for off-balance sheet debt is perceived as 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 which allow firms access to more liquid markets, however, 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 on average rating agency adjustments 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 the rating agency's adjustments are supposed to capture. This assumption may not hold, given the rating agency's access to private information, and a general skeptical view of the efficient market hypothesis.

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 may 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 an information intermediary's output is used in contracting — unlike, for example, equity analysts' recommendations or EPS forecasts — adds an additional tension to an already rich setting.

References

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.

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.

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.

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.

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.

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

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 US million (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
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 (USD Billion)	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

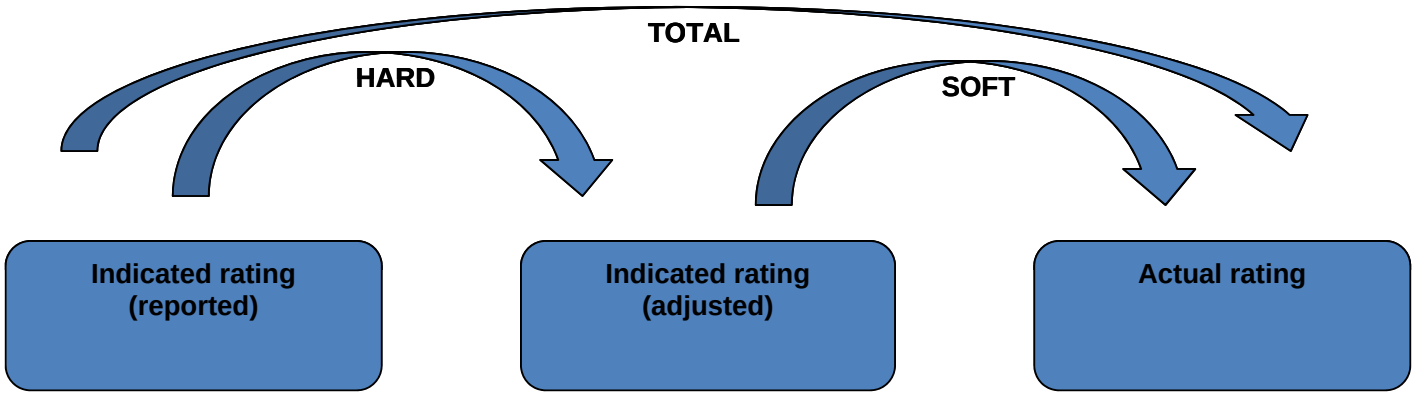
Rating	Letter	Numeric
Indicated Rating (reported)	Aa1	2
Indicated Rating (adjusted)	Aa2	3
Actual rating	Aa1	2
HARD		-1
SOFT		1
TOTAL		0

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
- Non-financial statement data

- Adjusted financial statements
- Non-financial statement data

- Adjusted financial statements
- Non-financial statement data
- Qualitative factors

Table 1

Sample summary statistics

The table reports descriptive 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**
FMDSTrace (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
FMDSFisd					
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 descriptive 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 (USD million)						
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 (USD million)	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	-0.0120	-0.0093	-0.0110	-0.0086	-0.0140	-0.0110
Shock_ret_w	-0.0120	-0.0088	-0.0110	-0.0081	-0.0140	-0.0100

Table 2

Performance pricing by year and type

The table reports descriptive 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. 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)

	mean	min	max
MaxLessInitial	44	0	743
InitiallessMin	26	0	425

Table 3
Correlation matrix

The 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. * denotes significance at the 5% significance 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 table reports the estimates for coefficients and test statistics for the OLS regression ADJ = f (PPrating, firm characteristics) for 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 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	9	10	11	12	13	14	15	16
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****	**1.833****	**1.834****	**1.849****	**1.873****	-0.147	**-0.155+**	**-0.155+**	-0.140	**1.699****	**1.691****	**1.695****	**1.743****
	[3.29]	**[3.02]**	**[3.04]**	**[3.00]**	**[7.62]**	**[8.05]**	**[8.02]**	**[8.23]**	**[1.50]**	[1.69]	[1.69]	[1.49]	**[6.63]**	**[7.02]**	**[6.97]**	**[7.35]**
ln(revenues)	0.003	0.014*	0.016*	0.013*	-0.337**	-0.284**	-0.315**	-0.279**	-0.007	-0.016	-0.015	-0.022	-0.348**	-0.307**	-0.340**	-0.308**
	[0.49]	[2.17]	[2.31]	[2.02]	[3.61]	[3.64]	[3.97]	[3.60]	[0.17]	[0.49]	[0.47]	[0.70]	[3.33]	[3.54]	[3.88]	[3.58]
leverage	-0.102	0.074	0.060	0.073	0.727	0.907*	1.237**	0.966*	1.181**	0.971**	0.964**	0.993**	1.920**	1.875**	2.154**	1.954**
	[1.53]	[0.78]	[0.66]	[0.78]	[1.42]	[2.18]	[3.01]	[2.34]	[4.95]	[5.30]	[5.30]	[5.41]	[3.21]	[4.06]	[4.74]	[4.25]
coverage_w	0.001	0.001		0.001	-0.014*	-0.017**		-0.017**	0.000	0.000		0.000	-0.013+	-0.016**		-0.017**
	[1.08]	[1.35]		[1.36]	[2.15]	[2.84]		[3.01]	[0.15]	[0.19]		[0.16]	[1.96]	[2.62]		[2.79]
opmargin_w	-0.223**	-0.250**	-0.219**	-0.241**	-1.747+	-1.521+	-1.953*	-1.492	0.114	0.121	0.132	0.184	-1.590	-1.392	-1.797+	-1.299
	[5.06]	[5.53]	[5.69]	[5.42]	[1.77]	[1.65]	[2.10]	[1.62]	[0.43]	[0.52]	[0.57]	[0.79]	[1.43]	[1.37]	[1.76]	[1.29]
tangibility	0.145**	0.199**	0.202**	0.200**	0.430	0.805+	0.699	0.943*	-0.057	-0.197	-0.194	-0.181	0.344	0.558	0.446	0.715
	[3.52]	[4.40]	[4.45]	[4.44]	[0.88]	[1.85]	[1.61]	[2.17]	[0.25]	[0.96]	[0.95]	[0.89]	[0.64]	[1.18]	[0.94]	[1.51]
quick_w	-0.055**				-0.556**				0.102				-0.452**			
	[4.64]				[3.68]				[1.46]				[2.78]			
M2B	0.000				0.002**				0.000				0.002**			
	[0.35]				[6.41]				[0.64]				[5.12]			
Constant	0.206+	-0.102	-0.114	-0.062	5.290**	3.397**	3.722**	2.099+	-0.605	-0.868+	-0.878+	-0.317	3.366*	3.312*	3.695**	1.909
	[1.88]	[0.87]	[0.95]	[0.55]	[3.41]	[2.72]	[2.91]	[1.80]	[0.83]	[1.89]	[1.92]	[0.68]	[2.05]	[2.46]	[2.71]	[1.47]
Observations	3,787	4,389	4,389	4,389	747	842	842	842	748	846	846	846	743	838	838	838
R-squared	0.11	0.10	0.10	0.10	0.25	0.21	0.19	0.19	0.08	0.09	0.09	0.09	0.21	0.18	0.17	0.17

Table 4 (continued)
Regression analysis

Panel B

The table reports the estimates for coefficients and test statistics for the regression ADJ = f (PPrating, firm characteristics) for 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 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	9	10	11	12	13	14	15	16
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+**	**0.823****	**0.879****	**0.894****	**0.899****	-0.116	-0.121	-0.126	-0.116	**0.734****	**0.787****	**0.799****	**0.810****
	[2.50]	[1.62]	[1.86]	[1.66]	**[4.22]**	**[4.55]**	**[4.56]**	**[4.57]**	**[1.40]**	**[1.52]**	**[1.59]**	[1.45]	**[3.55]**	**[3.89]**	**[3.89]**	**[3.92]**
ln(revenues)	-0.006	0.007	0.009	0.006	-0.003	0.022	0.012	0.022	-0.010	-0.012	-0.008	-0.016	-0.028	-0.009	-0.019	-0.013
	[1.10]	[0.89]	[1.07]	[0.79]	[0.04]	[0.31]	[0.17]	[0.31]	[0.31]	[0.44]	[0.28]	[0.59]	[0.33]	[0.12]	[0.25]	[0.17]
leverage	-0.045	0.177	0.162	0.175	0.122	0.478	0.543	0.518	1.098**	0.939**	0.915**	0.959**	1.220*	1.395**	1.456**	1.454**
	[0.84]	[1.28]	[1.22]	[1.27]	[0.29]	[1.26]	[1.43]	[1.36]	[5.20]	[5.73]	[5.70]	[5.79]	[2.38]	[3.25]	[3.44]	[3.35]
coverage_w	0.001	0.001		0.001	-0.001	-0.003		-0.003	0.002	0.001		0.001	-0.001	-0.003		-0.003
	[1.24]	[1.51]		[1.53]	[0.14]	[0.51]		[0.53]	[0.81]	[0.69]		[0.76]	[0.13]	[0.55]		[0.51]
opmargin_w	-0.244**	-0.260**	-0.223**	-0.253**	-1.870+	-1.680+	-1.769*	-1.521+	0.064	0.006	0.045	0.073	-1.713	-1.595	-1.690+	-1.371
	[6.08]	[6.24]	[6.07]	[6.19]	[1.95]	[1.87]	[2.06]	[1.70]	[0.27]	[0.03]	[0.21]	[0.34]	[1.62]	[1.65]	[1.82]	[1.42]
tangibility	0.165**	0.204**	0.206**	0.204**	0.440	0.697+	0.685+	0.831*	-0.072	-0.181	-0.177	-0.168	0.250	0.380	0.370	0.534
	[4.34]	[4.95]	[4.97]	[4.95]	[0.96]	[1.70]	[1.68]	[2.01]	[0.36]	[1.02]	[0.99]	[0.94]	[0.50]	[0.87]	[0.85]	[1.20]
quick_w	-0.045**				-0.462**				0.033				-0.412**			
	[4.08]				[3.25]				[0.54]				[2.82]			
M2B	0.000				0.002**				0.000				0.002**			
	[0.55]				[6.31]				[0.06]				[5.27]			
Constant	0.294**	-0.030	-0.053	-0.021	0.568	-0.749	-0.637	-1.651	-0.416	-0.226	-0.273	-0.437	-0.350	-0.109	0.003	-1.752
	[3.06]	[0.19]	[0.31]	[0.13]	[0.41]	[0.64]	[0.54]	[1.51]	[0.70]	[0.48]	[0.58]	[1.05]	[0.24]	[0.09]	[0.00]	[1.49]
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
R-squared	0.10	0.11	0.11	0.11	0.13	0.10	0.10	0.07	0.07	0.08	0.08	0.07	0.11	0.10	0.10	0.07

Table 5
Difference-in-difference analysis for rating thresholds

Panel A: Regressions for FMDS sample, conditional on PP

The table reports the estimates for coefficients and test statistics for the regression ADJ = f (PPrating, THRESHOLD, THRESHOLD*PPrating, firm characteristics) for 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 statistics in brackets. Standard errors clustered by firm. Industry fixed effects for utilities and energy. +

	1	2	3	4	5	6	7	8
Dependant variable	OFFBS	OFFBS	SOFT	SOFT	HARD	HARD	TOTAL	TOTAL
PPrating	-0.079**	-0.056*	1.895**	1.925**	-0.115	-0.002	1.792**	1.909**
	[3.55]	[2.11]	[7.74]	[4.58]	[1.07]	[0.01]	[6.82]	[4.22]
BBBminus	-0.073*		0.411		0.163		0.586	
	[2.16]		[0.75]		[0.84]		[1.23]	
BBBminus*PPrating	**0.095***		-0.622		-0.284		-0.912	
	[2.58]		[0.97]		[1.19]		[1.49]	
P2		-0.103*		2.229**		0.988**		3.259**
		[2.14]		[3.84]		[3.08]		[4.90]
P2*PPrating		**0.149****		**-2.399****		**-1.088****		**-3.521****
		[2.68]		**[3.86]**		**[2.79]**		**[4.83]**
ln(revenues)	0.004	0.004	-0.339**	-0.257*	-0.008	-0.034	-0.351**	-0.310*
	[0.65]	[0.57]	[3.67]	[2.26]	[0.19]	[0.56]	[3.39]	[2.42]
leverage	-0.107	-0.121+	0.781	1.183	1.206**	1.519**	2.000**	2.665**
	[1.59]	[1.74]	[1.53]	[1.56]	[4.91]	[3.21]	[3.33]	[2.78]
coverage_w	0.001	0.000	-0.014*	-0.009	0.000	0.002	-0.014*	-0.003
	[1.11]	[0.26]	[2.17]	[0.77]	[0.04]	[0.53]	[2.03]	[0.26]
opmargin_w	-0.220**	-0.195**	-1.802+	-1.926	0.088	0.074	-1.662	-1.889
	[5.01]	[3.16]	[1.83]	[1.22]	[0.33]	[0.20]	[1.50]	[1.06]
tangibility	0.143**	0.082+	0.440	0.260	-0.052	-0.386	0.362	-0.135
	[3.51]	[1.71]	[0.90]	[0.30]	[0.23]	[1.04]	[0.67]	[0.13]
quick_w	-0.055**	-0.047**	-0.546**	-0.558+	0.107	0.289+	-0.437**	-0.213
	[4.64]	[2.78]	[3.56]	[1.88]	[1.52]	[1.91]	[2.64]	[0.63]
M2B	0.000	0.000	0.002**	0.015	0.000	0.015	0.002**	0.034
	[0.33]	[1.21]	[6.56]	[0.81]	[0.68]	[1.34]	[5.27]	[1.47]
Constant	0.198+	0.186	5.258**	3.810+	-0.619	-1.134	3.270*	3.905+
	[1.82]	[1.63]	[3.42]	[1.95]	[0.84]	[1.10]	[2.00]	[1.80]
Observations	3,787	1,444	747	295	748	293	743	292
R-squared	0.11	0.10	0.25	0.24	0.09	0.10	0.21	0.19

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

Panel B: Regressions for FMDS sample

The table reports the estimates for coefficients and test statistics for the regression ADJ = f (PPrating, THRESHOLD, THRESHOLD*PPrating, firm characteristics) for 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 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	9	10	11	12
Dependant variable	OFFBS	OFFBS	OFFBS	SOFT	SOFT	SOFT	HARD	HARD	HARD	TOTAL	TOTAL	TOTAL
PPrating	-0.038**	-0.027	-0.034*	0.867**	1.094**	0.802*	-0.105	-0.174	-0.072	0.792**	0.906*	0.749+
	[2.85]	[1.44]	[2.17]	[4.25]	[3.26]	[2.27]	[1.17]	[1.19]	[0.47]	[3.65]	[2.58]	[1.94]
BBBminus	-0.036+			0.795+			-0.140			0.688+		
	[1.74]			[1.66]			[0.69]			[1.66]		
BBBminus*PPrating	**0.055***			-0.823			0.041			-0.819		
	[2.13]			[1.40]			[0.17]			[1.44]		
P1		-0.075**			2.193**			0.018			2.131**	
		[3.08]			[4.85]			[0.09]			[4.53]	
P1*PPrating		**0.048+**			**-1.477****			0.189			**-1.215***	
		[1.86]			**[3.16]**			[0.73]			**[2.42]**	
P2			-0.019			0.843			0.001			0.877
			[0.91]			[1.34]			[0.00]			[1.28]
P2*PPrating			**0.067****			-1.076			-0.115			-1.219
			[2.63]			[1.52]			[0.41]			[1.56]
ln(revenues)	-0.005	0.006	0.002	-0.006	-0.104	0.044	-0.010	0.000	0.002	-0.030	-0.112	0.025
	[1.03]	[1.01]	[0.31]	[0.08]	[1.10]	[0.51]	[0.29]	[0.00]	[0.05]	[0.36]	[1.13]	[0.26]
leverage	-0.048	-0.045	-0.026	0.196	-0.121	-0.475	1.092**	1.209**	1.214**	1.292*	1.084	0.760
	[0.89]	[0.80]	[0.50]	[0.45]	[0.25]	[1.00]	[5.11]	[3.10]	[3.14]	[2.47]	[1.50]	[1.10]
coverage_w	0.001	0.001	0.001	-0.001	-0.009	0.001	0.002	0.002	0.003	-0.001	-0.006	0.004
	[1.26]	[1.25]	[0.88]	[0.18]	[1.23]	[0.17]	[0.81]	[0.94]	[1.05]	[0.20]	[0.82]	[0.59]
opmargin_w	-0.243**	-0.209**	-0.243**	-1.845+	-2.118+	-1.507	0.041	-0.179	-0.107	-1.703	-2.180	-1.501
	[6.08]	[3.69]	[4.06]	[1.94]	[1.66]	[1.13]	[0.17]	[0.55]	[0.33]	[1.63]	[1.56]	[1.03]
tangibility	0.164**	0.164**	0.168**	0.449	0.853	0.387	-0.072	-0.308	-0.350	0.259	0.471	-0.037
	[4.34]	[3.26]	[3.30]	[0.98]	[1.18]	[0.52]	[0.36]	[0.95]	[1.09]	[0.52]	[0.58]	[0.04]
quick_w	-0.045**	-0.030*	-0.028+	-0.472**	-0.587*	-0.747**	0.038	0.261*	0.258*	-0.418**	-0.290	-0.436
	[4.07]	[2.01]	[1.88]	[3.35]	[2.40]	[2.89]	[0.61]	[2.19]	[2.17]	[2.89]	[1.06]	[1.54]
M2B	0.000	0.000	0.000	0.002**	-0.002	-0.001	0.000	0.000	0.000	0.002**	-0.002	-0.001
	[0.55]	[0.02]	[0.05]	[6.38]	[0.55]	[0.18]	[0.10]	[0.05]	[0.03]	[5.33]	[0.38]	[0.11]
Constant	0.292**	0.085	0.127	0.557	1.016	0.641	-0.424	-0.803	-0.607	-0.389	0.345	0.305
	[3.04]	[0.85]	[1.28]	[0.40]	[0.67]	[0.42]	[0.71]	[0.99]	[0.73]	[0.27]	[0.20]	[0.17]
Observations	4,902	2,046	2,046	928	398	398	928	396	396	922	394	394
R-squared	0.10	0.11	0.10	0.13	0.22	0.14	0.08	0.09	0.09	0.12	0.15	0.09

Table 6
Regression analysis with adverse shocks

Panel A

The table reports the estimates for coefficients and test statistics for the OLS regression ADJ = f (PPrating, Shock, Shock*PPrating, firm characteristics) for 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_ip measures the diff-in-diff. Robust t statistics in brackets. Standard errors clustered by firm. Industry fixed effects for utilities and energy. + significant at 10%; * significant at 5%; ** significant at 1%.

	FMDS				Conditional on PPfeature=1			
	1	2	3	4	5	6	7	8
	OFFBS	**SOFT**	**HARD**	**TOTAL**	**OFFBS**	**SOFT**	**HARD**	**TOTAL**
PPrating_up	-0.003	-0.206	-0.195	-0.419	-0.031	**1.300****	-0.11	**1.177***
	[0.21]	[0.83]	[1.29]	[1.42]	[1.62]	**[2.75]**	[0.59]	**[2.15]**
Shock_ret	**-0.924+**	**33.689****	**13.877****	**47.161****	-0.322	**31.723+**	**12.916***	**43.570***
	[1.92]	**[3.32]**	**[3.06]**	**[4.15]**	[0.82]	**[1.94]**	[2.46]	**[2.50]**
Shock_ret*Pprating_up	0.817	**-28.475+**	**-15.891***	**-43.565***	0.142	-19.84	**-14.533***	-32.866
	[1.52]	**[1.96]**	**[2.56]**	**[2.58]**	[0.30]	[1.05]	**[2.23]**	[1.57]
ln(revenues)	-0.003	0.095	-0.023	0.073	0.002	-0.218	-0.061	-0.273
	[0.45]	[0.96]	[0.51]	[0.63]	[0.35]	[1.46]	[0.95]	[1.55]
leverage	0.008	0.916	0.786+	1.714*	-0.077	2.364*	1.15	3.543*
	[0.14]	[1.46]	[1.68]	[1.99]	[0.89]	[2.55]	[1.37]	[2.39]
coverage_w	-0.001**	0.001	0.005	0.005	-0.001**	0	0.003	0.004
	[3.44]	[0.09]	[1.64]	[0.91]	[2.69]	[0.03]	[0.97]	[0.50]
opmargin_w	-0.110*	-0.254	0.352	0.406	-0.099*	-0.858	0.705+	0.212
	[2.27]	[0.24]	[0.94]	[0.35]	[2.05]	[0.74]	[1.69]	[0.17]
tangibility	0.097**	1.207*	-0.039	1.245+	0.086*	1.641**	-0.12	1.612+
	[2.71]	[2.46]	[0.11]	[1.90]	[2.19]	[2.61]	[0.26]	[1.92]
Constant	0.118	-1.292	0.224	-0.958	0.078	1.317	0.161	1.305
	[1.08]	[0.74]	[0.28]	[0.48]	[0.66]	[0.58]	[0.14]	[0.48]
Observations	5,459	1,301	1,297	1,294	3,748	932	927	925
R-squared	0.11	0.08	0.06	0.1	0.1	0.17	0.08	0.2

Table 6 (continued)
Regression analysis with adverse shocks

Panel B - weighted by trading volume

The table reports the estimates for coefficients and test statistics for the OLS regression ADJ = f (PPrating, Shock, Shock*PPrating, firm characteristics) for 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 statistics in brackets. Standard errors clustered by firm. Industry fixed effects for utilities and energy. + significant at 10%; * significant at 5%; ** significant at 1%.

	FMDS				Conditional on PPfeature=1			
	1	2	3	4	5	6	7	8
	OFFBS	**SOFT**	**HARD**	**TOTAL**	**OFFBS**	**SOFT**	**HARD**	**TOTAL**
PPrating_up	-0.003	-0.199	-0.184	-0.402	**-0.029**	**1.274****	-0.123	**1.134***
	[0.17]	[0.81]	[1.23]	[1.38]	**[1.57]**	**[2.67]**	[0.68]	**[2.06]**
Shock_ret_w	**-1.003***	**31.187****	**13.804****	**44.681****	-0.469	**33.137***	**15.256****	**47.519****
	[2.05]	**[3.12]**	**[2.96]**	**[3.94]**	[1.10]	**[1.97]**	**[2.78]**	**[2.60]**
Shock_ret_w*PPrating	0.867	**-27.842+**	**-14.812***	**-42.092***	0.261	-22.831	**-15.921***	**-37.573+**
	[1.61]	**[1.95]**	**[2.41]**	**[2.53]**	[0.52]	[1.18]	**[2.41]**	**[1.72]**
ln(revenues)	-0.003	0.098	-0.023	0.077	0.002	-0.219	-0.062	-0.275
	[0.45]	[1.00]	[0.50]	[0.66]	[0.35]	[1.47]	[0.97]	[1.57]
leverage	0.008	0.936	0.803+	1.752*	-0.078	2.417**	1.189	3.633*
	[0.14]	[1.49]	[1.73]	[2.05]	[0.89]	[2.63]	[1.44]	[2.50]
coverage_w	-0.001**	0.001	0.005	0.006	-0.001**	0.001	0.003	0.004
	[3.44]	[0.10]	[1.65]	[0.93]	[2.68]	[0.06]	[1.00]	[0.57]
opmargin_w	-0.109*	-0.235	0.358	0.43	-0.098*	-0.859	0.700+	0.203
	[2.26]	[0.22]	[0.96]	[0.37]	[2.03]	[0.73]	[1.68]	[0.16]
tangibility	0.097**	1.198*	-0.041	1.235+	0.085*	1.622*	-0.127	1.585+
	[2.71]	[2.43]	[0.12]	[1.88]	[2.19]	[2.58]	[0.27]	[1.89]
Constant	0.117	-1.375	0.216	-1.04	0.076	1.34	0.197	1.369
	[1.08]	[0.78]	[0.27]	[0.53]	[0.64]	[0.60]	[0.17]	[0.51]
Observations	5,459	1,301	1,297	1,294	3,748	932	927	925
R-squared	0.11	0.08	0.06	0.1	0.1	0.17	0.08	0.2

Table 6 (continued)
Regression analysis with adverse shocks

Panel C - adjustment changes (δ) on adverse shocks

The table reports the estimates for coefficients and test statistics for the OLS regression ADJ_delta = f (PPrating, Shock, Shock*PPrating, firm characteristics) for the FMDS-Trace sample, both conditional on having PPfeature and for total FMDS sample (always excluding hybrids). ADJ_delta equals ADJ at fiscal-year-end minus ADJ at prior fiscal-year end. 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 equals the tenth percentile of daily bond return by issuer-year-bond. The interaction term Shock*PPrating_up measures the diff-in-diff. Robust t statistics in brackets. Standard errors clustered by firm. Industry fixed effects for utilities and energy. + significant at 10%; * significant at 5%; ** significant at 1%.

	Bond returns				Bond returns, weighted by volume			
	1	2	3	4	5	6	7	8
Dep.variable: ADJ_δ	**OFFBS_δ**	**SOFT_δ**	**HARD_δ**	**TOTAL_δ**	**OFFBS_δ**	**SOFT_δ**	**HARD_δ**	**TOTAL_δ**
PPrating_up	-1.098	0.141	0.024	0.136	-1.043	0.14	0.039	0.144
	[1.08]	[0.59]	[0.19]	[0.59]	[1.08]	[0.59]	[0.31]	[0.65]
Shock_ret	-5.171	10.588	**11.969***	**21.180+**	-3.811	12.508	**10.146+**	**21.298+**
	[0.73]	[0.89]	**[2.43]**	**[1.78]**	[0.64]	[1.08]	**[1.88]**	**[1.76]**
Shock_ret*Pprating_up	10.785	-1.641	**-16.604***	-15.455	15.898	-2.073	**-15.191***	-15.014
	[0.89]	[0.11]	**[2.43]**	[1.06]	[0.95]	[0.14]	**[2.15]**	[1.02]
ln(revenues)	0.213	-0.021	0.05	0.031	0.211	-0.024	0.052	0.031
	[0.77]	[0.30]	[1.23]	[0.45]	[0.77]	[0.34]	[1.30]	[0.45]
leverage	-1.183	1.069+	0.459	1.637*	-1.17	1.097+	0.468	1.669*
	[1.08]	[1.94]	[1.14]	[2.41]	[1.08]	[1.97]	[1.18]	[2.45]
coverage_w	-0.016	0.006	-0.002	0.005	-0.015	0.006	-0.002	0.005
	[0.93]	[1.45]	[0.88]	[1.15]	[0.93]	[1.50]	[0.92]	[1.19]
opmargin_w	10.2	0.598	-0.442	1.058	10.179	0.587	-0.425	1.063
	[1.08]	[0.55]	[0.86]	[1.23]	[1.08]	[0.54]	[0.82]	[1.22]
tangibility	1.364	0.013	-0.172	0.218	1.365	0.013	-0.179	0.211
	[1.17]	[0.03]	[0.45]	[0.39]	[1.17]	[0.02]	[0.46]	[0.38]
Constant	-3.765	-0.092	-0.919	-1.366	-3.721	-0.055	-0.972	-1.38
	[0.79]	[0.07]	[1.28]	[1.19]	[0.79]	[0.04]	[1.35]	[1.20]
Observations	5,287	698	688	684	5,287	698	688	684
R-squared	0.02	0.08	0.07	0.13	0.02	0.08	0.07	0.13

Table 7
Pricing regression

The table reports the estimates for coefficients and test statistics for the OLS regression log(treasury spread) = f (PPrating, ADJ, ADJ*PPrating, controls) for 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. Robust t statistics in brackets. Standard errors clustered by firm. Industry fixed effects for utilities and energy. + significant at 10%; * significant at 5%; ** significant at 1%.

	PPrating				**PPrating_up**			
	1	2	3	4	5	6	7	8
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