The Economics of Unsolicited Credit Ratings

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PRELIMINARY AND INCOMPLETE

Abstract

The role of credit rating agencies as information producers has attracted considerable attention during the recent financial crisis. In this paper, we develop a dynamic rational expectations model to examine the credit rating process, incorporating three critical elements of this industry: (i) the rating agencies' ability to misreport the issuer's credit quality, (ii) their ability to issue unsolicited ratings, and (iii) their reputational concerns. We analyze the incentives of credit rating agencies to issue unsolicited credit ratings and the effects of this practice on the agencies' rating strategies. We find that the issuance of unsolicited credit ratings enables rating agencies to extract higher fees from issuers by credibly threatening to punish issuers that refuse to solicit a rating with an unfavorable unsolicited rating. This policy also increases the rating agencies' reputation by demonstrating to investors that they resist the temptation to issue inflated ratings. In equilibrium, unsolicited credit ratings are lower than solicited ratings, because all favorable ratings are solicited; however, they do not have a downward bias. We show that, under certain economic conditions, a credit rating system that incorporates unsolicited ratings is beneficial in the sense that it leads to more stringent rating standards and improves social welfare.

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1 Introduction

The role of credit rating agencies as information producers has attracted considerable attention during the financial crisis of 2007-2009. Their failure to predict the risk of many structured financial products and subsequent massive downgrades has put the transparency and integrity of the credit rating process in question. Among the most controversial aspects of the credit rating industry is the practice of unsolicited credit ratings. Unsolicited credit ratings are conducted by credit rating agencies *"without the request of the issuer or its agent"* (Standard & Poor's, 2007). In contrast to solicited ratings, which are requested and paid for by issuers, the issuance of unsolicited ratings does not involve the payment of a rating fee. Unsolicited credit ratings have been widely used since the 1990s and account for a sizeable portion of the total number of credit ratings in recent years. In 2000, the proportion varied between 6% and 27% in industrial countries (Fight, 2001). Gan (2004) estimates that unsolicited ratings account for 28% of bond issues in the U.S. between 1994 and 1998.[1]

Despite the prevalence of unsolicited credit ratings, the agencies' incentives to issue them are not well understood. As a recent SEC document points out, *"from an incentive compatibility perspective, this [practice] would appear to weaken the incentive constraint that encourages a firm to pay for being rated; this suggests that it is puzzling that the rating services evaluate companies that do not pay for ratings"* (Spatt, 2005). Credit rating agencies argue that unsolicited ratings should be seen as a service to *"meet the needs of the market for broader ratings coverage"* (Standard & Poor's, 2007). Issuers, on the other hand, have expressed concern that these ratings—which they sometimes refer to as "hostile ratings"—are used to punish firms that would otherwise not purchase ratings coverage. For example, Herbert Haas, a former chief financial officer of the German insurance company Hannover Re, recalls a conversation with a Moody's official in 1998 who told him that if Hannover paid for a rating, it *"could have*

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[1] In December 2004, the International Organization of Securities Commissions published its *Code of Conduct Fundamentals for Credit Rating Agencies* which includes the provision that unsolicited credit ratings should be identified as such (IOSCO, 2004). Prior to that, rating agencies did typically not disclose whether a credit rating has been solicited by the issuer for bonds issued in the U.S.

a positive impact" on the grade (Klein, 2004).[2] This practice seems to be consistent with the empirical evidence showing that unsolicited ratings are, on average, lower than solicited ratings.[3]

In this paper, we develop a dynamic rational expectations model to address the question of why rating agencies issue unsolicited credit ratings and why these ratings are, on average, lower than solicited ratings. We analyze the implications of this practice for credit rating standards, rating fees, and social welfare. Our model incorporates three critical elements of the credit rating industry: (i) the rating agencies' ability to misreport the issuer's credit quality, (ii) their ability to issue unsolicited ratings, and (iii) their reputational concerns. We focus on a monopolistic rating agency that interacts with a series of potential issuers that approach the credit market to finance their investment projects. The credit rating agency evaluates the issuers' credit quality, i.e., their ability to repay their debt. It makes these evaluations public by assigning credit ratings to issuers in return for a fee. Issuers agree to pay for these rating services only if they believe that their assigned rating substantially improves the terms at which they can issue debt. This creates an incentive for the rating agency to strategically issue favorable or even inflated ratings in order to motivate issuers to pay for them. Investors cannot directly observe the agency's rating policy. Rather, they use the agency's past performance, as measured by the debt-repaying records of previously rated issuers, to assess the credibility of its ratings.

The credit rating agency faces a dynamic trade-off between selling inflated ratings to boost its short-term profit and truthfully revealing the firms' prospects to improve its long-term

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[2]Within weeks after refusing to do so, Moody's issued an unsolicited rating for Hannover, giving it a financial strength rating of "Aa2," one notch below that given by S&P. Over the course of the following two years, Moody's lowered Hannover's debt rating first to "Aa3" and then to "A2." Meanwhile, Moody's kept trying to sell Hannover its rating services. In March 2003, after Hannover continued to refuse to pay for Moody's services, Moody's downgraded Hannover's debt by another three notches to junk status. The scale of this downgrade came as a surprise to industry analysts, especially since the two rating agencies Hannover paid for their services, S&P and A.M. Best, continued to give Hannover high ratings. For a more detailed account of this incident, see Klein (2004); additional anecdotal evidence of this practice can be found in Monroe (1987), Schultz (1993) and Bloomberg (1996).

[3]See, e.g., Gan (2004), Poon and Firth (2005), Van Roy (2006), and Bannier, Behr, and Güttler (2008).

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reputation. Issuing inflated ratings is costly to the rating agency in the long run, since it increases the likelihood that a highly rated issuer will not be able to repay its debt, thereby damaging the rating agency's reputation. This, in turn, lowers the credibility of the rating agency's reports, making them less valuable to issuers and thus reducing the fee that the rating agency can charge for them. The rating agency's optimal strategy balances higher short-term fees from issuing more favorable reports against higher long-term fees from an improved reputation for high-quality reports.

Our analysis shows that the adoption of unsolicited credit ratings can increase the rating agency's short-term profit as well as its long-term profit. This result is driven by two reinforcing effects. First, the ability to issue unsolicited ratings enables the rating agency to charge higher fees for solicited ratings. The reason is that the rating agency can use unfavorable unsolicited ratings as a way to "punish" issuers that refuse to pay for its rating services. This threat increases the value of a favorable rating and, hence, the fee that issuers are willing to pay for it.

The credibility of this threat stems from the fact that, by releasing unsolicited ratings, the rating agency can demonstrate to investors that it resists the temptation to issue inflated ratings in exchange for a higher fee, which improves its reputation. This second effect, in the form of a reputational benefit, gives the rating agency an incentive to *always* release an unsolicited ratings in case an issuer refuses to solicit a rating. In equilibrium, the credit rating agency therefore issues unsolicited ratings, along with solicited ratings. Since all favorable ratings are solicited, unsolicited credit ratings are lower than solicited ratings. However, they are not downward biased. Rather, they reflect the lower quality of issuers that do not solicit a rating.

The adoption of unsolicited credit ratings also has important welfare implications. We find that while rating agencies always benefit from such a policy, society may not. In particular, we show that, for some parameterizations, allowing rating agencies to issue unsolicited ratings leads to less stringent rating standards, thereby enabling more low-quality firms to finance

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negative NPV projects. This reduces social welfare and raises the cost of capital for high-quality borrowers. Such an outcome is typically achieved when the increase in rating fees associated with the adoption of unsolicited ratings is sufficiently large so that it outweighs the additional reputational benefit from truthfully revealing the firm's quality. However, when this increase in rating fees is small (for example, because the value of the outside option for unrated firms is low), we obtain the opposite result: in this case, the ability to issue unsolicited ratings leads to more stringent rating standards, which prevents firms from raising funds for negative NPV investments and, hence, improves social welfare. These results suggest that there is no simple answer to the question of whether credit rating agencies should be allowed to issue unsolicited ratings. The effect of such ratings on the agencies' rating standards depends on the valuations of highly rated firms, lowly rated firms, and unrated firms, and thus may vary over the business cycle.

A number of empirical papers have shown that unsolicited ratings are significantly lower than solicited ratings, both in the U.S. market and outside the U.S.[4] These studies explore the reasons for this difference based on two hypotheses. The "self-selection hypothesis" argues that high-quality issuers self-select into the solicited rating group while low-quality issuers self-select into the unsolicited rating group. Under this hypothesis, unsolicited ratings are unbiased. On the other hand, the "punishment hypothesis" argues that lower unsolicited ratings are a punishment for issuers that do not pay for rating services and are therefore downward biased. More specifically, given the same rating level, an issuer whose rating is unsolicited should ex post perform better than one whose rating is solicited. The findings of these papers provide conflicting evidence. Using S&P bond ratings on the international market, Poon (2003) reports that, consistent with the "self-selection hypothesis," issuers who chose not to obtain rating services from S&P have weaker financial profiles. Gan (2004) finds no significant difference between the performance of issuers with solicited and unsolicited

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[4]A partial list includes Poon (2003), Gan (2004), Poon and Firth (2005), Van Roy (2006), and Bannier, Behr, and Güttler (2008).

ratings. This result leads her to reject the "punishment hypothesis" in favor of the "self-selection hypothesis." In contrast, Bannier, Behr, and Güttler (2008) cannot reject the "punishment hypothesis" for their sample. Our analysis reconciles the conflicting empirical evidence. We show that while unsolicited ratings are lower, they are not downward biased. Rather, they reflect the lower quality of issuers. As a result, issuers with unsolicited ratings should have weaker financial profiles, but we should not observe any significant differences between their ex post performance and that of issuers with solicited ratings, once we control for their rating level. This argument, however, does not rule out the fact that rating agencies use unfavorable unsolicited ratings as a threat in order to pressure issuers to pay higher fees for more favorable ratings. In fact, our analysis shows that, although "punishment" is an out-of-equilibrium outcome and thus not observed by investors, it still plays an important role in the credit rating process.

There is also a growing theoretical literature that seeks to understand the phenomenon of ratings inflation. Mathis, McAndrews, and Rochet (2009) examine the incentives of a credit rating agency to inflate its ratings in a dynamic model of endogenous reputation. They show that reputational concerns can generate cycles of confidence in which the rating agency builds up its reputation by truthfully revealing its information only to later take advantage of this reputation by issuing inflated ratings. In Bolton, Freixas, and Shapiro (2009), ratings inflation emerges from the presence of a sufficiently large number of naive investors who take ratings at face value. Opp, Opp, and Harris (2010) argue that ratings inflation may result from regulatory distortions when credit ratings are used for regulatory purposes such as bank capital requirements. Finally, Sangiorgi, Sokobin, and Spatt (2009) and Skreta and Veldkamp (2009) focus on "ratings shopping" as an explanation for inflated ratings. While both papers assume that rating agencies truthfully disclose their information to investors, the ability of issuers to shop for favorable ratings introduces an upward bias. In Skreta and Veldkamp (2009), investors do not fully account for this bias, which allows issuers to exploit this winner's curse fallacy. In contrast, Sangiorgi, Sokobin, and Spatt (2009) demonstrate

that when investors are rational, shopping-induced ratings inflation does not have any adverse consequences. While some of the features of our model can also be found in these papers, none of them addresses the issue of how a credit rating agency's incentive to inflate its ratings is affected by its ability to issue unsolicited ratings.

The remainder of this paper is organized as follows. Section 2 introduces the model. Section 3 describes the equilibrium of the model and analyzes the optimal rating policy in a solicited-only rating system. Section 4 solves for the equilibrium strategies in a rating system that incorporates unsolicited ratings and compares the results to those obtained in the solicited-only system. Section 5 compares the welfare properties of the two different rating systems. Section 6 summarizes our contribution and concludes. All proofs are contained in the Appendix.

2 The Model

We consider an economy endowed with three types of risk-neutral agents: firms (or "issuers"), a monopolistic credit rating agency (CRA), and investors. The game has two periods, denoted by $t \in \{1, 2\}$. The riskless rate is normalized to zero.

At the beginning of each period, a firm has access to an investment project with probability β. The project requires an initial investment of I units of capital. Firms have no capital and therefore must raise funds from outside investors in perfectly competitive capital markets. If the project is undertaken, it yields an end-of-period payoff of $R > I$ if successful ($\omega = S$) and a payoff of 0 if it fails ($\omega = F$). The outcome of the project, that is whether the project succeeds or fails, is observable to outside investors. If the firm does not invest, the project vanishes and the firm becomes worthless. Absent a project, the firm has a (default) value of $\bar{V} \geq 0$.

The quality of an investment project is characterized by its success probability. A type-G project (denoted by $\theta = G$) has a success probability of one, and a type-B project ($\theta = B$)

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has a success probability of q, where $qR < I$. Investors believe ex ante that a fraction α of projects are "good" (i.e., of type G) and a fraction $1 - \alpha$ are "bad" (i.e., of type B). We use $\theta = N$ to denote a firm without a project.

Financial markets are characterized by asymmetric information. While firm insiders know the quality of their own project, outside investors cannot tell a firm with a good project from a firm with a bad one. This creates a role for the CRA: by releasing a "credit rating," the CRA can reduce the information asymmetry between firms and investors and, possibly, allow firms to raise capital at better terms.

The credit rating process is as follows (see Table 1 for the timeline). At the beginning of each period, a (randomly selected) firm that obtained a project can approach the CRA to request a credit rating.[5] The CRA is endowed with an information production technology that allows it to privately learn the true project type at no cost.[6] Based on its knowledge of the project quality, θ, the CRA then proposes a credit rating, r, to the firm at a certain fee, ϕ. The credit rating proposed to the firm can either be "high" ($r = H$) or "low" ($r = L$). The fee requested for the rating service can depend on the rating offered to the firm. Let ϕ_θ^r denote the fee charged to a firm of type $\theta \in \{G, B\}$ when a rating $r \in \{H, L\}$ is proposed. The rating and fee schedule pair $\{r, \phi_\theta^r\}$ is privately proposed by the CRA to the issuing firm and is not observable to investors.

The firm can either accept the offer by the CRA and pay the specified fee, or decline the offer. If the firm accepts the offer, the CRA collects the rating fee and publicizes the rating as a "solicited credit rating" $r_t^s \in \{H, L\}$ to investors. If the firm declines the offer, it does not pay the fee. The CRA can then choose to either issue an "unsolicited rating" $r_t^u \in \{h, l\}$ or not to issue a rating at all (denoted by $r_t = \emptyset$).[7] Note that if the CRA decides to issue an unsolicited rating, it does not have to be the same as the one proposed to the firm.

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[5] The assumption that at most one firm approaches the CRA in each period is only made for tractability and is not crucial to our results.

[6]

[7] The absence of a rating, $r_t = \emptyset$, can be interpreted as a period of time in which the rating activity of the CRA is "lower than usual."

In the "solicited-only" credit rating system, a credit rating policy for the opportunistic CRA consists of a pair $\left\{\phi_{\theta,t}^{r^s}, k_{\theta,t}^{r^s}\right\}$ for each period $t \in \{1,2\}$, where $\phi_{\theta,t}^{r^s}$ denotes the fee charged to a firm of type $\theta \in \{G,B\}$ when a rating $r^s \in \{H,L\}$ is proposed, and $k_{\theta,t}^{r^s} \in [0,1]$ denotes the probability that a firm of type $\theta \in \{G,B\}$ is offered a rating $r^s \in \{H,L\}$ (after the CRA observes the firm's true type).

In a credit rating system with unsolicited credit ratings, a credit rating policy for the opportunistic CRA consists of a triplet $\left\{\hat{\phi}_{\theta,t}^{r^s}, \hat{k}_{\theta,t}^{r^s}, \hat{k}_{\theta,t}^{r^u}\right\}$ for each period $t \in \{1,2\}$, where $\hat{\phi}_{\theta,t}^{r^s}$ denotes the fee charged to a firm of type $\theta \in \{G,B\}$ when a solicited rating $r^s \in \{H,L\}$ is proposed, $\hat{k}_{\theta,t}^{r^s} \in [0,1]$ denotes the probability that a firm of type $\theta \in \{G,H\}$ is offered a solicited rating $r^s \in \{H,L\}$, and $\hat{k}_{\theta,t}^{r^u} \in [0,1]$ denotes the probability that a firm of type $\theta \in \{G,H\}$ is assigned an unsolicited rating $r^u \in \{h,l\}$ (at no fee).

Credit ratings are important to firms because they affect the terms at which they can raise capital from investors. Investors' valuation of a firm, V^r, depends on the firm's credit rating r and on the credibility of the CRA which issued the rating. This, in turn, is determined by the confidence that investors have in the CRA. CRA credibility is important because the CRA cannot commit to truthfully reveal the firm's type to investors. Rather, the CRA may have the incentive to misreport a firm's quality, which is not directly observable to investors. Investors must therefore decide to what extent they should trust the CRA and its ratings, based on available information.

To capture these ideas in our model, we assume that there are two types of CRA: ethical ones (denoted by $\tau = e$) and opportunistic ones ($\tau = o$). An ethical CRA always truthfully reveals the type of a firm that requests a rating, whether ratings are solicited or unsolicited. An opportunistic CRA chooses a credit rating policy—that is, a pair $\left\{\phi_{\theta,t}^{r^s}, k_{\theta,t}^{r^s}\right\}$ in a solicited-only credit rating system and a triplet $\left\{\hat{\phi}_{\theta,t}^{r^s}, \hat{k}_{\theta,t}^{r^s}, \hat{k}_{\theta,t}^{r^u}\right\}$ in a credit rating system with unsolicited credit ratings—that maximizes its expected profits over the two periods. Investors do not observe the CRA's type and believe that, at the beginning of period 1, the CRA is of the ethical type, $\tau = e$, with probability μ_1 (and with probability $1 - \mu_1$ it is of

Period 1:	(1)	A (randomly chosen) firm learns whether it obtained a project and, if it did, decides whether or not to request a rating.
	(2)	The CRA proposes a rating r to the firm at a fee ϕ_θ^r.
	(3)	The firm accepts or declines the CRA's offer.
	(4)	The CRA publicizes the proposed rating if the firm accepts the offer; otherwise it decides whether or not to issue an unsolicited rating.
	(5)	Investors evaluate the firm based on the observed rating.
	(6)	The firm raises funds and invests in the project.
	(7)	The outcome of the investment project is realized.
Period 2:	Steps (1) to (7) are repeated.	

Table 1: Sequence of events.

the opportunistic type, $\tau = o$). As investors get more information about the credit ratings released by the CRA and observe its performance over time, they update their beliefs about the CRA's type. The probability that the CRA is ethical measures investors' confidence in the CRA and, hence, the CRA's "reputation."

For simplicity, we assume that the monopolistic CRA has all the bargaining power and extracts the entire surplus of the firm.[8] We assume that firms have a short-term horizon and maximize the current market value of their shares. Opportunistic CRAs maximize the value of their profits they expect to earn over the two periods.

3   The Solicited-Only Credit Rating System

We begin our analysis by characterizing the equilibrium in a rating system with solicited ratings only. Note that, absent the option of issuing unsolicited ratings, firms that decline to purchase a rating will remain unrated in this case. As we will show below, this applies to all firms that are offered an L-rating by the CRA. These firms are better off not acquiring a rating, since an L-rating would reveal that they are of the bad type.[9] To simplify the

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[8]It is easy to extend the model to the case in which the CRA extracts (through bargaining) only a fraction of the firm's surplus.

[9]Recall that the value of a firm without a project exceeds that of firms of type B.

exposition, our discussion of the solicited-only credit rating system therefore focuses on the case where the CRA either issues an H-rating or the firm remains unrated. In addition, we restrict our attention to the case where only firms with an H-rating can raise sufficient capital to invest in the project (which will happen in equilibrium).

The investors' valuation of firms with a given credit rating depends on the CRA's reputation, that is, on how confident investors are that the CRA's ratings truthfully reveal the firms' types. Since an ethical CRA always assigns an H-rating (L-rating) to a type-G (type-B) firm, whereas an opportunistic CRA may prefer a different rating policy, the observation of a credit rating is informative about the CRA's type. Accordingly, investors update their beliefs about the CRA's type over time. Specifically, the CRA's reputation is updated twice in each period. The first updating takes place after the CRA releases a rating; the second updating occurs when investors observe the outcome (i.e., success or failure) of the firm's investment project (assuming that an investment has been made).

Let μ_t denote the CRA's initial reputation at the beginning of period $t \in \{1, 2\}$. The first round of updating occurs after the release of a rating $r_t \in \{H, \emptyset\}$. Using Bayes' rule, we derive the CRA's reputation after issuing an H-rating as:

$$\mu_t^H \equiv prob[\tau = e | r_t^s = H] = \frac{\mu_t \, \alpha}{\mu_t \, \alpha + (1 - \mu_t) \left(\alpha \, \tilde{k}_{G,t}^H + (1 - \alpha) \tilde{k}_{B,t}^H \right)}, \qquad (1)$$

where $\tilde{k}_{G,t}^H$ and $\tilde{k}_{B,t}^H$ denote the investors' beliefs about the CRA's rating choices $k_{G,t}^H$ and $k_{B,t}^H$.

After observing an H-rating and updating the CRA's reputation accordingly, investors update the probability that the firm's investment project is of the good type as follows:

$$\alpha_t^H \equiv prob[\theta = G | r_t^s = H] = \mu_t^H + \left(1 - \mu_t^H \right) \left(\frac{\alpha \, \tilde{k}_{G,t}^H}{\alpha \, \tilde{k}_{G,t}^H + (1 - \alpha) \, \tilde{k}_{B,t}^H} \right). \qquad (2)$$

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Firm valuation is equal to the expected payoff from the investment project, that is:

$$V_t^H = \left(\alpha_t^H + \left(1 - \alpha_t^H\right) q \right) R. \tag{3}$$

It is easy to verify that the CRA's reputation positively affects the value of a firm with a favorable credit rating.

Lemma 1. *The value of an H-rated firm is an increasing function of the CRA's reputation, i.e., $dV_t^H / d\mu_t^H > 0$.*

In a rating system without unsolicited ratings, the observation of an unrated firm, $r_t = \emptyset$, is also informative about the CRA's type and, hence, affects its reputation. This happens because the absence of a rating can mean either that a firm does not have access to an investment project and, hence, does not request a rating, or that the CRA proposed an L-rating which was then declined by the firm. From Bayes' rule, we thus have:

$$
\begin{aligned}
\mu_t^\emptyset &\equiv prob[\tau = e | r_t = \emptyset] \\
&= \frac{\mu_t \left(1 - \beta + (1 - \alpha)\beta\right)}{\mu_t \left(1 - \beta + (1 - \alpha)\beta\right) + (1 - \mu_t)\left(1 - \beta + \alpha\beta\left(1 - \tilde{k}_{G,t}^H\right) + (1 - \alpha)\beta\left(1 - \tilde{k}_{B,t}^H\right)\right)}
\end{aligned} \tag{4}
$$

From the investors' perspective, the value of an unrated firm is the weighted average of the value of a firm without an investment project, $\bar{V}$, and the value of a firm with a project that has been offered an L-rating by the CRA. Our analysis below shows that the latter category only consists of type-B firms. The value of an unrated firm is therefore equal to:

$$V_t^\emptyset = \left(1 - \beta_t^\emptyset\right) \bar{V}, \tag{5}$$

where $1 - \beta_t^\emptyset$ represents the investors' beliefs that a firm is of the type $\theta = N$ if it is unrated,

i.e.:

$$\begin{aligned}
\beta_t^\emptyset &\equiv prob[\theta \neq N | r_t = \emptyset] \\
&= \frac{\mu_t^\emptyset (1-\alpha)\beta}{1 - \beta + (1-\alpha)\beta} + \frac{\left(1 - \mu_t^\emptyset\right)\left(\alpha\beta\left(1 - \tilde{k}_{G,t}^H\right) + (1-\alpha)\beta\left(1 - \tilde{k}_{B,t}^H\right)\right)}{1 - \beta + \alpha\beta\left(1 - \tilde{k}_{G,t}^H\right) + (1-\alpha)\beta\left(1 - \tilde{k}_{B,t}^H\right)}.
\end{aligned} \quad (6)$$

If an investment is made, which in equilibrium happens only if the firm obtains an H-rating, the project payoff is realized at the end of the period and becomes known to investors. After observing the outcome of the investment project, investors update once more the CRA's reputation. Since firms with good projects are always successful, while firm with bad projects are successful only with probability q, the CRA's updated reputation depends on whether the investment project succeeds ($\omega_t = S$) or not ($\omega_t = F$). If it succeeds, the CRA's reputation becomes:

$$\mu_t^{H,S} \equiv prob[\tau = e | r_t^s = H, \omega_t = S] = \frac{\mu_t \, \alpha}{\mu_t \, \alpha + (1-\mu_t)\left(\alpha \, \tilde{k}_{G,t}^H + (1-\alpha)\, \tilde{k}_{B,t}^H \, q\right)}. \quad (7)$$

In contrast, project failure reveals the CRA as being opportunistic for sure, since an ethical CRA never issues an H-rating for a firm with a bad project. Thus, we have:

$$\mu_t^{H,F} \equiv prob[\tau = e | r_t^s = H, \omega_t = F] = 0. \quad (8)$$

We now turn to deriving the objective function of the opportunistic CRA. Proceeding backwards, in the second and last period, the CRA only cares about the profit that it generates by selling a rating in that last period. Thus, the CRA's objective function is given by:

$$\pi_2(\mu_2) = \beta\left(\alpha \, k_{G,2}^H \, \phi_{G,2}^H + (1-\alpha)\, k_{B,2}^H \, \phi_{B,2}^H\right). \quad (9)$$

Note that the period 2 profit depends on the CRA's reputation at the beginning of the period,

μ_2, since it affects the fee $\phi_{G,2}^H$ and $\phi_{B,2}^H$ that the CRA can charge firms for an H-rating.

In the first period, the opportunistic CRA chooses its rating policy to maximize the sum of the expected profit obtained in periods 1 and 2:

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\begin{aligned}
\pi_1(\mu_1) = {} & \alpha\beta \left[k_{G,1}^H \left(\phi_{G,1}^H + \pi_2 \left(\mu_1^{H,S} \right) \right) + \left(1 - k_{G,1}^H \right) \pi_2 \left(\mu_1^\emptyset \right) \right] \\
& + (1-\alpha)\beta \left[k_{B,1}^H \left(\phi_{B,1}^H + q\,\pi_2 \left(\mu_1^{H,S} \right) + (1-q)\,\pi_2 \left(\mu_1^{H,F} \right) \right) + \left(1 - k_{B,1}^H \right) \pi_2 \left(\mu_1^\emptyset \right) \right] \\
& + (1-\beta)\,\pi_2 \left(\mu_1^\emptyset \right).
\end{aligned}
\tag{10}
$$

The three components of the opportunistic CRA's expected profit, $\pi_1(\mu_1)$, represent the three cases in which a firm with a good project requests a rating, a firm with a bad project requests a rating, or no firm requests a rating. If the firm requesting a rating is of type G, which happens with probability $\alpha\beta$, the expected profit depends on whether the CRA proposes an H-rating (probability $k_{G,1}^H$) or an L-rating (probability $1 - k_{G,1}^H$). In the former case, the CRA earns a fee of $\phi_{G,1}^H$ in the first period and obtains an expected profit of $\pi_2 \left(\mu_1^{H,S} \right)$ in the second period based on the updated reputation $\mu_1^{H,S}$, taking into account that good projects always succeed. In the latter case, the firm refuses to purchase the offered L-rating and the CRA does not earn a rating fee in the first period. In this case, the expected profit in the second period is a function of the updated reputation $\pi_2 \left(\mu_1^\emptyset \right)$.

If the firm requesting a rating is a bad firm, which happens with probability $(1-\alpha)\beta$, the CRA's expected profit depends on whether the CRA offers to issue an H-rating (probability $k_{B,1}^H$) or an L-rating (probability $1 - k_{B,1}^H$). In the former case, the CRA earns a fee of $\phi_{B,1}^H$ in the first period. The expected second-period profit now depends on whether the project succeeds ($\omega = S$) or not ($\omega = F$), since the project outcome affects the CRA's reputation, $\mu_1^{H,\omega}$, $\omega \in \{S, F\}$. Thus, in contrast to the case where an H-rating is released to a good firm, by releasing an H-rating to a bad firm, the CRA exposes itself to the risk of a reputation loss. If an L-rating is released, the firm declines the offer and remains unrated. The CRA earns no profit in the first period and its expected second-period profit is again $\pi_2 \left(\mu_1^\emptyset \right)$.

Finally, if the firm has no project, which happens with probability $1 - \beta$, the firm does not request a rating from the CRA and thus remains unrated. In this case, the CRA's profit is given by the expected fee it earns in the second period, conditional on the its reputation when no rating is issued in the first period.

Having characterized the CRA's objective function, we now turn to solving for the equilibrium of our economy. The equilibrium concept we use is that of a Perfect Bayesian Equilibrium (PBE). Formally, a PBE of our economy consists of the opportunistic CRA's choice of rating policy $\{\phi_{\theta,t}^{r^s}, k_{\theta,t}^{r^s}\}$, the firm's decision on whether to purchase the rating (and, hence, raise capital and invest in the project) or not, the investors' evaluation of a firm $V_t^{r^s}$ that obtained a rating r_t^s, and a system of beliefs formed by investors such that: (i) the choices made by the CRA and firms maximize their respective utility, given the equilibrium choices of the other players and the set of equilibrium beliefs formed by investors in response to these choices; (ii) the beliefs of investors are rational, given the equilibrium choices made by the CRA and the firms, and are formed using Bayes' rule; and (iii) any deviation from the equilibrium strategy by any party is met by beliefs of the other parties that yield a lower expected utility for the deviating party, compared to that obtained in equilibrium.

Proposition 1. *Suppose that $R > R_c$, where R_c is defined in the Appendix. Then, in the solicited-only credit rating system, there exists an equilibrium characterized by the following strategies:*

(i) In period 1, the opportunistic CRA charges a fee of $\phi_{G,1}^H = \phi_{B,1}^H = V_1^H - I - V_1^\emptyset \equiv \phi_1^H$ for a solicited H-rating; a type-G firm obtains an H-rating with probability one (i.e., $k_{G,1}^H = 1$); a type-B firm obtains an H-rating with probability $k_{B,1}^H > 0$, and an L-rating with probability $1 - k_{B,1}^H$. In period 2, the opportunistic CRA offers an H-rating to all firms requesting a rating (i.e., $k_{G,2}^H = k_{B,2}^H = 1$), and charges a fee of $\phi_{G,2}^H = \phi_{B,2}^H = V_2^H - I - V_2^\emptyset \equiv \phi_2^H$ for it.

(ii) All firms with an investment project request a credit rating in periods 1 and 2. Firms

acquire an H-rating for a fee of up to $V_t^H - I - V_t^\emptyset$, $t \in \{1, 2\}$. Firms never acquire an L-rating rating at a positive fee. Firms raise funds and invest in the project if and only if they obtain an H-rating.

In a credit-rating system with solicited ratings only, the credit rating policy of the opportunistic CRA is determined by balancing two opposing incentives. The first incentive is to give an H-rating to *all* firms requesting a rating, and earn the fee, ϕ_1^H. The second incentive is due to the disciplining effect of reputation. Investors' willingness to pay for a security (that is, its market value) depends on the rating given by the CRA and, critically, on the CRA's credibility in the eyes of investors, represented by its reputation. By giving an H-rating to a bad firm, the CRA can charge the firm the ϕ_1^H, but it exposes itself to the risk of a reputation loss in case the project fails. This loss of reputation reduces the CRA's credibility and, hence, the fee that it can charge to firms for an H-rating in the next period.

The CRA's equilibrium behavior changes over time. In the second and last period, the opportunistic CRA has no reputational concerns anymore when choosing its credit rating policy and thus finds it optimal to assign an H-rating to all firms requesting a rating (i.e., $k_{G,2}^H = k_{B,2}^H = 1$).

In the first period, the CRA always gives an H-rating to a good firm. While such a policy allows the CRA to pocket the fee ϕ_1^H, it is costly in terms of the CRA's reputation. The reason is that, in equilibrium, an H-rating is more likely to be released by an opportunistic CRA than an ethical one, since an opportunistic CRA releases H-ratings also to bad firms with positive probability, whereas an ethical CRA never does so. Thus, $\mu_1^H < \mu_1$. This loss of reputation is mitigated by the fact that projects from good firms are more likely to succeed and the CRA's reputation partially recovers after the project is revealed as successful: $\mu_1^H < \mu_1^{H,S} \leq \mu_1$. Thus, releasing an H-rating lowers the CRA's reputation, even if the firm's project succeeds.[10] The reduced reputation, in turn, decreases the reliability of the ratings

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[10]Remember that an opportunistic CRA releases H-ratings also to (some) bad firms, whose projects succeed with probability q.

released by the CRA in the next period and, hence, the value of the securities that are marketed with an H-rating. Since the CRA's profit depends directly on the value of the securities issued by the firms that they rate, a lower reputation leads to lower second-period profits, generating an economic loss. The fee paid by the firm in the first period compensates the CRA for this loss.

In equilibrium, an opportunistic CRA also gives H-ratings to bad firms with positive probability. If a bad firm requests a rating, the opportunistic CRA faces the following choices. First, it can offer to issue an H-rating for the bad firm. The benefit of this strategy is that the CRA can pocket the fee ϕ_1^H that the firm is charged for an H-rating. The cost is the loss of reputation described above, which is now aggravated by the fact that, if the project fails, the CRA is revealed as being of the opportunistic type ($\mu_1^{H,F} = 0$).

The second possibility is for the opportunistic CRA to offer the bad firm an L-rating, which will be declined by the firm. The benefit of this strategy is that it increases the CRA's reputation, since $\mu_1^\emptyset > \mu_1$. This follows from the fact that a lack of rating activity is more likely to be observed for an ethical CRA than an opportunistic one.

In equilibrium, the opportunistic CRA mimics the behavior of the ethical CRA and always releases H-ratings for good firms. It differs from the ethical CRA by pursuing a mixed strategy and issuing H-ratings to bad firms with probability $k_{B,1}^H > 0$. In what follows, we refer to $1 - k_{B,1}^H$ as characterizing the quality of the "credit rating standard."

Proposition 2. *In the solicited-only credit rating system, the credit rating standard is decreasing in the payoff R of successful investment projects (that is, $k_{B,1}^H$ is increasing in R), increasing in the CRA's prior reputation μ_1 when $\mu_1 < \underline{\mu}_1$, and decreasing in μ_1 when $\mu_1 > \bar{\mu}_1$ (where $\underline{\mu}_1$ and $\bar{\mu}_1$ are defined in the Appendix).*

An increase in the project payoff, R, increases the maximum fee that firms are willing to pay for an H-rating and, thus, the surplus that the CRA can extract from H-rated firms. This makes it more profitable for the opportunistic CRA to issue inflated ratings for bad firms and

leads to a lower credit rating standard (i.e., a greater $k_{B,1}^H$). In addition, when the CRA's prior reputation is sufficiently small (i.e., when $\mu_1 < \underline{\mu}_1$) or when it is sufficiently large (i.e., when $\mu_1 > \bar{\mu}_1$), the informativeness of the CRA's rating record about its type is relatively small. This means that releasing an H-rating has only a minor impact on the CRA's reputation, weakening its disciplinary role. As a result, the CRA's reputational concerns become weaker, leading to a less stringent rating standard.

4 The Credit Rating System with Unsolicited Ratings

In this section, we examine a credit rating system that incorporates unsolicited ratings—that is, a system in which CRAs have the ability to issue ratings even if not requested by firms. Our basic model is modified as follows. After a firm endowed with a project of quality $\theta \in \{G, B\}$ approaches the CRA, the opportunistic CRA offers to issue an H-rating (respectively, an L-rating) with probability $\hat{k}_{\theta,t}^H$ (respectively, $1 - \hat{k}_{\theta,t}^H$). If the firm accepts the offer, it pays the fee $\hat{\phi}_{\theta,t}^H$ (respectively, $\hat{\phi}_{\theta,t}^L$) and the rating is released as a "solicited rating," $r_t^s \in \{H, L\}$. If the firm rejects the offer, the opportunistic CRA releases an "unsolicited rating" $r_t^u = h$ (respectively, $r_t^u = l$) with probability $\hat{k}_{\theta,t}^h$ (respectively, $\hat{k}_{\theta,t}^l$) at no cost to the firm. The ethical CRA always gives an H-rating to firms with good projects and L-ratings to firms with bad projects; H-ratings are accepted by firms and are released as "solicited ratings," $r_t^s = H$; L-ratings are rejected by firms and are released as "unsolicited ratings," $r_t^u = l$.

The possibility of releasing unsolicited credit ratings changes the CRA's strategy space, affecting the investors' updating process about the CRA's reputation and, hence, firm valuations. In particular, firms with bad investment projects that are offered an L-rating may no longer be able to pool with type-N firms by rejecting the rating, if the CRA then decides to issue an unsolicited l-rating for them (which, as we demonstrate below, will indeed be part of the CRA's equilibrium strategy).

Releasing an unsolicited rating not only affects the value of the firm, it is also informative

about the CRA's type. After observing an unsolicited l-rating, investors update the CRA's reputation as follows:

$$
\begin{aligned}
\hat{\mu}_t^l &\equiv prob[\tau = e | r_t^u = l] \\
&= \frac{\mu_t (1 - \alpha)}{\mu_t (1 - \alpha) + (1 - \mu_t) \left(\alpha \left(1 - \tilde{k}_{G,t}^H \right) \tilde{k}_{G,t}^l + (1 - \alpha) \left(1 - \tilde{k}_{B,t}^H \right) \tilde{k}_{B,t}^l \right)},
\end{aligned} \tag{11}
$$

where, as before, $\tilde{k}_{\theta,t}^H$, $\theta \in \{G, B\}$, denotes the investors' conjecture about the opportunistic CRA's equilibrium choice of $\hat{k}_{\theta,t}^H$, and $\tilde{k}_{\theta,t}^l$ denotes their conjecture about $\hat{k}_{\theta,t}^l$. The above expression takes into account that an unsolicited rating can only be released for firms that refused to acquire a solicited rating, which is only the case for firms that were offered an L-rating.

Interestingly, the possibility of releasing unsolicited ratings affects the CRA's reputation also when no rating is released (i.e., when $r_t = \emptyset$):

$$
\begin{aligned}
\hat{\mu}_t^\emptyset &\equiv prob[\tau = e | r_t = \emptyset] \\
&= \frac{\mu_t (1 - \beta)}{\mu_t (1 - \beta) + (1 - \mu_t) \left(1 - \beta + \alpha\beta \left(1 - \tilde{k}_{G,t}^H \right) \left(1 - \tilde{k}_{G,t}^l \right) + (1 - \alpha)\beta \left(1 - \tilde{k}_{B,t}^H \right) \left(1 - \tilde{k}_{B,t}^l \right) \right)}.
\end{aligned} \tag{12}
$$

The above expression reflects the fact that while an ethical CRA issues a rating for all firms that have access to an investment project, an opportunistic CRA may refuse to do so. By offering an L-rating to a firm with a project of type $\theta \in \{G, B\}$ and by not issuing an unsolicited rating once the offer has been rejected by the firm, the opportunistic CRA can make sure that no rating is observed for this firm.[11]

It is easy to verify that the possibility of releasing unsolicited ratings impacts the CRA's reputation after it releases an H-rating only insofar as it affects the opportunistic CRA's rating choices $\hat{k}_{G,t}^H$ and $\hat{k}_{B,t}^H$ and, hence, the investors' updating process. The expressions for

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[11]For liability reasons, we assume that the opportunistic CRA cannot charge a fee in exchange for not releasing an unfavorable unsolicited rating.

$\hat{\mu}_t^H$, $\hat{\mu}_t^{H,S}$, and $\hat{\mu}_t^{H,F}$ are therefore identical to those in equations (1), (7), and (8), respectively. Further, the updated probability that a firm with an H-rating is of type G, $\hat{\alpha}_t^H$, is again given by the expression in equation (2), and the value of an H-rated firm is equal to:

$$\hat{V}_t^H = \left(\hat{\alpha}_t^H + \left(1 - \hat{\alpha}_t^H\right) q\right) R. \tag{13}$$

The objective function of the opportunistic CRA in a credit rating system with unsolicited ratings is similar to the one derived for the solicited-only rating system. In the second and last period, the CRA's profit is again given by equation (9): it equals the fee that it earns by releasing an H-rating to a firm.[12] In the first period, the objective function now has to take into account the possibility that the CRA can release unsolicited ratings and is modified as follows:

$$
\begin{aligned}
\pi_1(\mu_1) \;=\; & \alpha\beta \left[\hat{k}_{G,1}^H \left(\phi_{G,1}^H + \pi_2\left(\mu_1^{H,S}\right)\right) + \left(1 - \hat{k}_{G,1}^H\right)\left(\hat{k}_{G,1}^l \, \pi_2\left(\mu_1^l\right) + \left(1 - \hat{k}_{G,1}^l\right) \pi_2\left(\mu_1^{\emptyset}\right)\right) \right] \\
& + (1-\alpha)\beta \left[\hat{k}_{B,1}^H \left(\phi_{B,1}^H + q\,\pi_2\left(\mu_1^{H,S}\right) + (1-q)\,\pi_2\left(\mu_1^{H,F}\right)\right) \right. \\
& \qquad\qquad \left. + \left(1 - \hat{k}_{B,1}^H\right)\left(\hat{k}_{B,1}^l \, \pi_2\left(\mu_1^l\right) + \left(1 - \hat{k}_{B,1}^l\right) \pi_2\left(\mu_1^{\emptyset}\right)\right) \right] \\
& + (1-\beta)\,\pi_2\left(\mu_1^{\emptyset}\right). \tag{14}
\end{aligned}
$$

The following proposition characterizes the equilibrium in a credit rating system that allows rating agencies to release unsolicited ratings.

Proposition 3. *Suppose that $R > \hat{R}_c$, where $\hat{R}_c$ is defined in the Appendix. Then, in the credit rating system with unsolicited credit ratings, there exists an equilibrium characterized by the following strategies:*

(i) In period 1, the opportunistic CRA charges a fee of $\hat{\phi}_{G,1}^H = \hat{\phi}_{B,1}^H = \hat{V}_1^H - I \equiv \hat{\phi}_1^H$ for a solicited H-rating; a type-G firm obtains an H-rating with probability one (i.e., $\hat{k}_{G,1}^H = 1$); a type-B firm obtains an H-rating with probability $\hat{k}_{B,1}^H > 0$, and an unsolicited

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[12]Note that the probability $k_{\theta,2}^H$ has to be replaced by $\hat{k}_{\theta,2}^H$, and the fee $\phi_{\theta,2}^H$ by $\hat{\phi}_{\theta,2}^H$, $\theta \in \{G, B\}$.

l-rating with probability $1 - \hat{k}^H_{B,1} > 0$. *In period 2, the opportunistic CRA offers an* H-rating to all firms requesting a rating (i.e., $\hat{k}^H_{G,2} = \hat{k}^H_{B,2} = 1$), *and charges a fee of* $\hat{\phi}^H_{G,2} = \hat{\phi}^H_{B,2} = \hat{V}^H_2 - I \equiv \hat{\phi}^H_2$ *for it.*

(ii) *All firms with an investment project request a credit rating in periods 1 and 2. Firms acquire an H-rating for a fee of up to $\hat{V}^H_t - I$, $t \in \{1, 2\}$. Firms never acquire an L-rating rating at a positive fee. Firms raise funds and invest in the project if and only if they obtain an H-rating.*

The ability to release unsolicited credit ratings changes the incentives of the opportunistic CRA as follows. Similarly to the case with solicited ratings only, releasing an H-rating lowers the CRA's reputation, where the loss of reputation is mitigated (aggravated) if the project turns out to be a success (failure), i.e.:

$$0 = \hat{\mu}^{H,F}_1 < \hat{\mu}^H_1 < \hat{\mu}^{H,S}_1 \leq \mu_1. \tag{15}$$

In contrast, issuing an unsolicited l-rating has a positive effect on the CRA's reputation. To see this, note that:

$$\mu_1 \leq \hat{\mu}^{\emptyset}_1 < \hat{\mu}^l_1. \tag{16}$$

This result is due to the fact that, in equilibrium, unsolicited l-ratings are more likely to be issued by ethical CRAs than by opportunistic CRAs. Thus, by releasing an l-rating, the opportunistic CRA can improve its reputation by signaling to investors that it resisted the temptation to issue an inflated H-rating.

By assumption, ethical CRAs always issue a solicited H-rating to firms with good projects and an unsolicited l-rating to firms with bad projects. Proposition 3 shows that the equilibrium rating policy of opportunistic CRAs differs from that of ethical CRAs in the sense that a solicited H-rating is issued for a type-B firm with positive probability. Giving an inflated rating to a bad firm allows the opportunistic CRA to earn a higher fee, but comes at the cost

of a reputation loss, as shown in equation (15). In addition, if a bad project fails, the CRA runs the risk of revealing itself as being opportunistic, which comes at the cost of a further loss of reputation.

The following proposition presents comparative static results with respect to the equilibrium credit rating standard characterized by the probability $1 - \hat{k}_{B,1}^H$.

Proposition 4. *In a credit rating system with unsolicited ratings, the credit rating standard is decreasing in the payoff R of successful investment projects (that is, $\hat{k}_{B,1}^H$ is increasing in R), increasing in the CRA's prior reputation μ_1 when $\mu_1 < \underline{\mu}_1^u$, and decreasing in μ_1 when $\mu_1 > \bar{\mu}_1^u$ (where $\underline{\mu}_1^u$ and $\bar{\mu}_1^u$ are defined in the Appendix).*

The intuition for these results is analogous to that given for the solicited-only rating system.

We now turn to a comparison of the rating system with unsolicited ratings to the solicited-only rating system. We begin with the rating fees that the CRA can charge under these two systems. The following proposition shows that the ability to release unsolicited l-ratings allows the opportunistic CRA to charge higher fees for solicited H-ratings.

Proposition 5. *The fee charged for solicited H-ratings is higher in a rating system that allows for unsolicited ratings than in a solicited-only credit rating system.*

Proposition 5 provides one of the key insights of this paper. The ability to issue unsolicited ratings is valuable to the CRA because it enables the CRA to charge higher fees and, hence, to extract more surplus from the rated firms. This happens because in a solicited-only credit rating system firms have the option to avoid a low rating by refusing to be rated by the CRA. In this case, the value of the default option for the firm is the value of an unrated firm, given by equation (5). The CRA's opportunity to issue unsolicited l-ratings eliminates the option for the firm to remain unrated, and lowers the value of its default option to the value of a bad firm, which is zero. This increases the value of a favorable H-rating for the

firm and, hence, the fee that it is willing to pay for it. As argued above, if a firm refuses to acquire an L-rating, it is optimal for the CRA to issue an unsolicited l-rating, given the positive impact that releasing such a rating has on the CRA's reputation. Thus, issuing an unsolicited l-rating is a credible threat for the CRA. The credibility of this threat stems from the fact that, by issuing an unsolicited l-rating, the CRA demonstrates to investors that it resists the temptation to issue a (possibly) inflated rating.

The above argument also has implications for the type of ratings that are observed in equilibrium. The following corollary follows immediately from Proposition 3.

Corollary 1. *Unsolicited ratings are only issued for type-B firms. Thus, unsolicited ratings are associated with lower firm valuations, compared to solicited ratings. These unsolicited ratings are, however, not downward biased.*

A number of empirical papers have shown that unsolicited ratings are significantly lower than solicited ratings (e.g., Poon, 2003; Gan, 2004; Poon and Firth, 2005; Van Roy, 2006; Bannier, Behr, and Güttler, 2008).[13] However, the reason for this difference is not well understood. Using S&P bond ratings on the international market, Poon (2003) reports that issuers who chose not to obtain rating services from S&P have weaker financial profiles. His analysis indicates, however, that the difference in ratings cannot be explained by this self-selection bias and he concludes that unsolicited ratings are downward biased. Gan (2004) uses an ex post regression approach and finds no significant difference between the performance of issuers with solicited and unsolicited ratings. This result leads her to reject the "punishment hypothesis"—that is, the hypothesis that rating agencies use unfavorable unsolicited ratings to punish firms that refuse to solicit a rating—in favor of the self-selection hypothesis. Bannier, Behr, and Güttler (2008), however, cannot reject the "punishment hypothesis" for their sample.

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[13]For example, using international data from 1998 to 2000, Poon (2003) shows that while solicited ratings are more common for investment-grade issues (55% of issues in this category have solicited ratings), unsolicited ratings are the dominant rating type for speculative-grade issues (68% of ratings in this category are unsolicited).

Our paper suggests an alternative explanation for these findings, which reconciles the conflicting empirical evidence. While unsolicited ratings are lower, they are not downward biased. Rather, they reflect the lower quality of issuers. As a result, while issuers with unsolicited ratings should have weaker financial profiles, we should not observe any significant differences between their ex post performance and that of issuers with solicited ratings, once we control for their rating level. This argument, however, does not imply that rating agencies do not use unsolicited ratings to threaten issuers to pay higher fees for more favorable ratings. In fact, our analysis shows that, although "punishment" is an out-of-equilibrium outcome and thus not observed by investors, it still plays an important role in the credit rating process as a credible threat. The presence of such a credible threat allows CRAs to charge higher fees for solicited ratings and, thus, to extract more surplus from firms.

Proposition 5 and Corollary 1 are also related to the recent concern raised by both issuers and regulators that *"unsolicited ratings do not appear to be as favorable empirically as solicited ratings"* and that they may be used to *"punish firms that would otherwise not purchase ratings coverage from a particular credit rating service"* (Spatt, 2005). Our results are consistent with anecdotal evidence showing that rating agencies seem to use unsolicited ratings to induce firms to pay higher rating fees. Although this evidence implies that the rating agencies' adoption of unsolicited ratings is unfavorable from the issuers' point of view, we show in the following section that a rating system with unsolicited ratings can lead to higher credit rating standards and, hence, improve social welfare.

5   Credit Rating Standards and Social Welfare

In this section, we compare the welfare properties of the credit rating system with unsolicited ratings to those of the solicited-only rating system. As argued above, the quality of the two credit rating systems—that is the "credit rating standard"—is fully characterized by the equilibrium values of $k_{B,1}^H$ and $\hat{k}_{B,1}^H$ in our model. In the ensuing analysis, we compare the

CRA's choice of these two quantities and discuss their implications for the rating standard and, consequently, for social welfare under the different rating systems.

Proposition 6. *For low values of $\bar{V}$, the credit rating standard is more stringent in a rating system that incorporates unsolicited ratings (i.e., $\hat{k}_{B,1}^{H} < k_{B,1}^{H}$). For high values of $\bar{V}$, the credit rating standard is more stringent in a rating system that does not incorporate unsolicited ratings (i.e., $k_{B,1}^{H} < \hat{k}_{B,1}^{H}$).*

We know from Proposition 5 that ability to issue unsolicited ratings enables the CRA to charge a higher fee for a solicited H-rating. Thus, compared to the solicited-only rating system, the opportunistic CRA's marginal benefit from issuing an inflated H-rating to a type-B firm is greater in the case when unsolicited ratings are permitted.

At the same time, by releasing an unsolicited l-rating to truthfully reveal a bad firm's type, the CRA can boost its reputation to a greater extent than it could in the absence of unsolicited ratings. In order to obtain an intuitive understanding of this result, note that, without the possibility of issuing unsolicited ratings, CRAs can signal their ethical behavior to investors only by refusing to release an H-rating for a firm, in which case the firm remains unrated. However, the set of unrated firms, which contains firms with bad projects that declined to acquire an L-rating and firms that do not have a project, is much larger than the set of firms that obtained an unsolicited l-rating. This makes it more difficult for investors to infer the CRA's action from the observed outcome. It is therefore not surprising that unsolicited ratings are an integral part of the opportunistic CRA's optimal credit rating policy. This argument shows that the possibility of releasing unsolicited ratings also increases the CRA's marginal cost in terms of a reputation loss associated with the issuance of an inflated rating.

In equilibrium, the CRA's choice of $\hat{k}_{B,1}^{H}$, relative to that of $k_{B,1}^{H}$, therefore balances these two effects and trades off the benefit of a higher rating fee against the cost of a larger loss of reputation. When the difference between the marginal costs in the two systems (that is, the marginal reputation cost of an H-rating with unsolicited ratings minus that

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without unsolicited ratings) outweighs the difference between the marginal benefits (that is, the marginal benefit in terms of fees of an H-rating with unsolicited ratings minus that without unsolicited ratings), the CRA optimally chooses to issue less inflated ratings in the rating system with unsolicited ratings (that is, $\hat{k}_{B,1}^H < k_{B,1}^H$ in this case). This is typically the case when the value of an unrated firm is low (that is, when $\bar{V}$ is low), because this value represents the extent to which the value of remaining unrated in the solicited-only system exceeds that in the system with unsolicited ratings (which is zero). Thus, a low of value of $\bar{V}$ means that the difference between the fees that the CRA charges for an H-rating in the two systems is small (see Propositions 1 and 3). In contrast, the ability to release unsolicited l-ratings provides a clear reputation benefit for the CRA and, thus, leads the CRA to choose a more stringent rating standard in the rating system with unsolicited ratings. Conversely, when $\bar{V}$ is large, the CRA finds it more lucrative to inflate its ratings in a system with unsolicited ratings because of the higher fee that it can charge for solicited H-ratings. The presence of unsolicited ratings therefore causes the CRA to adopt a more lax rating standard.

Proposition 6 also challenges the argument that the higher fees associated with a rating system that allows for unsolicited ratings compromises the agencies' rating standards. Our analysis shows that this is not always the case. In particular, we demonstrate that rating standards can be higher in a system with unsolicited ratings than in a solicited-only system, even when the fees charges in the former system exceed those charged in the latter system. The reason is that, in a system with unsolicited ratings, CRAs benefit more from the increased reputation associated with releasing unsolicited l-ratings. Thus, under certain conditions, this disciplinary role of reputation leads to a higher rating standard.

Given the ambiguous effect that the adoption of unsolicited ratings has on the CRA's rating standard, it is not surprising that the effect on social welfare is ambiguous as well. The following proposition shows that the result again depends on the value of an unrated firm, $\bar{V}$.

Proposition 7. *For low (high) values of $\bar{V}$, the adoption of unsolicited credit ratings leads to an improvement (a deterioration) in social welfare.*

Proposition 7 sheds some light on the recent debate on whether the adoption of unsolicited ratings should be encouraged or not, and on how such a change would affect social welfare. Our analysis shows that the answer to these questions depends on the state of the economy. During a recession when the value of a firm's growth options is low (i.e., when $\bar{V}$ is low), the issuance of unsolicited ratings leads to more stringent rating standards and, thus, improves social welfare by preventing firms from investing in negative NPV projects. Such a rating system would, however, induce rating agencies to adopt lax rating standards during expansionary periods because of the higher fees they can charge for favorable ratings in this environment. Thus, our analysis suggests that regulators have an active role in monitoring and supervising rating agencies and to adjust their policies in accordance with current economic conditions.

6   Conclusion

In this paper, we develop a dynamic rational expectations model to address the question of why credit rating agencies issue unsolicited ratings and why these ratings are, on average, lower than solicited ratings. We analyze the implications of this practice for credit rating standards, rating fees, and social welfare. Our model incorporates three critical elements of the credit rating industry: (i) the rating agencies' ability to misreport the issuer's credit quality, (ii) their ability to issue unsolicited ratings, and (iii) their reputational concerns. We focus on a monopolistic rating agency that interacts with a series of potential issuers. In equilibrium, the agency trades off a higher short-term profit from selling inflated ratings to low-quality issuers against a lower long-term profit associated with a reduction in its reputation.

Our analysis shows that the rating agency issues unsolicited ratings for two reasons. First,

it enables the rating agency to charge higher fees for solicited ratings, because it can credibly threaten to punish issuers that refuse to solicit a rating with an unfavorable unsolicited rating. This increases the value of a favorable rating and, hence, the fee that an issuer is willing to pay for it. Second, by issuing a low unsolicited rating, the rating agency can demonstrate to investors that it resists the temptation to issue inflated ratings, which improves its reputation.

We demonstrate that, in equilibrium, unsolicited ratings are lower than solicited ratings, because all favorable ratings are solicited. This does not mean, however, that unsolicited ratings have a downward bias. Rather, they reflect the lower quality of firms that do not request a rating.

Comparing credit rating systems with and without unsolicited ratings, we find that while rating agencies benefit from having the option to issue unsolicited ratings, such a system can actually lead to less stringent credit rating standards, thereby reducing social welfare.

Appendix

Proof of Lemma 1. To be added. ∎

Proof of Proposition 1. To be added. ∎

Proof of Proposition 2. To be added. ∎

Proof of Proposition 3. To be added. ∎

Proof of Proposition 4. To be added. ∎

Proof of Proposition 5. To be added. ∎

Proof of Corollary 1. To be added. ∎

Proof of Proposition 6. To be added. ∎

Proof of Proposition 7. To be added. ∎

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