The Quality of Credit Ratings: A Two-Sided Market Perspective

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Abstract

This paper presents a formal model of a credit rating agency. I study the consequences of the transition from an “investor-pays” model to an “issuer-pays” model on the quality standard of credit ratings chosen by the agency. I find that such a transition is likely to generate a degradation of the quality standard, which may fall below the socially efficient level. I discuss empirical implications and several reform proposals to the business model of credit rating agencies.

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1. Introduction

Credit rating agencies are for-profit companies specialized in assessing the credit worthiness of a corporation or security. They fulfill a double role of certification (by granting ratings to potential security issues) and dissemination of information (by distributing rating reports to investors). In their beginnings,\textsuperscript{1} credit rating agencies provided ratings of an issuer free of charge, and financed their operations through the sale of thick rating reports to investors. Credit rating

agencies started to charge issuers for ratings in the early 1970s. Nowadays, most
of the revenue of the three major credit rating agencies (Fitch Ratings, Moody’s
Investors Service and Standard & Poor’s Ratings Services) accrues from issuer’s
fees, while investors get rating reports free of charge.\footnote{See, for example, Moody’s Corporation (2007). In addition to the three major credit rating
agencies, there are specialized and smaller agencies. Some of them get their revenue from
investor’s fees but, according to United States Securities and Exchange Commission (2009),
rating agencies operating under the issuer-pays model have granted over 98 percent of the total
currently outstanding credit ratings. For an analysis of the structure of the credit rating industry
see White (2002).}

The transition from the “investor-pays” model to the “issuer-pays” model
raised concerns about the quality of credit ratings. Several recent cases have
revived the concerns. For example, the bad performance of the major agencies
in rating structured finance products has been suggested to be at the heart of
the subprime crisis.\footnote{On July 8, 2008, the United States Securities and Exchange Commission (2008) released
findings from extensive staff examinations of the three major rating agencies that uncovered
significant weaknesses in ratings practices: “One analyst [at one of the major credit rating
agencies] expressed concern that her firm’s model did not capture ‘half’ of the deal’s risk, but
that ‘it could be structured by cows and we would rate it.’ ” (p. 12)} The big Icelandic banks that failed in 2008 were awarded
AAA ratings by Moody’s Investors Service in 2007, and Enron Corporation was
rated investment grade by the major rating agencies just four days before it de-
clared bankruptcy in 2001. Moreover, a preliminary analysis of the default rate
of corporate bonds rated by Moody’s Investors Service between 1970 and 2007
(see Appendix A) suggests the existence of a degradation of the quality of credit
ratings. Such default rate (which is an \textit{ex post} measure of the quality of ratings)
follows a positive and significant temporal trend after filtering transitory macroe-
conomic effects out. This result suggests that the rating agency becomes more
permissive to give ratings at the same time that it changes its pricing model.\footnote{Mathis et al. (2009) provide similar evidence for the case of structured finance products. Moreover, the existence of ratings agencies that obtain their revenue exclusively from investors presents an interesting opportunity for comparisons. According to Beaver et al. (2006) and
Johnson (2003), the ratings by Egan-Jones Rating Corporation, a small rating agency that
works under the investor-pays model, are timelier and lead the ratings by Moody’s Investors
Services and by Standard & Poor’s Ratings Services.}

This paper presents a formal model of a credit rating agency that acts as a

platform between issuers of securities (e.g., corporate bonds) and investors. From this two-sided market perspective, I study the consequences of the transition from the investor-pays model to the issuer-pays model on the quality standard chosen by the rating agency. The main finding is that such a transition may generate a degradation of the quality standard, which may fall below the socially efficient level. There is a conflict of interest inherent in the issuer-pays model: rating agencies may have an interest in generating business from the firms that seek ratings, which could conflict with providing ratings of integrity. Under the investor-pays model, however, to reduce the quality standard of credit ratings could reduce their demand from investors, and so damage the business of the agencies. Finally, I analyze policy implications and reform proposals, and advocate for a change in the business model of credit rating agencies to a “platform-pays” model complemented by prudential oversight of ratings’ quality.

In the model, a credit rating agency certifies the quality of potential security issues by granting ratings, which I assume for simplicity to be binary: either “bad” or “good”. I also assume that investors are not ready to buy securities that have received a bad rating. Without loss of generality, I can thus consider that a rating is always “good”, while a “bad” rating is equivalent to a rating denial.

From a normative point of view, I show that the rating agency should give ratings only to high-quality securities when the marginal utility of issuers is sufficiently low, and should also give ratings to a positive, and strictly lower than one, fraction of low-quality securities otherwise. The intuition for these results is as follows. To give ratings to low-quality securities reduces the surpluses of investors and high-quality issuers because the average quality of the group of rated securities decreases. Thus, it is socially optimal to give ratings to low-quality securities if and only if the increment in social welfare due to the incorporation of low-quality issuers to the market for rated securities is larger than the decrement in social welfare due to the reduction in the surpluses of investors and high-quality issuers (i.e., if the marginal utility of low-quality issuers is high enough). However, to give ratings to all low-quality securities will break the market down because the quality of the group of rated securities will fall below the investors’ reservation
value.

From a positive viewpoint, I show that, under the investor-pays model, the quality standard chosen by the credit rating agency is equal to or higher than the socially efficient level. The reason for this result is that the rating agency does not internalize the surplus of issuers from getting their securities rated. Consequently, it only rates high-quality securities. On the contrary, under the issuer-pays model, the rating agency may choose a quality standard below the socially efficient level. In this case, the rating agency does not internalize the disutility that investors suffer from investing in low-quality securities. Hence, it may prefer to rate some low-quality securities in order to increase its profit. Thus, the transition from the investor-pays model to the issuer-pays model (weakly) creates a degradation of the quality standard chosen by the rating agency, leading to a degradation of the average quality of the group of rated securities.

Policy implications are straightforward: the business model of credit rating agencies should be changed to eliminate the source of quality degradation of credit ratings, i.e. the commercial link between issuers and credit rating agencies. I analyze the pros and cons of several reform proposals that have been envisaged. I conclude that a “platform-pays model” (as proposed by Mathis et al. (2009), and Richardson and White (2009))\footnote{The basic idea is that an issuer that would like its security rated pays an up-front fee to a centralized clearing platform. In turn, the platform chooses which rating agency would rate the security, pays it an up-front fee (not contingent on the outcome of the rating process), and publicly discloses the outcome of the rating process.} could cut direct commercial links between issuers and rating agencies, but it could not prevent issuers to secretly approach a credit rating agency to obtain favorable ratings through some kind of side-contracting (e.g., briberies). Hence, I support a platform-pays model complemented by prudential oversight of ratings’ quality. For example, the platform could assign potential issues to rating agencies based on historical data about their relative performance, rewarding with a larger number of securities to rate (hence, with a larger revenue) those rating agencies with the best performance. Another complementary mechanism is to regulate minimum quality standards and enforce them through costly supervision, auditing and accountability (as proposed
by Forster (2008)).

This paper builds on the recent literature on two-sided markets, borrowing extensively from its insights (see, for example, Armstrong, 2006; Jeon and Rochet, 2009; Rochet and Tirole, 2003, 2006). In particular, the model is inspired of Jeon and Rochet (2009), who incorporate two novel aspects into this strand of the literature. First, in addition to choose a price for each side of the market (e.g., issuers and investors), the platform (e.g., the rating agency) also chooses a minimum quality standard. Second, the externalities from one side to the other are not always positive: as the number of rated securities increases, the utility of investors increases up to a maximum and then decreases.

This paper contributes to the recent literature on credit rating agencies. Bolton et al. (2009) examine an industry of opportunistic rating agencies that rate complex securities (e.g., structured finance products) in a finite horizon model. They find that these agencies may overstate the quality of a security when there are more naive investors or when reputation costs are lower. Mathis et al. (2009) analyze an opportunistic credit rating agency that rates complex products in an infinite horizon model. They show that, when rating complex products becomes a major source of income for the rating agency, it is always too lax. Differently from these papers, I analyze a committed rating agency that rates traditional products (e.g., corporate bonds)\(^6\) in a two-sided market model. I find that the rating agency becomes more permissive to give ratings when it changes its pricing model from an investor-pays model to an issuer-pays model.

The next section presents the model. Section 3 characterizes the first-best and the second-best outcomes. Section 4 analyzes the consequences of the transition from the investor-pays model to the issuer-pays model on the quality standard chosen by the rating agency. Section 5 presents empirical implications. Finally, Section 6 analyzes reform proposals and proposes a possible extension. A preliminary empirical analysis is in the Appendix.

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\(^6\)A distinctive characteristic of complex versus traditional products is that the quality of the former is \textit{a priori} unknown, including to the issuer itself, while the issuer of the latter generally knows the quality of its security.
2. The Model

2.1. Agents, Technologies and Preferences

The model is an adaptation to the credit rating industry of Jeon and Rochet’s (2009) two-sided market model of an academic journal. There are three types of agents: issuers of securities, an investor, and a monopolistic credit rating agency.

**Issuers.** There is a continuum of issuers. Their mass is normalized to one. Each issuer has a security (e.g., a bond) of quality \( \theta \in \{ \theta_L, \theta_H \} \), with \( 0 < \theta_L < \theta_H < 1 \); thus, \( \theta \) can be interpreted as the probability with which a security repays, and \( 1 - \theta \) as the probability with which it defaults. A security yields 1 in the case of repayment, and 0 in the case of default. Hence, the probability of repayment of a security (i.e., its quality) is equal to its expected return.\(^7\) The probability of repayment of each security is independently drawn from the same cumulative distribution function \( F \) with \( \Pr(\theta = \theta_H) = \mu \), and \( \Pr(\theta = \theta_L) = 1 - \mu \), which is common knowledge. Hence, \( \mu \) is the fraction of high-quality securities, and \( 1 - \mu \) is the fraction of low-quality securities. The quality of each security is perfectly observed by its issuer, and by the rating agency through some costly screening technology. The investor and third-party issuers do not observe the quality of individual securities.

Issuers are impatient (i.e., they want to consume immediately), and decide whether or not to submit their securities to the rating agency in order to get a rating. If a security is rated, it can be issued (i.e., sold) at a price \( Q \). For simplicity, the price \( Q \) is assumed to be equal to the expected return of a rated security. Asymmetry of information about the quality of securities implies that they cannot be issued without the certification provided by the rating agency (i.e., without a rating). To capture these ideas in a simple way, I assume that the utility function of an issuer is:

\[
U_{IS} = \begin{cases} 
\alpha Q - f_S - f_R & \text{if the security is submitted and rated} \\
-f_S & \text{if the security is submitted and not rated} \\
0 & \text{if the security is not submitted}
\end{cases}
\]

\(^7\)Hereafter, I use the expressions “probability of repayment”, “quality” and “expected return” of a security as synonymous.
where $\alpha$ is the issuer’s marginal utility of the revenue raised by issuing a security, $f_S$ is the fee charged by the rating agency in order to consider a security for the rating process (i.e., a submission fee that is paid even if the security is not rated), and $f_R$ is the fee charged by the rating agency for including a security in the rating report (i.e., a rating fee).

**The Investor.** There is an investor that makes investment decisions on behalf of its clients (e.g., it is a fund manager). It is allowed to invest a total volume $X$ only in rated securities and in T-bills. T-bills yield a deterministic return $\delta$. If the investor decides to invest in rated securities, it has to buy the rating report (or manual), which is sold at a price $f_M$, in order to know the identity of the securities that have been rated. The investor decides the composition of the investment portfolio and receives a revenue (e.g., a bonus) that is proportional to its return. To capture these ideas in a simple way, I assume that the expected utility of the investor is:

$$U_{IN} = \begin{cases} 
\beta [QS + \delta(X - S)] - f_M & \text{if buys the report and invests in } S \text{ securities} \\
\beta \delta X - f_M & \text{if buys the report and invests only in T-bills,} \\
\beta \delta X & \text{if does not buy the report}
\end{cases}$$

where $\beta$ is the investor’s marginal utility of the return of the investment portfolio, and the term in brackets is the expected return of a portfolio of $S$ rated securities and $X - S$ T-bills.

**The rating agency.** The credit rating agency acts as a platform between issuers and the investor. It fulfills a double role of certification and dissemination of information. It certifies the quality of the group of rated securities (i.e., those securities that are included in the rating report) by committing to rate a proportion $r_H$ of high-quality securities and a proportion $r_L$ of low-quality securities.\(^8\)

The rating agency also disseminates information about the identity of the issuers whose securities have been rated through the rating report.

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\(^8\)As we will see in Section 2.2, the investor can perfectly anticipate the number of securities that should be rated from the announcement of $r_H$ and $r_L$. Hence, the fact that the investor can observe the number of securities that have been rated may act as a commitment device.
The rating agency incurs a cost $\gamma$ to perfectly observe the quality of each security that have been submitted (i.e., a rating cost). For simplicity, the costs of publishing, reproducing and distributing the rating report (i.e., the dissemination costs) are normalized to zero. The rating agency sets the quality standard $(r_H, r_L)$, and fees $f_S$, $f_R$, and $f_M$, in order to maximize its profits.

2.2. Information

Issuers and the investor can perfectly anticipate the number of securities that will be rated, the number of rated securities that will be demanded by the investor, and the expected return (i.e., the average quality) of a rated security from the quality standard and the pricing policy announced by the rating agency.

Issuers will submit their securities to get a rating when the following participation constraints are satisfied:

$$r_i[\alpha Q (r_H, r_L) - f_R] - f_S \geq 0, \quad i \in \{H, L\}. \quad (PC_{IS})$$

An issuer of type $i \in \{H, L\}$ will have its security rated with probability $r_i$, in which case its utility will be $\alpha Q (r_H, r_L) - f_R$; $Q(r_H, r_L)$ is the expected return of a rated security when the quality standard announced by the rating agency is $(r_H, r_L)$. Thus, an issuer will be willing to submit its security to get a rating as long as its expected utility is larger than the submission fee, $f_S$. Hence, if $(PC_{IS})$ are satisfied, the number of securities that will be rated is: $\mu r_H + (1 - \mu) r_L$.

Similarly, the investor will be willing to demand all the supply of rated securities (i.e., $S = \mu r_H + (1 - \mu) r_L$) when the following constraint is satisfied:

$$\beta [Q (r_H, r_L) S + \delta (X - S)] - f_M \geq \beta \delta X,$$

and nothing (i.e., $S = 0$) otherwise. This constraint can be rewritten as:

$$\beta S [Q (r_H, r_L) - \delta] - f_M \geq 0. \quad (PC_{IN})$$

Finally, the expected return of a rated security can be inferred from:

$$Q (r_H, r_L) = \frac{\mu r_H \theta_H + (1 - \mu) r_L \theta_L}{\mu r_H + (1 - \mu) r_L}. \quad (1)$$
2.3. Assumptions

The following assumptions on the value of the parameters are introduced in order to avoid non-interesting cases:

\[(A.1) \quad \theta_L < \delta < \theta_H.\]

Assumption (A.1) says that, from an investor’s point of view, it is worthwhile to invest only on high-quality securities.

\[(A.2) \quad Q(1, 1) = \mu \theta_H + (1 - \mu) \theta_L < \delta.\]

Assumption (A.2) implies that the certification function fulfilled by the rating agency is necessary for a market of securities to exist. It says that, without certification, the expected return of a security is lower than the return of a T-bill (i.e., the opportunity cost of investing in a rated security). Hence, the investor will not demand rated securities (i.e., \((PC_{1N})\) will not be satisfied).

\[(A.3)\]

\[(i) \quad \beta(\theta_H - \delta) \geq \gamma;\]
\[(ii) \quad \alpha \theta_H \geq \gamma.\]

Assumptions (A.3) (i) and (A.3) (ii) are viability conditions. They say that, if only high-quality securities are rated, then (i) the investor-pays model is viable (i.e., the rating agency makes a non-negative profit), and (ii) the issuer-pays model is viable.

2.4. Timing

The timing unfolds as follows:

— The rating agency announces the quality standard \((r_H, r_L)\), and fees \(f_S\), \(f_R\), and \(f_M\).

— Each issuer decides whether or not to submit its security to get a rating.

— The rating agency reviews all submitted securities and gives a rating (i.e., includes the security in the rating report) or not to each of them.

— The investor decides whether or not to buy the rating report and to invest in rated securities.
3. Benchmarks

3.1. The First-Best Outcome

In this section, I derive the first-best outcome that would be implemented by a social planner who could choose which securities get ratings and the composition of the portfolio of the investor. If a proportion $r_H$ of high-quality securities and a proportion $r_L$ of low-quality securities are rated, social welfare (denoted $W(r_H, r_L)$) is given by:

$$W(r_H, r_L) \equiv \alpha Q(r_H, r_L)S + \beta Q(r_H, r_L)S + \delta(X - S) - \gamma S.$$ 

The first term is the surplus of the $S$ issuers that have their securities rated, the second term is the surplus of the investor, and the third term is the rating cost.

Replacing $S$ by the number of rated securities $\mu r_H + (1 - \mu) r_L$, $Q(r_H, r_L)$ by the equivalent expression (1), and rearranging terms, social welfare can be rewritten as:

$$W(r_H, r_L) = \mu r_H [(\beta \theta_H - \delta) + (\alpha \theta_H - \gamma)] + (1 - \mu) r_L [(\alpha + \beta) \theta_L - (\beta \delta + \gamma)] + \beta \delta X,$$

where the first term is the increment on social welfare from rating a proportion $r_H$ of high-quality securities, the second term is the increment on social welfare from rating a proportion $r_L$ of low-quality securities, and the third term is a constant. Assumptions (A.1) and (A.3) (ii) imply that the expression within brackets in the first term is positive. Hence,

$$r_{FB}^H = 1.$$

The first-best optimal value for $r_L$ depends on the sign of the expression within brackets in the second term. If the social benefit from rating low-quality securities (i.e., $(\alpha + \beta) \theta_L - \gamma$) is larger than the social cost (i.e., $\beta \delta$), then all low-quality securities should be rated; otherwise, only high-quality securities should be rated. Hence,

$$r_{FB}^L = \begin{cases} 0 & \text{if } \alpha < \alpha_2, \\ 1 & \text{if } \alpha \geq \alpha_2, \end{cases} \quad \alpha_2 \equiv \frac{\gamma}{\theta_L} + \frac{\beta(\delta - \theta_L)}{\theta_L}.$$

The following Proposition summarizes.
Proposition 1. The first-best outcome \((r_{FB}^H, r_{FB}^L)\) is characterized by:

- rating only high-quality securities (i.e., \(r_{FB}^H = 1 \) and \(r_{FB}^L = 0\)) when the marginal utility of issuers is sufficiently low: \(\alpha < \frac{\gamma}{\theta_L} + \frac{\beta(\theta - \theta_L)}{\theta_L} \equiv \alpha_2\);

- rating all securities (i.e., \(r_{FB}^H = 1 \) and \(r_{FB}^L = 1\)) when the marginal utility of issuers is sufficiently high: \(\alpha \geq \alpha_2\).

I now analyze the fees, \(f_{FB}^S\), \(f_{FB}^R\) and \(f_{FB}^M\), that implement the first-best outcome when the social planner cannot fully control issuers and the investor, and has to satisfy the participation constraints \((PC_{IS})\) and \((PC_{IN})\). If \(\alpha < \alpha_2\), any price structure satisfying \(0 < f_{FB}^S, f_{FB}^S + f_{FB}^R \leq \alpha \theta_H\) and \(f_{FB}^B \leq \beta \mu (\theta_H - \delta)\) induces only high-quality issuers, and the investor to participate. If \(\alpha \geq \alpha_2\), any price structure satisfying \(f_{FB}^S + f_{FB}^R \leq \alpha Q(1,1)\) and \(f_{FB}^M \leq \beta \left[ Q(1,1) - \delta \right]\) induces all issuers and the investor to participate.

Interestingly, in the second case (i.e., \(\alpha \geq \alpha_2\)), Assumption (A.2) implies that the first-best fee for the rating report, \(f_{FB}^M\), has to be strictly negative. Since the investor generates a positive externality on issuers, it is optimal to subsidize the former by charging a negative fee for the rating report. Otherwise, the investor does not demand rated securities because the expected return of a rated security, \(Q(1,1)\), is lower than the opportunity cost, \(\delta\).

3.2. The Second-Best Outcome

The previous analysis of the first-best outcome works under the somewhat implausible assumption that the social planner could induce the investor to invest in rated securities by charging a negative price for the rating report. However, charging a negative price for the rating report would not, in practice, necessarily induce the investor to buy rated securities when the expected return of a rated security is lower than the return of a T-bill. Moreover, it would induce fake investors, who have no interest in investing in rated securities, to buy the rating report only to obtain the subsidy.

In this section, I derive the second-best outcome in which the social planner is constrained to maintain the expected return (i.e., the average quality) of a rated
security above its opportunity cost (i.e., the return of a T-bill); equivalently, the social planner is constrained to charge a non-negative fee for the rating report.

As in the previous section, under Assumptions (A.1) and (A.3) (ii) the maximization of social welfare implies that all high-quality securities should be rated:

\[ r^{SB}_{H} = 1. \]

The average quality of a rated security when all high-quality securities and a proportion \( r_L \) of low-quality securities are rated is equal to

\[ Q(1, r_L) = \frac{\mu \theta_H + (1-\mu)r_L \theta_L}{\mu + (1-\mu)r_L}. \]

From Assumptions (A.1) and (A.2), there exists \( \overline{r}_L \in (0, 1) \) such that \( Q(1, \overline{r}_L) = \delta \), \( Q(1, r_L) < \delta \) if \( r_L > \overline{r}_L \), and \( Q(1, r_L) > \delta \) if \( r_L < \overline{r}_L \). Consequently, it is never optimal to choose \( r_L > \overline{r}_L \). Hence, if \( \alpha \geq \alpha_2 \), it is second-best optimal to rate a fraction \( \overline{r}_L \) of low-quality securities. Otherwise, only high-quality securities should be rated. The following Proposition summarizes.

**Proposition 2.** The second-best outcome \((r^{SB}_{H}, r^{SB}_{L})\) is characterized by:

- rating only high-quality securities (i.e., \( r^{SB}_{H} = 1 \) and \( r^{SB}_{L} = 0 \)) when the marginal utility of issuers is sufficiently low: \( \alpha < \alpha_2 \);

- rating all high-quality securities and a proportion \( \overline{r}_L \) of low-quality securities (i.e., \( r^{SB}_{H} = 1 \) and \( r^{SB}_{L} = \overline{r}_L \)) when the marginal utility of issuers is sufficiently high: \( \alpha \geq \alpha_2 \).

4. The Quality of Credit Ratings

In this section, I analyze the consequences of the transition from the investor-pays model (i.e., \( f_S = f_R = 0 \) and \( f_M > 0 \)) to the issuer-pays model (i.e., \( f_S + f_R > 0 \) and \( f_M = 0 \)) on the quality standard, \((r_H, r_L)\), chosen by the credit rating agency.

4.1. Investor-Pays Model

Under the investor-pays model, if the rating agency commits to rate a proportion \( r_H \) of high-quality securities and a proportion \( r_L \) of low-quality securities

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such that the average quality of a rated security, \( Q(r_H, r_L) \), is larger than the opportunity cost, \( \delta \), then the rating agency’s profit (denoted \( \Pi_{IN}(r_H, r_L) \)) is given by:

\[
\Pi_{IN}(r_H, r_L) = f_M - \left[ \mu r_H + (1 - \mu) r_L \right] \gamma,
\]

where \( f_M \) is the fee for the rating report, and the second term is the rating cost. Replacing for the value of \( f_M \) that makes binding the participation constraint of the investor (\( PC_{IN} \)): \( f_M = \beta \left[ \mu r_H + (1 - \mu) r_L \right] \left[ Q(r_H, r_L) - \delta \right] \), using (1), and rearranging terms, the rating agency’s profit can be rewritten as:

\[
\Pi_{IN}(r_H, r_L) = \mu r_H \left[ \beta (\theta_H - \delta) - \gamma \right] + (1 - \mu) r_L \left[ \beta (\theta_L - \delta) - \gamma \right].
\]

Assumption (A.3) (i) implies that the expression within brackets in the first term is positive and Assumption (A.1) implies that the expression within brackets in the second term is negative. Hence, the credit rating agency includes only high-quality securities in its rating report. To give ratings to low-quality securities reduces the average quality of the group of rated securities; hence, it reduces the price that can be charged for the report and the rating agency’s profit. Consequently, the rating agency prefers not to give ratings to low-quality securities. The following Proposition summarizes.

**Proposition 3.** Under the investor-pays model, the quality standard chosen by the credit rating agency is characterized by \( r_{IH} = 1 \) and \( r_{IL} = 0 \); only high-quality securities get ratings.

### 4.2. Issuer-Pays Model

Under the issuer-pays model, the credit rating agency chooses the price structure (i.e., the submission fee, \( f_S \), and the rating fee, \( f_R \)) and the quality standard \((r_{IH}^{IS}, r_{IL}^{IS})\). In this section, I first determine the optimal price structure and then the optimal quality standard chosen by the rating agency.

#### 4.2.1. The Price Structure

Under the issuer-pays model, if the rating agency commits to rate a proportion \( r_H \) of high-quality securities and a proportion \( r_L \) of low-quality securities such that
the average quality of a rated security, \( Q(r_H, r_L) \), is larger than the opportunity cost, \( \delta \), then the rating agency’s profit (denoted \( \Pi_{IS}(r_H, r_L) \)) is given by:

\[
\Pi_{IS}(r_H, r_L) = [\mu r_H + (1 - \mu)r_L](f_S + f_R - \gamma).
\]

The monopolistic credit rating agency sets the price structure in order to extract as much as possible surplus from issuers. Hence, the submission and the rating fees are constrained above by the participation constraints of the issuers, \( (PC_{IS}) \). Direct inspection of these constraints reveals that, under free submission, the monopolistic credit rating agency can extract all the surplus from issuers through a rating fee. However, the rating agency can only extract the expected value of the surplus from the issuers that get ratings less frequently (i.e., those issuers \( i \in \{H, L\} \) such that \( r_i = \min_{j \in \{H, L\}} r_j \)) through a positive submission fee. Hence, the rating agency prefers to charge issuers only for ratings. The following Proposition summarizes.

**Proposition 4.** Under the issuer-pays model, the price structure chosen by the credit rating agency is characterized by a positive rating fee (i.e., \( f_R > 0 \)) and free submission (i.e., \( f_S = 0 \)).

### 4.2.2. The Quality Standard

Given that the rating agency chooses a price structure characterized by \( f_R > 0 \) and \( f_S = 0 \), that the issuers’ participation constraints \( (PC_{IS}) \) are binding for \( f_R = \alpha Q(r_H, r_L) \), and using (1), the rating agency’s profit can be written as:

\[
\Pi_{IS}(r_H, r_L) = \mu r_H(\alpha \theta_H - \gamma) + (1 - \mu)r_L(\alpha \theta_L - \gamma).
\]

Assumption (A.3) (ii) implies that the expression within parenthesis in the first term is positive; hence, the rating agency prefers to give ratings to all high-quality securities. The sign of the expression within parenthesis in the second term depends on the value of the parameters. If the marginal utility of issuers,

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9This is in conformity with the practice of credit rating agencies. According to United States Securities and Exchange Commission (2008), “Typically, the rating agency is paid only if the credit rating is issued.” (p. 9)
\( \alpha \), is large enough, then the credit rating agency also prefers to give ratings to a proportion \( \overline{r_L} \) of low-quality securities. The following Proposition summarizes.

**Proposition 5.** Under the issuer-pays model, the quality standard chosen by the credit rating agency is characterized by:

- rating only high-quality securities (i.e., \( r_{IS}^H = 1 \) and \( r_{IS}^L = 0 \)) when the marginal utility of issuers is sufficiently low: \( \alpha < \frac{\gamma}{\theta_L} \equiv \alpha_1 \);

- rating all high-quality securities and a proportion \( \overline{r_L} \) of low-quality securities (i.e., \( r_{IS}^H = 1 \) and \( r_{IS}^L = \overline{r_L} \)) when the marginal utility of issuers is sufficiently high: \( \alpha \geq \alpha_1 \).

### 4.3. Comparisons

In this section, I compare three scenarios (second-best, investor-pays and issuer-pays) in terms of the average quality, \( Q (r_H, r_L) \), of the securities that are included in the rating report. Table 1 shows \( Q (r_H, r_L) \) as a function of the marginal utility of issuers, \( \alpha \), in each scenario.

<table>
<thead>
<tr>
<th>( \alpha ) ∈</th>
<th>( [0, \alpha_1) )</th>
<th>( [\alpha_1, \alpha_2) )</th>
<th>( [\alpha_2, \infty) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second-best</td>
<td>( \theta_H )</td>
<td>( \theta_H )</td>
<td>( \delta )</td>
</tr>
<tr>
<td>Investor-pays</td>
<td>( \theta_H )</td>
<td>( \theta_H )</td>
<td>( \theta_H )</td>
</tr>
<tr>
<td>Issuer-pays</td>
<td>( \theta_H )</td>
<td>( \delta )</td>
<td>( \delta )</td>
</tr>
</tbody>
</table>

\( \alpha_1 \equiv \frac{\gamma}{\theta_L} \), \( \alpha_2 \equiv \alpha_1 + \frac{\beta (\delta - \theta_L)}{\theta_L} \)

Direct inspection of Table 1 shows that the transition from the investor-pays model to the issuer-pays model (weakly) creates a degradation of the average quality of the securities that are included in the rating report. Under the investor-pays model, to give ratings to low-quality securities reduces investors’ willingness to pay for the rating report. In turn, it reduces the profit of the credit rating agency. Hence, the rating agency prefers to give ratings only to high-quality securities. Under the issuer-pays model, however, the rating agency does not care
about investors’ surplus because it makes its profit by pricing issuers. Therefore, it may seek to increase its profit by giving ratings to a higher proportion of issuers, which may have negative implications for the average quality of the group of rated securities.

Interestingly, under the investor-pays model, the rating agency may set a quality standard above the (second-best) efficient level because the rating agency does not internalize the utility of issuers from getting their securities rated. Consequently, it gives ratings only to high-quality issuers. On the contrary, under the issuer-pays model, the rating agency may set a quality standard below the (second-best) efficient level. In this case, the rating agency does not internalize the disutility of the investor from investing in low-quality securities. Hence, it may prefer to give ratings to some low-quality securities in order to increase its profit. The following Proposition summarizes these results.

**Proposition 6.**

- **The transition from the investor-pays model to the issuer-pays model (weakly) creates a degradation of the quality standard chosen by the credit rating agency. It may imply a degradation on the average quality (i.e., the average probability of repayment) of the group of rated securities.**

- **Under the investor-pays model, the quality standard chosen by the credit rating agency is equal to or higher than the (second-best) efficient level.**

- **Under the issuer-pays model, the quality standard chosen by the credit rating agency is equal to or lower than the (second-best) efficient level.**

According to Cantor and Packer (1994), Hill (2004), Sylla (2002) and White (2002), starting in the early 1900s in the United States, the introduction of a new class of securities (i.e., corporate bonds issued by railroad corporations) and the emergence of a new class of investors (i.e., non-specialist lenders; mainly wealthy people) increased dramatically the demand for certification of bond quality. In this environment of high demand for ratings from investors, rating agencies provided public ratings of an issuer free of charge, and financed their operations solely
through the sale of thick rating reports to investors. Investors’ willingness for ratings kept high\(^\text{10}\) and rating agencies applied the investor-pays model until the late 1960s. In terms of the model, the marginal utility of investors, \(\beta\), was large, likely implying \(\alpha < \alpha_2\) in Table 1. Hence, credit rating agencies might implement the (second-best) efficient quality standard until the 1960s.

Market conditions changed dramatically by early 1970s. First, the costs of reproducing and distributing (i.e., disseminating) the rating report decreased considerably as photocopying and other technology developed and became progressively cheaper. It became almost impossible for rating agencies to prevent one investor from giving or selling information to others. Second, major defaults in the United States (e.g., Penn Central’s in 1970) led to a radical change on the demand for ratings. Not only investors sought credit ratings, but also issuers actively sought them to reassure nervous investors. It was almost impossible to do public offering of bonds without getting a rating. Third, the introduction of the “Nationally Recognized Statistical Rating Organization” designation in 1975 implied what Partnoy (1999, 2009) calls a “regulatory license”: without a rating, many issuers will be locked out of the markets. In this new environment, rating agencies started to charge corporate issuers for ratings. In terms of the model, the marginal utilities of issuers and investors, \(\alpha\) and \(\beta\) respectively, where large, likely implying \(\alpha_1 < \alpha < \alpha_2\) in Table 1. Hence, starting in the 1970s, credit rating agencies may implement a quality standard below the (second-best) efficient one.

The following Corollary to Proposition 6 summarizes.

**Corollary 1.**

- Until the 1960s, credit rating agencies might implement the (second-best) efficient quality standard.

\(^{10}\)One factor driving investors’ demand for rating was the introduction of rating-dependent regulation. For example, banks in the United States were prohibited from purchasing “speculative securities” in 1936. During the 1940s and 1950s state regulators followed the same path with insurance companies, and federal pension regulators pursued a similar strategy in the 1970s. See Cantor and Packer (1994) and White (2009) for overviews of the introduction of rating-dependent regulation.
5. Empirical Implications

The theoretical results of this paper have testable implications. Evidence supporting the null hypothesis that the transition from the investor-pays model to the issuer-pays model creates a degradation of the quality standard of credit ratings would come from the existence of a positive causal effect of the proportion of the revenue of rating agencies that accrues from issuers on the default rate of rated securities. The default rate of a group of rated securities is an *ex post* measure of the quality of ratings. If rating agencies became more permissive to grant ratings (i.e., if they reduced their quality standards), the default rate of the group of rated securities would increase. The participation of issuers on the total revenue of credit rating agencies is a measure of the stage of the transition from the investor-pays pricing model to the issuer-pays model. Consequently, the null hypothesis will not be rejected when the participation of issuers on the total revenue of rating agencies has a positive causal effect on the observed default rates.

Importantly, credit rating agencies achieve rating stability by their through-the-cycle methodology (see, for example, Altman and Rijken, 2006). Moreover, transitory, exogenous factors may affect the observed default rates. Hence, default rates should be filtered out of cyclical and transitory components.

Appendix A presents the results of a preliminary empirical analysis in which the default rate of all corporate bonds rated by Moody’s Investors Service between 1970 and 2007 is regressed on a temporal trend and on a variable controlling for the economic cycle.\(^{11}\) Such default rate follows a positive and significant temporal trend, which is robust to consider different time horizons to default. This result

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\(^{11}\)Lack of data about the sources of revenue of ratings agencies makes it impossible to use the proportion of the revenues accruing from issuers as an explanatory variable. I assume that the transition from the investor-pays model to the issuer-pays model has been gradual since 1970 and use a temporal trend instead.
suggests that the rating agency becomes more permissive to give ratings at the same time that it changes its pricing model.

6. Reform Proposals and Possible Extension

The results in this paper imply that, under the issuer-pays model, rating agencies may set a quality standard below the socially efficient level because they receive fees from issuers only if they give ratings. Policy implications are straightforward: the business model of credit rating agencies should be changed to eliminate the conflict of interest inherent in the issuer-pays model.

Several reform proposals have been envisaged. For example, Bolton et al. (2009) analyze what they call the “Cuomo plan”: an agreement between the New York State Attorney General Andrew Cuomo and the three major credit rating agencies requiring that issuers pay them up-front for their rating, and not contingent on the report. Bolton et al. (2009) conclude that this plan resolves the conflict of interest, but does not prevent “shopping” for ratings because issuers could decide to go on with the issue only when a rating agency secretly guarantees a favourable rating.

They also conclude that to switch to an investor-pays model could also resolve the conflict of interest. However, it is probably impossible to go back to the investor-pays model. First, it is impossible to keep one investor from giving or selling information to others (i.e., a free riding problem). Second, a compulsory tax to investors would solve the free riding problem but there are a lot of questions about the viability of an international investors taxation system.

Grundfest and Petrova (2009) argue that the creation of a new category of credit rating agencies, that they call “Buyer Owned and Controlled Rating Agencies” (i.e., owned and operated by the largest, most sophisticated debt market investors), would promote an investor’s point of view in the rating process. However, the fact that such a category of rating agencies did not appear spontaneously under current rules puts doubts on the viability of this proposal.

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12 Portes (2008) analyzes several of them and concludes that only a few of the proposed policy solutions are likely to be both feasible and helpful.
Mathis et al. (2009), and Richardson and White (2009) propose to cut any direct commercial link between issuers and credit rating agencies through the creation of what they call a “platform-pays model”. The basic idea is that an issuer that would like its security rated pays an up-front fee to a centralized clearing platform. In turn, the platform chooses which rating agency would rate the security, pays it an up-front fee (not contingent on the outcome of the rating process), keeps record of the process and discloses its outcome to the market.

The platform-pays model could cut direct commercial links between issuers and rating agencies but it could not prevent issuers to secretly approach a credit rating agency to obtain favorable ratings through some kind of side-contracting (e.g., briberies). Hence, I support the introduction a platform-pays model complemented by prudential oversight of ratings’ quality. The idea is to provide credit rating agencies with incentives to abstain from signing side-contracts with issuers by punishing rating agencies caught overrating. For example, the platform could assign potential issues to rating agencies based on historical data on their relative performance, rewarding with a larger number of securities to rate (hence, with a larger revenue) those rating agencies with the lowest realized default rates.\(^{13}\) Another complementary mechanism is to regulate minimum quality standards and enforce them trough costly supervision, auditing and accountability (see, for example, Forster, 2008).

Finally, it would be interesting to extend the monopolistic model presented in this paper to an oligopolistic version. On the one hand, competition could increase the incentive of rating agencies to choose a higher quality standard because they could use quality as a strategic variable to differentiate themselves from competitors. Indeed, rating agencies argue that being deliberately permissive to give ratings would be too dangerous for them since their reputation is at stake.\(^{14}\) On

\(^{13}\)Mathis et al. (2009) and Stolper (2009) argue that if the realized default rates are too high, then the license of the rating agency should be revoked. This mechanism would increase the reward for honest behaviour by reducing the number of competitors in future periods (see, for example, Perotti and Suarez, 2002).

\(^{14}\)A report by Standard & Poor’s to the United States Securities and Exchange Commission in 2002 (see http://www.sec.gov/news/extra/credrate/standardpoors.htm) states that “the ongoing value of Standard & Poor’s credit ratings business is wholly dependent on continued market
the other hand, rating agencies could relax their quality standards with the aim of attracting more issuers. Recent theoretical and empirical work suggest that the latter force is stronger than the former one (see, for example, Bolton et al. (2009), Cantor and Packer (1994) and Skreta and Veldkamp (2009)).

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Appendix

A. Empirical Analysis

This appendix presents a preliminary empirical analysis providing support for the null hypothesis that rating agencies reduce their quality standards at the same time that they change their pricing models.

Empirical Strategy

Evidence of this effect would come from a non-decreasing temporal trend on the default rate of the group of rated securities, after controlling for the economic cycle, since the transition of pricing models started in the early 1970s. The following specification is used for the test:

\[ DR_t = a_0 + a_1 \times Trend_t + a_2 \times Cycle_t + \epsilon_t, \]

where \( DR_t \) is the default rate of all rated corporate bonds, \( Trend_t \) is a temporal trend, and \( Cycle_t \) is a variable that controls for the economic cycle (I use the rate of growth of the United States’ Gross Domestic Product). Three models

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confidence in the credibility and reliability of its credit ratings.” However, Mathis et al. (2009) show that reputation concerns are not enough to prevent opportunistic behavior by credit rating agencies that rate structured products, and Becker and Milbourn (2008) show that competition leads to more issuer-friendly ratings of corporate bonds.

15This statement assumes that the transition has been gradual since the early 1970s.
are estimated as a sort of robustness check by considering different time horizons to default in the definition of the dependent variable: one year, three years and five years. The time horizon to default measures the length, in years, from the moment in which a security is rated (i.e., the cohort year $t$) and the moment in which it defaults.\footnote{Models considering other time horizons (not reported) give similar results.}

Data

The data come from Moody’s Investors Service (2008), Exhibit 36. The data set contains cumulative, issuer-weighted default rates in corporate bonds rated by Moody’s by cohort-year, and for a time horizon to default of up to 20 years. The data set contains annual observations from the cohort year 1970 to the cohort year 2007.

Results

Table 2 reports the results of the regression specified above. In all three models the variable measuring the economic cycle has a negative sign: better macro-economic conditions imply a lower default rate on corporate bonds. The constant is positive and significant in all three models: on average, approximately 1 percent of the corporate bonds rated by Moody’s Investor Service between 1970 and 2007 defaulted within the first year following the rating (Model 1); approximately 3 percent of the corporate bonds rated between 1970 and 2005 defaulted within the three years following the rating (Model 2); and approximately 5 percent of the corporate bonds rated between 1970 and 2003 defaulted within the five years following the rating (Model 3).

More germane to our hypothesis are the results for the trend variable. In all three models the default rate of the corporate bonds rated by Moody’s follows a positive and significant temporal trend after filtering temporary macro-economic effects out. The figures imply that the one-year default rate of the corporate bonds that were rated by Moody’s in a given cohort-year $t$ is, on average, 3 basic points bigger that the one-year default rate of the corporate bonds that were rated by
Table 2: OLS Regressions. Dependent variable: cumulative-issuer-weighted default rate.

<table>
<thead>
<tr>
<th>Time horizon:</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>One-year</td>
<td>Three-year</td>
<td>Five-year</td>
</tr>
<tr>
<td>Constant</td>
<td>1.039**</td>
<td>2.706**</td>
<td>5.105**</td>
</tr>
<tr>
<td></td>
<td>(0.011)</td>
<td>(0.044)</td>
<td>(0.030)</td>
</tr>
<tr>
<td>Trend</td>
<td>0.031**</td>
<td>0.123***</td>
<td>0.221***</td>
</tr>
<tr>
<td></td>
<td>(0.035)</td>
<td>(0.002)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Cycle (a)</td>
<td>-0.138*</td>
<td>-0.137</td>
<td>-0.193</td>
</tr>
<tr>
<td></td>
<td>(0.090)</td>
<td>(0.202)</td>
<td>(0.133)</td>
</tr>
</tbody>
</table>

| Observations | 38 | 36 | 34 |
| Adjusted $R^2$ | 0.138 | 0.241 | 0.380 |
| F            | 3.96** | 6.57*** | 11.11*** |
|              | (0.028) | (0.004) | (0.000) |

Notes: $p$-values for $H_0$: the coefficient is equal to zero are in parentheses below the estimated coefficients. *, **, and *** stand for the estimated coefficient is significant at the 1%, the 5% and the 10% level respectively.

(a) US GDP growth rate: annual in one-year time horizon regression, three-year and five-year cumulative rate in three-year and five-year time horizon regressions respectively.

Moody’s in the previous cohort-year $t − 1$ (Model 1). The estimates for the trend variable in Models 2 and 3 confirm the robustness of this result.

References


United States Securities and Exchange Commission, 2008. Summary report of issues identified in the commission staff’s examinations of select credit rating agencies.

