Reputation and competition: evidence from the credit rating industry

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Abstract. Fair and accurate credit ratings arguably play an important role in the financial system. In an environment absent free entry of rating agencies, the provision of quality ratings is at least partially sustained by the reputational concerns of the rating agencies. The economically significant entry of a third agency into essentially a duopolist market provides a unique experiment to examine the effect of increased competition on the disciplining effects of reputation. Using a variety of data sources, we find that competition leads to more issuer-friendly and less informative ratings. First, the credit ratings issued by the two incumbent agencies increased toward better ratings. Second, the correlation between bond yields and ratings fell. And lastly, negative stock price responses to announced rating downgrades are larger in absolute value (a downgrade in this weaker ratings environment is even worse news). Our findings overall are consistent with models that suggest competition can impede the reputational mechanism. Importantly, we address concerns about the possible endogeneity of our competition metric in several ways.

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1. Introduction

A credit rating is an assessment of the creditworthiness of a corporation or security, based on the history of borrowing and repayment for the issuer, its assets and liabilities and its overall business performance. These ratings fulfill a key function of information transmission in debt markets.[1] Issuers seek ratings for a number of reasons, including to improve the marketability or pricing of their financial obligations, to improve the trust of their business counterparties or because they wish to sell securities to investors with preferences over ratings. Investors, financial intermediaries and regulators use ratings to provide information on the likely repayment of securities. Also, certain categories of institutional investors are obliged to rely on ratings for their investment decisions. For example, the amount of capital required for banks and insurance companies who own securities varies with the credit rating. There are also regulatory constraints forcing some investors (e.g., insurance companies and Savings & Loans) to only hold debt securities of investment grade (i.e., with a rating of BBB or better). For these reasons, ratings are considered important by issuers and investors alike.[2]

The provision of accurate ratings is made more complicated by the peculiar market structure of the ratings industry. Ratings are issued by rating agencies, such as Moody's, Standard & Poor's (S&P) and Fitch Ratings. Once produced, ratings are made publicly available and disseminated for free. Ratings agencies charge the firms they rate (or whose securities they rate) for the work, but the users of ratings, such as investors, use them for free.[3] Users of ratings, such as investors, desire accurate ratings. However, rating agencies' revenues come from fees paid by issuers who are rated or whose securities are rated. These issuers

[1] The majority of ratings of corporate securities relate to corporate bonds. Corporate securities other than bonds, such as preferred stock, are frequently rated as well, and government bonds (at the municipal, state and federal levels) and structured financial products (such as CMOs, CDOs, etc.) are also rated. See Table 1B for an overview of ratings categories.

[2] See Graham and Harvey (2001) for a survey of financial executives' attitudes toward credit ratings, Campbell and Taksler (2003) for recent evidence on the effect of ratings on corporate bond prices, and Tang (2006) regarding the information transmission of ratings. Kisgen (2006) shows how firm capital structure decisions are affected by credit rating considerations.

[3] Early on, rating agencies tried an alternative revenue model that charged users of ratings. This model suffers from being very dependent on the enforcement of contractual limits to how customers can share ratings information they receive. As pointed out by White (2002), the change from user-paid to issuer-paid ratings as the dominant model "in the early 1970s coincides with the spread of low-cost photo-copying".

likely prefer favorable ratings, and not necessarily fully truthful ones. This disagreement leads to an agency problem. The desire of raters to please paying customers may thus potentially lead to compromised quality of credit ratings. It has been suggested that the key feature that keeps this tension in check is the raters' concern for their reputations as providers of honest and accurate ratings (see e.g. Cantor and Packer (1994) and Smith and Ingo (2002)). Rating agencies' reputations are indeed considered critical by industry observers. According to a Bear Stearns & Co equity analyst in June 2007, S&P claimed that "reputation is more important than revenues". Bloomberg news cites Moody's CEO Raymond McDaniel stating that "we are in a business where reputational capital is more important".[4] Former executive VP of Moody's Thomas McGuire stated in 1995 that "what's driving us is primarily the issue of preserving our track record. That's our bread and butter."[5]

A theoretical literature that begins with Klein and Leffler (1983) argues that the formation of reputations can help support quality provision in markets where information problems would otherwise preclude it (see also e.g. Shapiro 1983, and Cooper and Ross 1984, Diamond 1989, Mailath and Samuelson 2001, Bar-Isaac 2005, and Bar-Isaac and Tadelis forthcoming). In the standard setting, users care about output quality. However, they can only assess the quality of a seller's product after using it, so they must make purchase decisions without this information. The provision of high quality under such imperfect information is not an equilibrium in a one-shot model, but if interactions are repeated and quality in previous periods is known, high quality may be sustainable in equilibrium. In Klein and Leffler's multi-period model, producers' quality history is common knowledge and consumers can condition their decisions on that history. In a reputational equilibrium, sellers are induced to provide high quality (at a cost) when the value of expected future rents associated with a maintained reputation exceeds the temporary profit gains from delivering lower quality goods. Something akin to this mechanism may be at work in the ratings industry.

In Klein and Leffler's setting, the building and maintenance of reputation is likely to be heavily affected by competition, and usually for the worse. Competition will reduce the effectiveness of the reputational mechanism for two reasons. First, reputations are only

[4] Bloomberg News March-11-2008, "Moody's, S&P Defer Cuts on AAA Subprime, Hiding Loss".
[5] Institutional investor, 10-1995, "Ratings Trouble".

valuable if there are future producer rents. Since competition typically reduces rents, the incentive for maintaining a reputation is correspondingly reduced by competition. Second, if the demand elasticity facing individual sellers is higher in a competitive market, the temptation to reduce prices or otherwise attract business may be stronger, again undermining the value of preserving a reputation for high-quality ratings in the hope of garnering future rents.

On the other hand, competition may enhance the effectiveness of the reputational mechanism if the existence of competitive choice is required to make the loss of reputation a real threat. In Hörner's (2002) model, *"competition endogenously generates the outside option inducing disappointed consumers to leave the firm"*. Only when consumers have a choice of supplier does the loss of reputation lead to lost business. Hence, Hörner's theory provides an alternative prediction about the effect of increased competition on the reputational mechanism: the quality of ratings may increase with competition (at least over some range).

Both sets of theoretical arguments plausibly apply to the credit rating industry. However, of the two positions, the argument that ratings would be of better quality if there was more competition has been raised most often in policy debates. For example, Paul Schott Stevens, the President of the Investment Company Institute, stated "I firmly believe that robust competition for the credit rating industry is the best way to promote the continued integrity and reliability of their ratings" in testimony for a US Senate Committee on Banking, Housing, and Urban Affairs.[6] Thus, our analysis of this issue is clearly timely.

The credit ratings industry provides a natural environment for studying the effect of competition on reputation and its ability to mitigate potential agency problems.[7] The environment differs from the standard setting where there are two parties: producers who produce a good of ex ante unobservable quality and consumers who must decide whether to

[6] See http://www.financial-planning.com/asset/article/527499/fund-industry-group-calls-more-credit.html

[7] Other industries where reputations have been studied empirically include equity analysts (Chevalier Ellison (1999), Hong Kubik (2003) and Hong Kacperczyk (2008)), auto mechanics (Hubbard (2002)), online trading (Cabral Hortaçsu (2006)) and restaurants (Jin Leslie (2003, 2008)). Using a natural experiment (a merger), Hong and Kacperczyk (2008) find that competition reduced biases for earnings analysts (i.e. probably improved quality). Among the many interesting differences, equity analysts face quicker feedback (earning forecasts are usually for less than a year), and have personal (as opposed to firm) reputations.

buy a product where sellers are evaluated by their reputations. In the credit ratings industry, there are three parties: ratings agencies, firms, and investors. The rating agencies have a reputation for the quality of their ratings. Investors attempt to determine the value of securities using these ratings. Firms must then choose which rating agencies (if any) to use, based on whether investors will assign value to them. Also, regulation may require investors to pay particular attention to ratings (e.g., many investors – pension funds, insurance companies, etc. – can only consider holding securities with investment grade ratings). Owing to these factors, the credit ratings industry is a slightly more complicated setting than that used in standard models. However, since the fundamental research question is the same (whether reputations can motivate the production of temporarily unobservable high quality services), it seems natural that many predictions should apply. A few conditions are obvious. First, theories of reputation will only apply to the ratings industry if investors and issuers (firms) agree about the reputation established by raters. This seems plausible since corporate default, the key event for the ex post assessment of ratings quality, is publicly observable. Other information regarding security payoffs is also typically common knowledge once the payoffs are realized. Second, the provision of quality must be costly to producers. Presumably, informative ratings are expensive to produce because they require the input of significant skilled labor and require upfront investment in experience and industry knowledge, whereas low quality ratings are cheaper to produce. Perhaps the largest potential cost to providing honest and accurate ratings is the potential forgone revenue from unhappy issuers.[8]

Until the late 1990's, two agencies – Moody's and Standard & Poor's (S&P), founded in 1909 and 1916, respectively – were the dominant rating agencies of U.S. corporate debt. Other rating agencies, such as Duff & Phelps, which entered in the early 1970s, were considerably smaller. Fitch Ratings, although as old as the main agencies (it was founded in 1913 and has rated bonds on the AAA to D scale since 1924), was historically much smaller.[9] Starting in 1989, and especially since its acquisition by a French investor in 1997, Fitch has invested in growing its market share to become an alternative to S&P and Moody's, growing to more or

[8] Even if there is no price premium ever paid for favorable ratings, amounts of future business could quite possibly be related to current ratings. However, this is a speculative argument, since detailed revenues and fees are not public information.

[9] See Cantor and Packer (1994) for evidence that Fitch still had a very low market share of the market for rating corporate securities in the early 1990-ies.

less size-parity through both organic growth and acquisitions.[10] Acquisitions include IBCA (British) in 1997, Duff & Phelps Credit Rating (American), and Thomson Bankwatch (Canadian) in 2000. Fitch's growth has varied considerably across industries, which is important to the construction of our empirical tests. Over the decade starting in the mid-1990s that we study, Fitch's share of corporate bond ratings issued has increased from around 10% to approximately one third of the market.[11]

We test predictions about the impact of competition on reputation building made by several theories, using the growth of Fitch's market share as the measure of competition faced by other rating firms (S&P and Moody's). In our tests, we exploit the fact that entry varied across industries.[12] We rely on three different types of evidence. First, ratings issued by S&P and Moody's increased (moved closer to the top AAA rating) as competition increased.[13] Second, the correlation between bond yields and ratings fell. Third, we find evidence of changes in equity price responses to firm downgrades. As competition increased, downgrade returns became larger in absolute value, consistent with a lower bar being set for the rating categories. We observe an even greater price decline in response to competitive entry if the rating downgrade takes the issuer from the investment grade category to the speculative grade one.

While we present three distinct pieces of evidence that suggest competition led to poor ratings quality, it is possible that our results are misleading due to some omitted variable. For instance, could Fitch's rate of entry in a particular industry be correlated with future changes in

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[10] We use a simple count-based measure of market share, which may overstate Fitch's revenue market share slightly (if Fitch issues more ratings without being compensated than S&P and Moody's).

[11] This is the average across market shares at the 2-digit NAICS industry level. The same pattern is true for the median market share across these industries as well. In 2005-2006, Fitch's market share was highest in real estate, retail trade, utilities, construction and finance. Fitch remained relatively less represented in agriculture, educational services and transport. The largest gains (increase from 1997-98 to 2005-2006) were in public administration, real estate and construction, waste management and related, and retail trade.

[12] It's important for our empirical approach that industry-level market shares are informative about the competitive pressure across industries. Since rating agencies rely on extensive industry-specific knowledge to evaluate firm credit worthiness, it seems likely that the competitive situation varies across industries. Indirect evidence for this can be seen in the large number of industry-level reports published by the rating agencies.

[13] Blume, Lim, and Mackinlay (1998) document a trend toward tougher ratings standards in the period preceding our sample.

ratings levels, perhaps due to industry performance changes (beyond what's captured by firm controls)? One possibility is that a period of less-friendly credit ratings coincides with demand for alternative ratings by issuers who prefer not to see their ratings decline. We believe that this is unlikely to explain our findings, however, since we find that Fitch's entry is correlated with friendlier ratings. Also, this explanation does not seem to explain why ratings become less correlated with bond yields as competition increases. We also explicitly test several theories of entry which might interfere with our interpretations. We find that Fitch's market share is not tied to increases or decreases in demand for debt in an industry, the amount of ratings issued in an industry, or industry profitability. Finally, we use an instrumental variables regression to address possible endogeneity concerns regarding Fitch's market share. We use the *predicted* market share in each industry from 1996 and onwards by extrapolating from the 1995 market share. Collectively, these additional tests lend greater credibility to our findings.

There are several implications of our findings. First, the fact that ratings quality seems to decrease with competition provides support for the standard economic theories of reputation (e.g., Klein and Leffler (1983)). Obviously, these findings do not necessarily indicate misbehavior by rating agencies, only that the equilibrium in the ratings industry relies on rents to reward reputation-building activities which are costly in the short run, and that the absence of such rents reduces the amount of reputation-building. Second, encouraging competition may reduce monopolistic (or in the case of ratings, oligopolistic) rents, but our findings consistently suggest that it is not likely to improve quality. For policy makers, the benefits and costs of competition must be carefully compared.

There are a number of caveats and limitations to our findings. First, we only consider corporate ratings, not ratings of CDOs, mortgage-backed securities or other structured products.[14] Second, our findings have limited implications for the efficacy of reputation mechanisms in other imperfectly-competitive setting, since the ratings industry is a particular in many ways. For example, Hong and Kacperczyk (2008) find positive effects of competition among equity analysts. These are different in many ways, including the underlying revenue

[14] Doherty, Kartasheva, and Phillips (2008) examine the effect of competitive entry among rating agencies of the insurance market. In contrast to our findings in the corporate bond arena, they find that the entry of S&P as a competitor to the incumbent monopolist of A.M. Best led to improved rating content.

model (equity analysts are paid indirectly by the users of recommendations, as opposed to the subjects of their analysis) and the rate at which quality feedback occurs (equity analysts make short-term predictions, whereas many corporate bonds are first rated ten or even twenty years before they mature, before which time any evaluation of the rating's accuracy is likely incomplete). Third, we disregard many potential important aspects of reputation, such as how the reputational mechanism varies over firms' life-cycles (see Diamond (1989)) and how entrants appear in the industry (Mailath and Samuelson (2001)).

The rest of the paper is organized as follows. In Section 2, we discuss credit ratings and the underlying industry in more detail. In Section 3, we present the predictions of various theories, and the methodology used to test them. We present the data in Section 4 and results in Section 5. Concluding remarks can be found in Section 6.

2. Credit ratings: background and policy debate

Credit ratings range from AAA to D (see Table 1B for an overview of the ratings levels for the three main rating agencies and our numerical value assignments for our empirical work).[15] There are two main types of ratings. Bond ratings are provided for a vast majority of publicly-traded bonds in the United States (U.S.). Firm (or Issuer) ratings are produced by each of the three main agencies for all U.S. public firms that issue public debt. Ratings are typically shared freely by the rating agencies; whose revenues derive from charges to the firms whose credit quality is being assessed. Fees for bond ratings typically consist of a fixed fee per year coupled with a larger upfront fee which is charged when the bond issue is first rated at time of issuance.[16] Paying for firm ratings is voluntary, although raters will *only* consider non-public information provided by the firm itself if they receive payment from the corporate issuer (see Jorion et al. (2005) regarding raters' access to non-public information). Ratings generated at the request of the issuer are referred to as solicited ratings for which the aforementioned fees apply, whereas ratings assigned not at the issuer's request are called unsolicited. Rating

[15] Sylla (2002) presents an excellent history of the ratings industry in the US.

[16] Fees vary with the face value of a bond issue, but usually in a non-linear way (i.e., they are capped). Also, active issuers may receive quantity discounts. In February, 2008, S&P shared information about their rating fee structure, including that corporate issuers (including industrial and financial service companies) pay "up to 4.25 basis points for most transactions" and that the minimum fee is $67,500. Also, "S&P will consider alternative fee arrangements for volume issuers and other entities that want multi-year ratings services agreements" (Standard and Poor's 2008).

agencies also provide various other types of ratings, such as short-term credit opinions and various industry-specific ratings.

Since 1975, the Securities and Exchange Commission (SEC) has limited competition in the market for credit ratings by designating only certain firms as "Nationally Recognized Statistical Rating Organizations" (NRSROs). This may induce concerns for maintaining a reputation of quality ratings beyond that induced by investors and their demand for high quality ratings. It may also make entry in the industry more difficult, since many investors will only consider ratings by an NRSRO when making investment decisions.[17] Some argue, such as SEC Commissioner Paul S. Atkins, that "the unintended consequence of the SEC's approach to credit rating agencies was to limit competition and information flowing to investors. The legislative history reflects a genuine concern that the SEC facilitated the creation of — and perpetuated — an oligopoly in the credit rating business. Indeed, today, three NRSRO-designated firms have more than 90 percent of the market share."[18]

To what extent might rating agencies diminish either the quality or informativeness of their ratings to garner further market share? It has in fact been alleged that Brian Clarkson, upon being named President of Moody's in August 2007, "set out to make [the firm] more client-friendly and focused on market share".[19] In recent US Congressional hearings, practitioners have spoken out against the rating agencies and the SEC's process for recognizing these agencies, of which there are currently only five with the esteemed designation of NRSROs. The President of the Investment Company Institute, Paul Schott Stevens, said during Senate testimony that "unfortunately, the current designation process does not promote – but, in fact, creates a barrier to – competition."[20]

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[17] See Boot, Milbourn and Schmeits (2006) for both a discussion and model of such investor restrictions to hold only investment grade debt securities.

[18] See "Speech by SEC Commissioner: Remarks to the Institute of International Bankers", by SEC Commissioner Paul S. Atkins, March 3, 2008. Link to full speech is here: (http://www.sec.gov/news/speech/2008/spch030308psa.htm)

[19] See "Rating Game – As Housing Boomed, Moody's Opened Up", *Wall Street Journal*, April 11, 2008, page A1.

[20] See http://www.financial-planning.com/asset/article/527499/fund-industry-group-calls-more-credit.html

3. Theory, hypotheses and methodology

The key empirical challenge in this study is to define rating quality in a theoretically appealing and empirically relevant manner. The SEC (2003) uses the phrase that they want to promote a market environment resulting in "credible and reliable ratings". In our attempt to understand the impact of increased competition in this industry, we use several complementary approaches and three main datasets to evaluate rating quality. Our methods are based on the idea that high quality ratings should be accurate, informative and honest. Hence, we assume that lower quality ratings – that is, ratings more influenced by issuer preferences – will be more favorable to issuers (i.e., higher) and less informative about credit quality. There are multiple implications of this statement. First, lower quality ratings will be on average better ratings, that is, ratings closer to the AAA end of the spectrum since this must be the universal desire of the issuers as the subject of the ratings.

Second, we also use information in equity prices. A firm's stock price tends to fall on announcement of a rating downgrade (i.e., the announcement that a firm's or bond's rating has been lowered by a rating agency).[21] If ratings standards deteriorate as competition increases, downgrades should be worse news in the wake of increased competition, since the downgraded security (or firm) has failed to pass an even lower quality bar than what was in place originally. The return to ratings downgrades should then be more negative (i.e., larger in an absolute sense) in this issuer-friendlier environment. Conversely, if ratings standards improve as competition increases, ratings downgrades should result in smaller equity price drops because a downgrade under stricter quality standards suggests less negative news. We test these predictions by examining if the negative equity returns around downgrades are smaller or larger when there is more competition. It is worth pointing out that, unlike the first prediction, this cannot be a permanent effect. In the short run, downgrades are worse news, but in the long run, the ratings distribution adjusts and downgrade returns should revert in magnitude.[22]

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[21] See, for example, Jorion et al (2005).

[22] It may seem reasonable that Fitch can only exert pressure on the ratings of S&P and Moody's if Fitch itself on average offers friendly ratings. Fitch ratings are not included in our samples, but in unreported tests comparing Fitch bond ratings to those issued by the other two rating agencies, Fitch's ratings are 0.2 steps higher (controlling for bond fixed effects), consistent with competition through ratings levels.

Third, lower quality ratings mean that ratings will reflect things other than expected repayment, and thereby rating levels will likely be less correlated with bond yields. Testing the informativeness of ratings is slightly more challenging. Direct testing using actual performance, such as the observed default rates and repayment histories for various rating categories, is impractical. Such direct testing would require a very long data horizon (since many ratings are issued for securities with long maturities for which ultimate payment performance is unobserved for a very long time). Second, for most rating categories, default is an incredibly unusual event. This doesn't mean that individual rating categories are not distinct, only that the distinction is difficult to identify empirically using actual defaults. Instead of actual payment performance, we use market prices of debt to assess the informativeness of ratings. We examine the correlation of ratings with bond yields, conditional on various controls known to correlate with yields. That is, we ask if ratings contain information about bond values beyond easily observable characteristics such as bond covenants and firm characteristics. In particular, we test if competition reduces or increases the informativeness of ratings, as measured by the conditional correlation with yields.

If ratings in practice are fraught with imperfections in that they become of lower quality and informativeness, then this is most likely the case because the subjects of these ratings (the issuing firms) have a strict preference for more favorable ratings. However, there should be some cross-sectional variation among firms with regards to their preferences for better ratings. In particular, more heavily-indebted firms are likely to care more about ratings than less indebted firms.[23] We therefore exploit cross-firm variation in the importance of ratings to issuers, and predict that any effect of competition would be stronger for firms with higher leverage.

Our tests rely on the use of Fitch's market share as a measure of competition. We calculate this based on the number of bond ratings issued. This is not a perfect measure of market share, and revenue share would probably be preferable but is not readily available. We believe that Fitch's market share of bond ratings is surely indicative of the competitive threat to S&P and Moody's in a segment of the market for ratings. One advantage of using individual

[23] This interpretation emerges from the survey data presented in Graham and Harvey (2001).

bond ratings is that it affords us a very large dataset. As described in the next section, our sample covering the early 1990s through 2007 yields over one million ratings.[24]

4. Data

Our tests require drawing data from a number of sources. We collect data on credit ratings for individual bonds (the issues) as well as for firms (the issuers), on firm characteristics and accounting numbers, on equity returns around rating downgrade events, and on bond yields for rated securities.

Data on bond ratings and market shares are drawn from the Mergent Fixed Income Securities Database (FISD). This database provides both issue- and issuer-specific data. We use data on ratings by S&P, Moody's and Fitch of individual issues (bonds) to estimate the market share of Fitch in each industry-year cell. The total number of bond ratings used to calculate market shares is approximately 1.1 million. Each bond rating is matched to an industry using the issuer's Cusip. There are more ratings around the year 2000 than in other years, but no year has fewer than 30,000 ratings. We define Fitch's market share as the fraction of all bond ratings in a year-industry cell performed by Fitch, where industries refer to the 2-digit North American Industry Classification System (NAICS) industries and our sample years run from 1995 to 2006 (although many of our tests will not use the first few years of data). Figure 1 presents a moving average of monthly market shares for Fitch from 1998 to 2006.[25] Fitch's market share increases especially fast in 2000, coinciding with two acquisitions.[26] For each bond rating issued by Moody's or Standard and Poor's, we identify the preceding rating of the same bond, as well as whether the bond has been rated by Fitch. We have used 4-digit industry classifications with very similar results throughout, but prefer 2-digit industries for two

[24] As a robustness test, we have also used an alternative measure of competition, the log of the number of ratings issued by Fitch in an industry-year. This variable is not mechanically affected by any decisions of S&P and Moody's and may therefore be considered cleaner than Fitch's market share from an identification standpoint. Results with this alternative measure of competitive pressure are with few exceptions statistically stronger, and with slightly larger magnitudes than the results presented in the paper.

[25] In tests, we use the total market share for each industry-year. This figure presents moving averages of total monthly market share across industries in order to provide a sense of the time path of Fitch's entry.

[26] Potentially, market share increases due to organic growth and acquisitions have different competitive impact, and including data from 2000 may make our results less representative. We have rerun our ratings levels regressions (Tables 3, 4, 6) using only post-2000 data, or all years except 2000, and uncover qualitatively similar results.

reasons. First, using larger industries reduces the noise in market shares estimates, reducing measurement error. Second, it's not clear that narrow 4-digit industries are actually competitively distinct (for credit rating agencies competing for business). The advantage of getting a larger number of distinct observations by using narrower industries does not seem to compensate for these disadvantages.

Firm ratings and accounting data are collected from the Compustat Industrial and Operating Segments databases. Compustat also contains S&P issuer credit ratings, defined as "a current opinion of an issuer's overall creditworthiness, apart from its ability to repay individual obligations. This opinion focuses on the obligor's capacity and willingness to meet its long-term financial commitments (those with maturities of more than one year) as they come due". We examine these ratings as well as individual bond ratings by Moody's and S&P. An important caveat to the use of these Compustat long-term debt ratings is the fact that they are updated only annually. In other tests below that require more precise calendar information on ratings changes, we rely on another database.

To identify bond yields, we use bond transaction data from the Mergent FISD database. This dataset covers all bond acquisitions and disposals (sales, redemptions) since 1995 by insurance companies. We exclude bonds denominated in foreign currencies, as well as any bonds that are callable, puttable, convertible, substitutable or exchangeable. We also exclude US issues by foreign issuers (i.e., Yankee bonds). We drop defaulted bond issues, bonds denominated in foreign currency, and bonds with refund protection. We drop variable coupon bonds (because their yields to maturity are harder to calculate). We also require several control variables (such as issuer industry) to be available, and drop bond trades with very high or very low sales prices to avoid data errors (this constraint does not affect our results). Most of these restrictions do not reduce the sample size much. We match each bond transaction to the most recent rating of the bond by Moody's or S&P, and throw out any bonds with no ratings in the month preceding the transaction. If there is more than one rating on the same date, we use the median of the most recent ratings. The remaining sample of bond transactions consists of a little more than one hundred thousand observations (each observation corresponds to one bond trade).

For each bond transaction, we determine the yield to maturity implied by the price at which trading took place (trades are quoted in terms of bond prices relative to bond face value), taking care to correctly time the coupons (typically semi-annual) and final payment. We use a numerical procedure to estimate yields. Because of the sample restrictions (e.g., no floating rate bonds), this is straightforward and fairly fast, and the precise numerical procedure is immaterial. We have tried the secant method, an approximate Newton-Raphson method, and methods exploiting the polynomial structure of the problem with virtually identical results. In the bond trade sample, the average yield to maturity is 6.5%. We use the yield to maturity to calculate yield spreads by subtracting the yield for the government bond with closest maturity (disregarding the fact that coupon payments occur before maturity). Government bond yield data is from the Federal Reserve's H15 reports. For each bond in this sample, we also try to identify the initial issue yield, and match that to an early rating.

We also collect data on firm upgrades and downgrades, which are changes in firm (issuer) ratings. The source for these data is Standard & Poor's Ratings History. We hand-match this sample to CRSP. Through this process, we obtain a total of 1,585 issuing firm credit rating downgrades with some matching stock return data for 543 different firms (our number of observations in some regressions is somewhat reduced due to limited availability of independent variables). Of these downgrades, 221 are downward movements from investment grade (BBB- and higher) to junk grade (BB+ and lower), which has an important practical consequence for investor participation.

An overview of the most important variables is presented in Table 1A. The number of observations for Fitch's market share refers to the number of industry-year cells.

5. Empirical results

This section presents our evidence from the various tests of rating quality and how it is seemingly affected by changes in the competitive landscape of rating agencies.

5.1. Bond and firm credit rating levels

The first test of ratings quality and how this is affected by increased competition is for the level of firm credit ratings. We regress firm ratings on Fitch's market share. Results are presented in Table 2. In column one, no controls are included. Errors are clustered by industry-

year cell, since this is the level at which our measure of interest varies. In this sample, there is a significant positive correlation between competition and credit ratings, suggesting that more competition pushes ratings toward the higher end of the rating spectrum (i.e., toward AAA). This pattern is clearly illustrated in Figure 2 which plots the frequency of each rating for industry-years with high and low values for Fitch's market share. As the graph shows, all investment grade ratings (i.e. BBB- and above) are more common under high competition, and all junk bond ratings (i.e. BB+ and below) are more common under low competition. In other words, the figure and the regression analysis offer complementary evidence that competition is correlated with higher ratings. The result that competition coincides with ratings that are friendly to raters, which we interpret as a suggestion of lower quality, is consistent with theories (along the lines of Klein and Leffler (1984)) that predict a negative effect of competition on product quality.

Of course, the estimated coefficients in column one may be unreliable since no controls are included. In column two, we rectify this by including year and industry dummies. This pushes up the R-squared significantly, and reduces the coefficient and standard error on competition. In this specification, the coefficient on Fitch's market share remains positive and significant. The magnitude is modest but non-trivial. For a one standard deviation change in competition (0.142), average ratings are predicted to increase by 0.19. This corresponds to a one rating step upgrade (e.g., BBB+ to A-) of approximately one out of every five firms. Since the variable used to capture competition is likely to be noisy, the estimated coefficient is biased toward zero due to measurement bias. The true magnitude may therefore be larger than that implied by our coefficient estimate.

On the other hand, firm level effects may potentially bias our findings either way. In column three, we include firm fixed effects (making industry fixed effects redundant), which absorb most of the variation in the dependent variable (firm ratings are fairly stable). The estimated effect of competition remains positive and significant, and the implied magnitude is close, albeit slightly smaller, corresponding to approximately one in nine firms. So far, we have not controlled for any time-varying features of a firm. In column four, we also include further firm controls related to firm size, profitability, indebtedness, and so on (see Table 2 for

the complete set of controls) to capture any time variation in firms' performance. The estimated coefficient on Fitch's market share is very similar to the one found in the previous specification.

Implicitly, the left hand side variable treats every step of the rating system as equal in the OLS specifications (see Table 1B for details of the numerical rating variable). There is no reason for this to be accurate, however. In column five, we run an ordered probit regression instead of OLS. This specification allows each cut-off to be estimated and so implicitly allows the effect of dependent variables to vary across different levels of ratings. The regression therefore uses data more efficiently (although it may be less robust to certain econometric problems than OLS). Observe that the coefficient on Fitch's market share remains positive and significantly different from zero. The marginal effect of competition is estimated to be positive and significant at the 5% level for the rating categories AAA, AA+, AA, AA-, A+, A, A-, BBB+ and BBB. It is negative and significant at the 10% level for BBB-, and negative and significant at the 5% level for all lower rating levels. This is similar to the non-parametric results (without any controls) displayed in Figure 2.

Overall, the firm rating results contained in Table 2 suggest that ratings become more favorable to issuers when competition increases, consistent with Klein and Leffler (1983) style theories that suggest disciplining effects of reputation are diminished as competition increases.

As a robustness test, we turn now to ratings of individual bond issues as opposed to the issuing firms. Such tests should provide further evidence of how increases in competition among rating agencies can affect the quality of ratings. In addition, by studying bond level ratings, we can control for more factors, and increase the number of observations. In Table 3, we report the estimates of regressions of individual bond credit ratings on Fitch's market share. The number of observations is very large, since many firms issue very many bonds (and since many bonds are rated repeatedly). We include a range of fixed effects in order to control for the effects of observables on bond ratings. In column one, we report a regression of ratings on Fitch's market share, controlling for both year and industry fixed effects, as well as fixed effects for the lagged rating of the same bond (i.e., the previous rating by S&P or Moody's, whenever it occurred) and time to maturity (rounded to the nearest number of years) fixed effects. Competition enters with a positive sign, suggesting that more competition tends to increase

ratings, consistent with the result for firm ratings. The coefficient on Fitch's market share implies that a one standard deviation increase in competition is expected to increase ratings by an average of 0.06 steps, that is, one in 17 bonds will see an increased rating of one step, a smaller effect than that estimated for firm level credit ratings.

Often, the same bond appears many times in our data. This means we can include bond issue fixed effects, and estimate the effect of competition holding the subject of the rating fixed (of course, important aspects of a bond may change through time). In column two, we include bond issue fixed effects (making industry fixed effects redundant). In this specification, Fitch's market share is again positively and significantly related to ratings (the estimated effect is approximately 20% larger than without bond fixed effects). This result rules out that our findings are driven by any time-invariant differences between the bonds.

It is important to observe that not all features of bonds are time invariant. Therefore, in column three we include a dummy variable equal to one if Fitch has rated the same bond during the calendar year in question.[27] Controlling for Fitch's presence in individual bonds addresses the concern that Fitch tends to rate bonds with either high or low ratings (and hence that competition is correlated with the left hand side variable due to reverse causality). In particular, we might find a positive correlation between competition and ratings if Fitch systematically rates bonds with high ratings. However, the Fitch dummy enters with a negative sign, suggesting that if anything, selection effects will bias the coefficient on Fitch market share downward. In other words, whereas bonds in industry-year cells with a big Fitch presence (what we interpret as competition) tend to receive higher ratings, the particular bonds that are rated by Fitch within an industry-year cell tend to have low ratings. The estimated coefficient on Fitch market share is still positive and significant, and somewhat larger. If competition is determined at the industry level, these results are consistent with our interpretation that competition increase ratings, while firms with worse ratings seemingly gravitate towards into using Fitch (tending to generate a negative relation between Fitch's

[27] Varying the time window has only a minor impact on the regression results. For example, using a dummy equal to one for bonds for which Fitch issued a rating ever, or issued a rating at the time of issue, yields very similar regression results (the coefficient on the market share variable is similar).

presence and ratings levels).[28] Adding up selection effects across many bonds can therefore not explain our competition finding. This reduces concerns about the endogeneity of the competition measure. [29]

In column four, we exclude financial firms (NAICS 52) from the sample in case bonds in this industry are fundamentally different from non-financial firms' bonds. The sample size is cut in approximately half, and the estimated coefficient is somewhat larger, corresponding to an upgrade of roughly one in ten bonds for a one standard deviation increase in Fitch's market share. In all our bond ratings regressions, ratings increase with competition, consistent with the theories predicting a negative effect of competition on quality and in agreement with the firm-level results. The estimated magnitude is about half of the estimated impact on firm-level ratings. A one standard deviation increase in Fitch's market share is predicted to increase ratings by between 0.06 and 0.10, that is, a one step increase for between one in sixteen and one in bonds firms.

5.2. Firm credit rating levels: interaction tests

We next consider cross-sectional variation in the impact of competition on firm ratings. The effect of competition should be felt more acutely for those firms that are likely to care more about their ratings. We use firm indebtedness to identify firms with a greater concern for ratings. In Table 4, we interact Fitch's market share with four measure of indebtedness: leverage (debt over assets), long-term leverage (long-term debt over assets), a high leverage dummy (leverage is above the median in the firm's industry) and debt divided by EBITDA. These specifications allow us to include industry-year interaction fixed effects (i.e., approximately 400 dummies), thereby reducing any concern about omitted variables that are correlated with Fitch's market share and vary within industries and years. Without exception, the interactions of competition and debt are positive and highly significant. This suggests that the effect of competition is disproportionately felt for firms which are likely to care more about

[28] The negative coefficient on the Fitch dummy for individual bonds is less robust to reasonable variations in regression specification than our competition variable.

[29] We further address the selection and endogeneity issue in a variety of ways below , including an instrumental variable estimation.

their ratings because they rely more heavily on debt financing. This is consistent with the argument that competition makes ratings more responsive to firm preferences.

5.3. Bond yields and ratings

With the empirical results related to rating levels in hand, we turn now to tests of bond rating informativeness and whether it changes in response to increased competition. In particular, we examine the conditional correlation of yields and ratings in the face of increases in competition. We test this by including an interaction of Fitch's market share and a bond's credit rating in a regression of bond yields on bond characteristics. Results are reported in Table 5. Bond trades occur at different times, and interest rates are likely to be an important source of time series variation in yields, so we include fixed effects for each date (specifically, each month-year pair). In column one, we include a bond's most recent credit rating and Fitch's market share in that industry year as controls. We also include fixed effects for industries as well as controls for bond characteristics (e.g., time to maturity and size of bond issue). The coefficient on credit ratings is negative and significant, confirming that bonds with better credit ratings trade at lower yields. The coefficient on the interaction of credit rating and Fitch's market share is positive and significant, implying that the correlation of credit ratings and bond yields is lower when competition is stronger. The magnitude of this effect is economically large. A one standard deviation increase in Fitch's market share reduces the coefficient on credit ratings by approximately a fifth of the implied value when Fitch has zero market share. This is consistent with the view that competition *reduces* the information content of ratings.

Our results are robust to the inclusion of year-industry fixed effects, as seen in column 2. However, one concern with the specifications reported in columns 1 and 2 is that we have not perfectly controlled for yield curve changes. We therefore deduct the yield on the closest maturity Treasury bond for each observation, and using the resulting yield spread as dependent variable. This yield spread is 138 basis point on average, with a standard deviation of 134 basis points. The regression produces results that are very similar to the previous specification, both in terms of magnitude and significance (the sample is slightly smaller when no match can be found, e.g., because the bond's maturity is too long).[30]

[30] We have also included the interaction of date (i.e., month-year) fixed effects and the natural log of time to maturity to absorb any variation in how credit spreads vary with bond age (not reported). Also, we

These tests are base on trades of bonds, where the same bond can appear multiple times (approximately five times on average). One concern is that multiple trades capture the same information. We include bond controls (and in unreported regressions, have included bond issue fixed effects). [31] However, a more direct way of addressing this is to look at the price at issue. The Mergent/FISD database contains yield spreads at issue and we can match these to early ratings using the same process as for the secondary market trades. In column four, we use these yield spreads at issue. As with data on secondary market trades, the implied correlation between credit ratings and bond yields is weaker when Fitch's market share is higher. The magnitude is similar to, but slightly lower than that found in the trade data.

An alternative way of assessing the correlation between yields and ratings is to run first stage regressions with all controls except ratings, and then regress residuals from the first stage on bond ratings. The second stage can be done separately for subsamples split by Fitch market share. Such specifications, containing multiple stages, are harder to assess statistically than our interaction tests. However, they offer very similar results. For example, we have run a two-step version of the regressions in column one (not reported), dropping ratings and the Fitch market share-rating interaction from the first stage. We then regressed yield residuals on ratings in a second stage, having split the sample in half by competition. For the high market share sample, the R-squared is 0.086, and for the low market share sample, 0.141.[32] In other words, the explanatory power of ratings for yields is higher when Fitch's market share is low. Again, ratings are more informative when competition is low.

The results in Table 5 show that the correlation of ratings and yields declines as competition increases. In other words, bond yields (and spreads) are less related to credit ratings when Fitch has a high market share. The implication is that credit ratings are less informative for yields when competition is stronger, or contain less yield-relevant information.

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have included controls based on estimated bond durations instead of maturities (not reported). These variations have only a marginal impact on the reported regression results.

[31] We have tried clustering errors by bond issue, and consistently get much higher significance than reported in the tables (where errors are clustered by industry-year combinations).

[32] The estimated coefficients on ratings are -0.094 and -0.215, respectively, and both highly significant.

Overall, this supports the theories that predict lower quality (less informative) ratings when there is more competition.

5.4. Rating downgrade announcement returns

In the final set of tests, we explore the information content of ratings by examining equity price reactions in response to rating downgrades. We follow the general methodology of Holthausen and Leftwich (1986).[33]

A quality reduction in ratings could have two contradictory effects. First, lower quality ratings should correspond to reduced creditor quality in any particular ratings category. One can then interpret this as the rating agency "lowering the bar", implying that a rating downgrade now conveys worse news since the firm is falling below an even lower quality threshold. This should tend to make downgrade returns more negative (i.e., larger in an absolute sense) in response to an announced rating downgrade.

There is also a second, long-term effect of such quality shifts. This relates to the reduced overall informational content once the population of ratings has come to reflect these factors other than simply credit quality. Lower quality ratings reflect factors other than expected repayment on the issue and such ratings will thereby be less correlated with the creditworthiness of borrowers. This will likely tend to reduce the amount of information released with downgrades, hence moving downgrade returns toward zero. Since this effect requires the population of ratings to be moved to a new equilibrium, whereas in practice revising ratings is most likely a slow and gradual process, this effect is unlikely to be visible quickly. It is therefore likely to be more challenging to detect econometrically.

We rely on this distinction in timing and focus on the first effect, which implies larger (i.e., even more negative) downgrade returns as competition increases. If our competition

[33] See Jorion et al (2005) for a recent example. There is also a literature looking at bond price reactions to downgrades, including Weinstein (1977), Wakeman (1978), Katz (1974), Grier and Katz (1976) and Ingram, Brooks and Copeland (1983) (with mixed findings). Hand, Holthausen and Leftwich (1992) find excess returns of around -0.80% for the day of and day after a downgrade announcement.

measure correlates with ratings of worse quality, returns should be negatively correlated with competition. We present results for this type of test in Table 6.

The dependent variable in Table 6 is the equity return during an event window around a firm downgrade, net of the market return during the same period.[34] We use daily event windows of [-1,1], [-2,2] and [-10,1] (the latter window is examined in case there is pre-event return drift). In columns one to three, we control only for industry and year fixed effects. The effect of competition on returns is negative for all event windows, and the two longer event windows present significant coefficients. The implied magnitude is also large. Based on column two, an increase of Fitch's market share is implied to reduce average event returns by about half of the mean, or 15% of a standard deviation.[35]

Event returns are likely to vary by firm, and reflect features such as the variability of its share price. In column four, we control for firm volatility, along with its square and cube to capture any nonlinearities. Fitch's market share has a negative and significant effect on five day event window returns, with a magnitude essentially unchanged from column two. The distinction between junk and investment grade is often considered particularly important. In our sample, the mean equity return in a five-day event window is 3.7% for such downgrades, slightly higher than the average 2.7% return for all downgrades. By focusing on these larger events, we hope to more clearly identify the effect of competition, although it will reduce our sample size. In columns five and six, we focus exclusively on downgrades from investment grade to junk status, leaving us with 182 observations. With or without controls for volatility, in columns five and six, respectively, we find an effect of competition about three times as large for downgrades to junk as for the full sample. The effect is also more economically significant than for the full sample. A one standard deviation increase in Fitch's market share implies reduced average event returns by slightly more than the mean, or 40% of a standard deviation.

[34] We have run similar tests with equity returns around bond downgrades. Although mean returns for these are different, the result for the effect of competition is very similar.

[35] We have also clustered standard errors by firm instead of by industry-year, yielding similar results (but with somewhat higher significance).

The results in Table 6 suggest that competition has made ratings more lenient and lowered the quality bar for downgrades, making announced downgrades worse news and equity returns around such downgrades more negative.

5.5. Alternative explanations

The empirical strategy of this paper relies on industry-level variation in the extent to which Fitch competes with the incumbent rating agencies. We have suggested that the rate of entry is largely driven by factors that do not relate specifically to industry ratings quality, and therefore we needn't worry about omitted variables and can treat Fitch's market share as exogenous. Factors that might determine the rate of entry are the speed with which suitable staff can be found and the accumulation of industry expertise. The key assumption is that entry is not driven by factors such as the growth in industry demand for credit or for credit ratings, or by variables that might be correlated with ratings quality through channels other than competition. As we consider the validity of these assumptions, our first potential concern is that Fitch tends to get a relatively higher market share when an industry's credit demand is growing rapidly (and hence the industry's demand for ratings). In this case, we might simultaneously see improved ratings (if credit demand coincides with good industry performance) and lower risk premia (which might manifest itself as a lower correlation between prices and ratings).[36] Credit demand growth may not be directly observable, but we can imagine several factors that might correlate with it, such as the amount of credit outstanding in an industry, the average growth rate, the number of ratings issued, and industry profitability.

We attempt to examine alternative explanations for Fitch's relative rate of entry in different industries explicitly. To do this, we examine the extent to which Fitch's market share is correlated with various proxies for credit demand across the industries. These proxies include the number of ratings in an industry, the level and changes of industry debt outstanding, and industry profitability (asset-weighted average and median). For these tests, we separately regress each of the industry-year observations of these credit demand proxies on Fitch's market share, controlling for industry and time fixed effects. We then repeat this for

[36] This alternative story is more difficult to reconcile with our findings on equity announcement effects, but we wish nevertheless to consider it carefully.

Fitch's market share timed at different lags and leads. Results are presented in Table 7. There seems to be no correlation between the various measures of demand for credit and Fitch's market share (one coefficient out of twenty five is estimated to be significant at the 10% level, which is slightly fewer than the expected number from a random sample). We conclude that Fitch's relative market share, controlling for industry and year fixed effects, is unlikely to reflect systematic demand factors and more likely to be driven by idiosyncratic factors internal to the firm or related to labor markets.

A second approach to address endogeneity of the market share is to find an instrument which is not subject to the same potential problem. We use this approach to rerun the regressions of Table 2 using instrumental variables (IV). We use predicted market share as an instrument for the actual market share. We begin with Fitch's market share in an industry in 1995, and make a linear projection for that industry to the 2006 median market share (35.5%).[37] The start and end years (1995 and 2006) are excluded. The intuition of the instrument is that a faster increase in competition is predicted in those industries where Fitch starts out with a low presence early in the sample. The instrument is highly correlated with the actual market share (the unconditional correlation is 0.463, significant at the 0.1% level). Since this measure is predetermined, any concern about endogeneity (e.g., industries with high ratings attracting entry), is much weaker.[38] The instrumental variable estimates are predicted to be smaller than those from OLS if there is positive correlation between ratings and competition due to reverse causality (i.e., Fitch was attracted to industries with high ratings). This is the concern we are trying to address. On the other hand, the IV approach will yield stronger results than OLS if there is negative correlation between ratings and competition due to reverse causality. Based on the negative coefficient on the Fitch dummy in Table 3, the latter may seem more likely. In that case, OLS underestimates the effect of competition. In addition, the instrument is less volatile than the actual market share, and if this reduces measurement error, there may be a smaller measurement error bias in our IV estimates. All in all, finding a positive link between

[37] Algebraically, the instrument for year t and industry i is $\widehat{F_{i,t}} = F_{i,1995} + \frac{0.353 - F_{i,1995}}{2006-1995}$. This instrument is similar to the one used by Burgess and Pande (2005), although in a different context.

[38] Market shares in 1995 might still be endogenous, but generally, that would tend to yield the opposite bias. This is because a high market share in 1995 predicts a *low* increase in market share after 1995.

instrumented Fitch's market share and ratings levels will increase the confidence in our findings.

Results of IV regressions are reported in Table 8. The table replicates the OLS regressions in Table 2 (columns one to four) with two stage least squares estimation. Throughout, the strength of the instrument is more than sufficient. In column one, with no controls, the estimated coefficient is 5.7, which is larger than the corresponding OLS coefficient (which is 2.4, cf. Table 2). The estimated coefficient is significant at the 5% level. In the other columns, regressions with additional controls are reported. The coefficients are consistently larger than the OLS estimates. The first stage t-stat and the F-test (not reported) are always significant at the 0.1% level (see Staiger and Stock (1997)). The implied magnitudes are on the order of a one step increase in the rating of one out of every two bonds for a one standard deviation increase in competition. The second column, with industry and year fixed effects provides a coefficient which is insignificant at the 10% level (although fairly close), while the third and fourth columns, which include firm fixed effects, produce estimates which are significant at the 1% level. Since the IV estimates are consistently larger than the OLS estimates, it is likely that some form of endogeneity is operating against our finding, implying that the true effect of competition may in fact be larger than the OLS findings suggest. It is also possible that no endogeneity affects our OLS results, but that measurement error in the measure of competition biases the coefficient toward zero, while the instrument is less noisy. Again, the higher IV coefficients would be more indicative of the impact of competition that we have uncovered throughout the paper. The instrumental variables estimates are, however, more complicated and less consistent across specifications. The most prudent interpretation of these results may be to confirm the significance of a negative causation from competition to ratings levels, without inferring too much about magnitudes.

Apart from the endogeneity of the market share we use to measure competitive pressure on S&P and Moody's, a practical phenomenon called "ratings shopping" might also explain part of our results. Ratings shopping refers to a situation where an issuing firm asks raters for opinions on the rating they might receive for a particular issue, and then choose to get ratings only from the rater(s) promising the most favorable ratings. In the absence of any biases, but as long as rating agencies disagree, the average rating might be higher when there

are more rating agencies from which to choose. There are three reasons why we believe this is unlikely to explain our findings. First, ratings shopping would not explain our findings in the issuer-level anaysis (cf. Table 2) since these ratings all come from the single rating agency of S&P. Second, although researchers have searched for it, there is little evidence for ratings shopping among US bond issuers (see Cantor and Packer (1997) and Jewell and Livingston (1999)). Finally, if ratings shopping were a key factor in ratings demand, we would expect to see Fitch's market share increase when industry performance was poor or when ratings were declining. Neither of these patterns is observed empirically (cf. Tables 2, 3 and 7).

6. Conclusions

Credit ratings perform a function of critical importance to the financial system. The quality of ratings is certainly sustained in part by the reputational concerns of rating agencies, whose paying customers have perhaps little to no inherent interest in the quality of ratings. Competition in this industry has been increasing and there have been calls for yet more competition. Will this reduce quality, as can be predicted by an argument along the lines of Klein and Leffler (1983) or improve it, as perhaps predicted by Hörner (2002)? We test these conflicting predictions in the ratings industry using the entry of Fitch Ratings as an experiment in the amount of competition faced by the incumbent rating agencies of S&P and Moody's.[39]

We find three pieces of evidence, all consistent with a reduction in credit rating quality as Fitch increased its market presence across industries. First, competition is associated with friendlier ratings (i.e., they are closer to the highest rating AAA). Second, ratings and bond yields have become less correlated (conditional on public information about bonds and issuers). Third, at least in the short run, equity prices react more to downgrades as competition increases, consistent with a lowering of the bar for ratings categories. This is especially clear for downgrades from investment grade to junk status.

[39] The system of third party ratings is based on considerable investment by rating agencies in a reputation for honesty and precision. These investments are only likely to occur if the rewards are commensurate. The current system relies on the existence of rents outweighing the short-term interest of individual issuers. Our study confirms this, but implies no criticism of individual firms. The expectation that rating agencies should provide a public good for free is unrealistic. If they are to fulfill their function, rents may be necessary.

The economic magnitudes we find are moderate but nontrivial. Conservatively, we find that a rise in competition corresponding to a one standard deviation increase in Fitch's market share is predicted to increase the average firm and bond rating by at least 5-10% of a rating step (and increase it significantly more for more highly-levered firms), to reduce the conditional correlation between ratings and bond yields by about a sixth compared to the case when Fitch has no market share, and increase the negative equity price responses to downgrades by a quarter or more.

We provide several lines of evidence to rule out concerns about endogeneity of the market share metric we use to capture competition. First, the measure is uncorrelated with industry performance such as profitability, leverage changes and amount of debt issues. Second, in the bond rating sample, we can control for whether or not an individual bond is rated by Fitch, that is, we can directly take out any selection effect. Third, we use an instrument based on Fitch's 1995 market shares to predict actual market shares going forward. This measure, because it is predetermined, is likely not driven by selection. All these robustness checks point to a large and robust effect of competition on ratings levels. If anything, endogeneity issues seem to reduce the estimated magnitudes we have uncovered in this paper.

These results have potential policy implications. For regulators, it is worth considering that increasing competition in the ratings industry involves the risk of impairing the reputational mechanism that underlies the provision of good quality ratings. There obviously may be benefits of competition in other areas (e.g., reducing rents may be a policy goal in and of itself). Nevertheless, calls for more competition, such as by the U.S. Department of Justice (1998), deserve a caveat. For bond markets, it is clear that relying on third party ratings paid for by issuers is not a system without risks. Our empirical findings suggest that the system will work better when competition is not too severe. These results about the level of competition and the efficiency of reputational mechanisms offer support for models of the Klein and Leffler (1983) variety. In other words, competition reduces future rents and increases the short terms gains to cheating, and hence makes the reputational equilibrium harder to sustain. Obviously, these implications may not apply to other markets and in other settings.

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Table 1A: Summary statistics

	Firm credit rating	Bond credit rating	Fitch market share	Yield-to-maturity	Yield to maturity - matched treasury yield	Leverage	Debt/ EBITDA	Downgrade equity return [-1,1]	Downgrade equity return [-2,2]	Downgrade equity return [-10,1]	Investment-to-junk downgrade return [-2,2]
Mean	18.092	23.080	0.212	6.534	1.381	0.368	3.798	-0.027	-0.027	-0.030	-0.037
Median	18	23	0.225	6.482	1.722	0.343	2.840	-0.011	-0.011	-0.013	-0.015
Standard Deviation	3.930	4.943	0.142	1.690	1.341	0.203	4.073	0.095	0.110	0.133	0.109
Observations	19,756	686,990	429	35,266	33,657	19,756	19,300	1,844	1,837	1,777	221

Notes: Each column presents the coefficient estimates from an OLS or logistic specification. Intercepts not reported. The sample period is from 1995 until 2006. The left hand side variable is coded as follows: AAA = 1, AA+ = 2, AA = 3, AA- = 4, A+ = 5, A = 6, A- = 7, BBB+ = 8, BBB = 9, BBB- = 10, BB+ = 11, BB= 12, BB- = 13, B+ = 14, B = 15, B- = 16, CCC = 17, CC = 18, C = 19 and D (default) = 20. Firm charateristics are the measured at the end of the previous fiscal year (using accounting data from Compustat). Leverage is debt over total assets. Downgrade returns refer to cumulative equity returns around a firm downgrade. Investment-to-junk refers to downgrades of firms from investment grade (BBB- and better) to junk status (BB+ and worse).

Table 1B. Credit ratings

Rating group	Rating agency: Moody's	Rating agency: S&P, Fitch	Numerical value assigned*	Category definition**
Investment Grade	AAA	AAA	28	The obligor's capacity to meet its financial commitment on the obligation is extremely strong.
	Aa	AA	24, 25, 26	The obligor's capacity to meet its financial commitment on the obligation is very strong.
	A	A	21, 22, 23	Somewhat more susceptible to the adverse effects of changes in circumstances and economic conditions than obligations in higher-rated categories. However, the obligor's capacity to meet its financial commitment on the obligation is still strong.
	Baa	BBB	18, 19, 20	Exhibits adequate protection parameters. However, adverse economic conditions or changing circumstances are more likely to lead to a weakened capacity of the obligor to meet its financial commitment on the obligation.
Speculative Grade	Ba	BB	15, 16, 17	Obligations rated 'BB', 'B', 'CCC', 'CC', and 'C' are regarded as having significant speculative characteristics. 'BB' indicates the least degree of speculation and 'C' the highest. While such obligations will likely have some quality and protective characteristics, these may be outweighed by large uncertainties or major exposures to adverse conditions.
	B	B	12, 13, 14	
	Caa	CCC	9, 10, 11	
	Ca	CC	7	
	C	C	4	
Default	D	D	1	An obligation in payment default. The 'D' rating category is used when payments on an obligation are not made on the date due even if the applicable grace period has not expired, unless Standard & Poor's believes that such payments will be made during such grace period. The 'D' rating also will be used upon the filing of a bankruptcy petition or the taking of a similar action if payments on an obligation are jeopardized.

* Multiple numerical values for a single rating level represent ratings with a + qualifier, no qualifier, and a - qualifier, respectively.

** Source for ratings definitions is Standard & Poor's Ratings Definitions from 17-Mar-2008.

Table 2. Predicting firm credit ratings with Fitch market share

	Dependent Variable: firm credit rating				
Regression model	OLS	OLS	OLS	OLS	Ordered Probit
	(1)	(2)	(3)	(4)	(5)
Fitch market share	2.393 ***	1.3189 **	0.8040 *	0.7795 *	0.3615 **
	(1.123)	(0.564)	(0.417)	(0.430)	(0.156)
Year Fixed Effects		X	X	X	X
Industry Fixed Effects		X			X
Firm Fixed Effects			X	X	
Firm controls				X	
R^2	0.0057	0.1408	0.8577	0.9032	n/a
N	*N* = 19,633	*N* = 19,633	*N* = 19,633	*N* = 19,633	*N* = 19,633

Notes: Each column presents the coefficient estimates from an OLS or ordered probit specification. Intercepts not reported. The sample period is from 1995 until 2006. The left hand side variable refers to credit opinion ratings by Standard and Poor's and is coded from 28 (AAA) to 1 (D). See Table 1 for details. Fitch market share is the fraction of bond ratings in an industry-year cell performed by Fitch Ratings. Firm charateristics are the log of sales, log of book value of assets, cash divided by total assets (and it's square), EBITDA divided by total assets (and it's square), cash flow over total assets (and it's square), EBITDA over sales (and it's square), cash flow over sales (and it's square), PPE over total assets (and it's square), interest expense over EBITDA (and it's square), debt over total assets (and it's square), all measured at the end of the previous fiscal year (using accounting data from Compustat). Industries are 2-digit level North American Industry Classifications System (NAICS) industries. The standard errors for the coefficient estimates are in parentheses and are clustered by industry*year cell.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 3. Predicting bond ratings with Fitch market share

	Dependent Variable: bond issue credit rating			
Regression model	OLS All ratings	OLS All ratings	OLS All ratings	OLS Excludes NAICS52
	(1)	(2)	(3)	(4)
Fitch market share	0.4187 ** (0.1873)	0.5024 ** (0.2202)	0.5941 *** (0.1984)	0.6793 ** (0.3362)
Fitch presence (dummy)			-0.0938 ** (0.0449)	
Year Fixed Effects	X	X	X	X
Industry Fixed Effects	X		X	
Time to maturity Fixed Effects	X	X	X	X
Previous rating Fixed Effects	X	X	X	X
Bond Issue Fixed Effects		X		X
R^2	0.941	0.959	0.941	0.904
N	*N* = 368,811	*N* = 368,811	*N* = 368,811	*N* = 146,3666

Notes: Each column presents the coefficient estimates from an OLS or ordered probit specification. Intercepts not reported. The sample period is from 1995 until 2006. The left hand side variable refers to credit opinion ratings by Standard and Poor's and is coded from 28 (AAA) to 1 (D). See Table 1 for details. Fitch market share is the fraction of bond ratings in an industry-year cell performed by Fitch Ratings. Fitch rating (dummy) is a dummy variable taking the value one if Fitch issued a rating for the bond issue in the same calendar year as the rating was made. Industries are 2-digit level North American Industry Classifications System (NAICS) industries. Previous rating refers to the same bond issue's preceding rating. The standard errors for the coefficient estimates are in parentheses and are clustered by industry*year cell.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 4. Predicting rating levels with Fitch market share - interactions with leverage

	Dependent Variable: firm credit rating			
Regression model	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)
Fitch market share * leverage	6.010 ***			
	(1.645)			
Fitch market share * long term leverage		5.317 ***		
		(1.708)		
Fitch market share * high leverage dummy variable			1.587 **	
			(0.682)	
Fitch market share * Debt/EBITDA				0.3806 ***
				(0.129)
Debt/EBITDA				0.3221 ***
				(0.0483)
Firm controls	X	X	X	X
Industry * Year Fixed Effects	X	X	X	X
R^2	0.589	0.599	0.588	0.629
N	*N* = 19,633	*N* = 19,633	*N* = 19,633	*N* = 19,633

Notes: Each column presents the coefficient estimates from an OLS or logistic specification. Intercepts not reported. The sample period is from 1995 until 2006. The left hand side variable refers to firm credit opinion ratings by Standard and Poor's and is coded from 28 (AAA) to 1 (D). See Table 1 for details. Fitch market share is the fraction of bond ratings in an industry-year cell performed by Fitch Ratings. Firm charateristics are the log of sales, log of book value of assets, cash divided by total assets (and it's square), EBITDA divided by total assets (and it's square), cash flow over total assets (and it's square), EBITDA over sales (and it's square), cash flow over sales (and it's square), PPE over total assets (and it's square), interest expense over EBITDA (and it's square), debt over total assets (and it's square), all measured at the end of the previous fiscal year (using accounting data from Compustat). Leverage is debt over total assets, , long term leverage is long-term debt over assets, teh highe leverage dummy is equal to one if debt over assets is above 0.2324 (the sample median). Industries are 2-digit level North American Industry Classifications System (NAICS) industries. The standard errors for the coefficient estimates are in parentheses and are clustered by industry*year cell.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 5. Bond yields and ratings - the effect of Fitch market share

Dependent Variable	Yield to maturity	Yield to maturity	Yield spread	Yield spread (at issue)
Regression model	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)
Credit rating * Fitch market share	0.756 ***	0.953 ***	0.968 ***	0.357 ***
	(0.054)	(0.204)	(0.214)	(0.131)
Credit rating	-0.567 ***	-0.612 ***	-0.620 ***	-0.276 ***
	(0.054)	(0.063)	(0.063)	(0.030)
Fitch market share	-14.283 **			
	(3.699)			
Log of time to maturity	-0.475 *	-0.484 *	-1.204 ***	0.487 ***
	(0.275)	(0.273)	(0.165)	(0.062)
Log of time to maturity, squared	0.212 ***	0.222 ***	0.268 ***	-0.079 ***
	(0.048)	(0.048)	(0.035)	(0.017)
Log of offering amount	-0.009	-0.099	-0.302 ***	-0.453
	(0.116)	(0.126)	(0.108)	(0.307)
Log of offering amount, squared	-0.007	-0.003	0.006	-0.017
	(0.005)	(0.005)	(0.004)	(0.013)
Date Fixed Effects (Month - Year)	X	X	X	X
Industry Fixed Effects	X			
Year - Industry Fixed Effects		X	X	X
R^2	0.567	0.594	0.503	0.521
N	*N* = 113,125	*N* = 113,125	*N* = 110,965	*N* = 9,161

Notes: Each column presents the coefficient estimates from an OLS regression. Intercepts not reported. Each observation is the yield to maturity of a bond in one transaction. The sample period is from 1995 until 2006. The left hand side variable in teh column one to four is the yield to maturiy implied by the price in a bond trade reported by FISD . In column five, the dependent variables is the yield to maturity minus the yield to maturity of teh government bond with the closest maturity. Credit ratings are bond credit rating issued by Standard and Poors and Moody's (reported by FISD), and represent the latest preceding the transaction (if several were issued simulatnesouly, we use the average). Fitch market share is the fraction of bond ratings in an industry-year cell issued by Fitch Ratings. Industries are 2-digit level North American Industry Classifications System (NAICS) industries. Bonds are excluded if they have non-standard features (see text for details) or negative yields or yields above 20%. The standard errors for the coefficient estimates are in parentheses and are clustered by industry*year cell.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 6. Announcement returns around Firm credit rating downgrades - the effect of Fitch market share

	Dependent Variable: equity return [t1,t2]					
Regression model [t1,t2]	OLS [-1,1]	OLS [-2,2]	OLS [-10,1]	OLS [-2,2]	OLS [-2,2]	OLS [-2,2]
	(1)	(2)	(3)	(4)	(5)	(6)
Fitch market share	-0.046	-0.093 *	-0.112 **	-0.094 *	-0.290 ***	-0.307 ***
	(0.037)	(0.053)	(0.057)	(0.050)	(0.090)	(0.097)
Volatility				-1.059		-10.820
				(1.303)		(6.858)
Volatility squared				-10.092		305.4 *
				(28.57)		(173.51)
Volatility cubed				122.7		-2695.8 **
				(158.7)		(1272.7)
Industry Fixed Effects	X	X	X	X	X	X
Year Fixed Effects	X	X	X	X	X	X
R^2	0.043	0.053	0.038	0.109	0.287	0.364
N	*N* = 1,585	*N* = 1,580	*N* = 1,533	*N* = 1,552	*N* = 182	*N* = 179

Notes: Each column presents the coefficient estimates from an OLS regression. Intercepts not reported. Returns are for firm equity, as reported in the CRSP database. The sample period is from 1996 until 2006. The left hand side variable is the cumulative equity return from time t1 to t2 (where zero represents the day of the downgrade return around a rating downgrade), calculated from CRSP data and net of the value-weighted market return. Observations with event returns larger than 50 percent or lower than minus 50 percent are excluded. Volatility is the standard deviation of daily stock returns in the preceding 120 trading days. Fitch market share is the fraction of bond ratings in an industry-year cell performed by Fitch Ratings. Industries are 2-digit level North American Industry Classifications System (NAICS) industries. The standard errors for the coefficient estimates are in parentheses and are clustered by industry*year cell.
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 7. Fitch's market share and segment characteristics

	Independent Variable: Fitch's market share				
Dependent variable:	# Ratings issued	Industry debt ($)	Change in ind. debt ($)	Industry profitability	Ind. profitability (median)
Timing of Fitch's market share	(1)	(2)	(3)	(4)	(5)
Lead (t+2)	0.1831	-0.1079	-0.0885	-0.0108	0.0085
	(0.4055)	(0.1937)	(0.2039)	(0.0272)	(0.0156)
Lead (t+1)	0.0194	0.0824	0.2870	-0.0167	0.0039
	(0.4210)	(0.1913)	(0.1794)	(0.0248)	(0.0155)
Simultaneous (t)	0.1474	-0.0617	-0.1813	-0.0086	0.0112
	(0.4151)	(0.1739)	(0.1541)	(0.0251)	(0.0158)
Lag (t+1)	0.2968	-0.2615	-0.1362	0.0151	-0.0008
	(0.3367)	(0.1673)	(0.1584)	(0.0245)	(0.0149)
Lag (t+2)	0.2015	-0.3075 *	0.1018	0.0213	0.0221
	(0.3190)	(0.1768)	(0.1577)	(0.0237)	(0.0165)
Industry Fixed Effects	X	X	X	X	X
Year Fixed Effects	X	X	X	X	X
N	$N \leq 266$	$N \leq 266$	$N \leq 266$	$N \leq 266$	$N \leq 266$

Notes: Each coefficient estimate refers to one OLS specification (different rows represent regressions which differ only in the timing of the independent variable). Each regression includes year and industry fixed effects. For each regression, the coefficient estimate for Fitch's market share is reported. The sample period is from 1995 until 2006. Number of ratings issued is the log of the aggregate number of credit ratings issued for bonds in an industry. Industry debt is the log of the total amount of outstanding debt of Compustat firms in an industry. The change in industry debt is the log of industry debt minus it's previous value. Industry profitability is an asset-weighted average of the ratio of EBITDA to assets in Compustat firms in the industry and Industry profitabiltiy (median) is the median EBITDA-asset ratio across all Compustat firms in the industry. Fitch market share is the fraction of bond ratings in an industry-year cell performed by Fitch Ratings. The number of observations is 266 or fewer (some observations are lost due to lags). The standard errors for the coefficient estimates are in parentheses and are heteroskedasticity-robust.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 8. Predicting bond and firm ratings with Fitch market share - Instrumental Variables

	Dependent Variable: firm credit rating			
Regression model	2SLS All ratings	2SLS All ratings	2SLS All ratings	2SLS All ratings
Second stage	(1)	(2)	(3)	(4)
Fitch market share (instrumented)	5.7475 **	14.290	6.074 ***	11.771 ***
	(1.941)	(10.011)	(2.254)	(2.299)
Year Fixed Effects	-	X	X	X
Industry Fixed Effects	-	X	X	X
Firm controls	-	-	-	X
Firm fixed effects	-	-	X	X
First stage				
Predcited market share	0.8815 ***	0.3419 ***	0.2965 ***	0.2910***
	(0.0107)	(0.0189)	(0.0242)	(0.0245)
First stage R^2	0.289	0.719	0.744	0.772
Second stage R^2	0.003	0.108	0.882	0.900
N	*N* = 16,810	*N* = 16,810	*N* = 16,810	*N* = 16,810

Notes: Each column presents the coefficient estimates from an OLS or ordered probit specification. Intercepts not reported. The sample period is from 1996 until 2006. The left hand side variable refers to credit opinion ratings by Standard and Poor's and is coded from 28 (AAA) to 1 (D). See Table 1 for details. Fitch market share is the fraction of bond ratings in an industry-year cell performed by Fitch Ratings. Fitch rating (dummy) is a dummy variable taking the value one if Fitch issued a rating for the bond issue in the same calendar year as the rating was made. Industries are 2-digit level North American Industry Classifications System (NAICS) industries. Previous rating refers to the same bond issue's preceding rating. The standard errors for the coefficient estimates are in parentheses and are clustered by industry*year cell.

* significant at 10%; ** significant at 5%; *** significant at 1%

Figure 1.

Fitch monthly market share of credit ratings (U.S. issuers)

12 month moving average 1998 - 2006

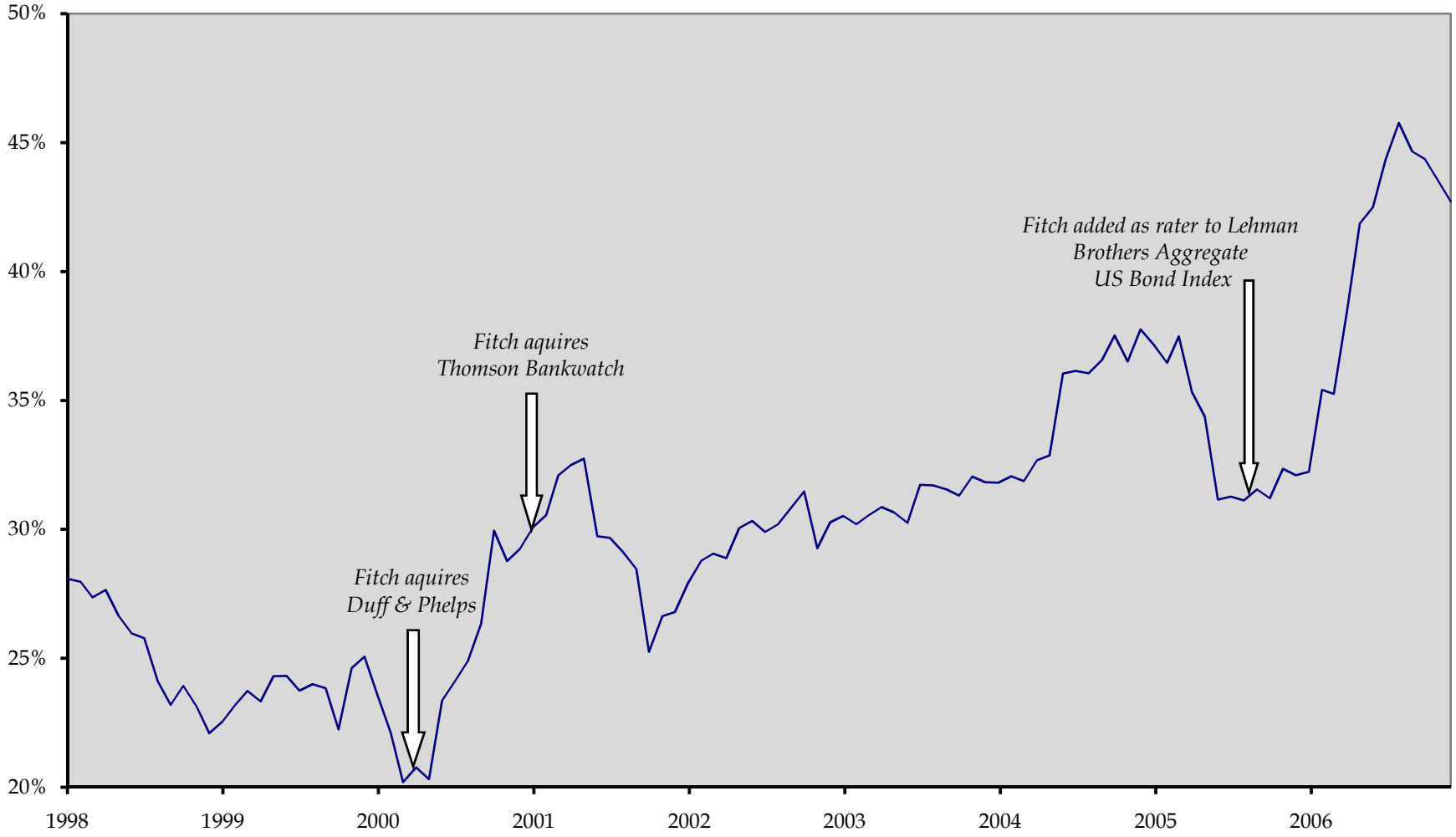

Figure 2.

Firm credit ratings distribution: high and low competition in the credit rating industry