Existence of Solicited Unsolicited Ratings

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Abstract

Unsolicited rating agencies convey information about potential borrowers to investors whether or not the borrowers want it to do so. However, as they do this without the consent of the borrowers, they are not paid for this service by the borrowers. It is often argued that this is done to build reputation. In this paper, we develop a model that identifies the scenarios where unsolicited ratings can co exist profitably with solicited ratings.

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1 Introduction

Rating agency facilitates information dissemination - about firms to investors. These ratings can take two different forms. The most common form is solicited ratings. With solicited ratings, the borrower(s) approach rating agencies for ratings. In return, the borrower(s) pay the agency the rating fees. The other form of rating is the unsolicited ratings. In this case, firms are rated without their consent. As the rating was done without the firms’ consent, the rating fees are no paid. In neither of the cases do the investors pay the fees.\(^1\) One natural question that emerges from the above is the financial viability of unsolicited ratings. This questions the existence and objective of unsolicited ratings. There are two broad and opposing views.

Two interesting views are often quoted in the context of unsolicited ratings. One, it is often argued that the unsolicited ratings are often too pessimistic. The reason given is that, first the rating agencies give lower grades. The rating agency then negotiates with the firm and seeks clientele with an implicit promise of better ratings if they pay the fees. Harington (1997) stated that some banks consider Moody’s practice of assigning unsolicited ratings as equivalent to “financial blackmail”. The other view, put forward by rating agencies themselves, is that of ‘building reputation’ through unsolicited ratings. The arguments given by rating agencies favoring unsolicited ratings is that when an agency wishes to break into a new market, it provides unsolicited ratings because there will not be any firm who would pay for the services of an agency who is yet to ‘prove’ itself. Gradually, as the rating agencies build up reputation, they can start charging for their services. In this paper we develop a model that addresses the issue of unsolicited ratings. To the best of our knowledge, there does not exist any model which captures these two important facts about unsolicited rating agencies. Our model shows that both these outcomes- that is, the unsolicited ratings give lower ratings and the fact that they can build reputation, is possible in equilibrium.

In USA, the first issuance of unsolicited ratings happened with Moody’s in 1991. Subsequently, S&P’s and Fitch decided to follow the lead of Moody’s. For example, S&P’s has aggressively entered the Japanese market in recent years, and it has assigned 176 unsolicited long-term credit ratings (i.e., 63% of the 278 ratings) to Japanese issuers as of December 2002.

\(^1\) Investors subscription accounts for at most 10% of the total revenue of rating agencies (Rose 1992).
In India, the rating agencies have been cautious on this issue.

The three major rating agencies in India are ICRA, CRISIL and CARE. All three respond to the best practices prescribed by ACRAA (the Association of Credit Rating Agencies in Asia) regarding unsolicited ratings similarly. They do not undertake unsolicited ratings, however they are not entirely opposed to the idea. CARE mentions the following interesting observation in their website (http://www.careratings.com/scripts/faq.asp): "There is however, a good case for undertaking unsolicited ratings. It will be relevant to mention here that any rating based entirely on published information has serious limitations and the success of a rating agency will depend, to a great extent, on its ability to access privileged information. Co-operation from the issuers as well as their willingness to share even confidential information are important pre-requisites. On its part, the rating agency has a great responsibility to ensure confidentiality of the sensitive information that comes into its possession during the rating process."

The official policy on unsolicited ratings in India is prohibitive. Reserve Bank of India (RBI), one of the principal regulators, in its response to New Basel capital Accord states "The unsolicited ratings are generally superficial. The use of such ratings for assigning preferential risk weights would undermine the basic philosophy of the New Accord. It may also lead to the potential for trade off between competition and quality in the rating industry" (RBI, 2003, pp 8). It appears that unsolicited ratings in India are not in the very near horizon.

The academic literatures on unsolicited ratings pretty much focus on the issue of lower grades with unsolicited ratings as against solicited ratings. Surprisingly, the topic has not generated enough interests among the academia. Some recent papers explore the outcome with unsolicited rating agencies. Poon (2003a) is the first empirical study to analyze the controversy using pooled time-series cross-sectional data of 265 firms in 15 countries from Standard and Poor's Ratings Services (S&P’s) during the period of 1998-2000. The results demonstrate that unsolicited ratings are lower. Interestingly, the paper also finds that those issuers who choose not to obtain rating services from S&P’s have weaker financial profiles. Poon (2003b) reports identical using Fitch’s ratings of 951 major international banks from 82 countries to analyze the controversy surrounding unsolicited credit ratings. Gan (2003) tests the downgraded hypothesis using both Moody’s and S&P ratings. This paper also finds evidence of downgrading. The author attributes this to lower information availability to unsolicited ratings.

In a recent important paper Byoun and Shin (2002), show that credit rating agencies issue much more unsolicited ratings of low-grade and down-
grade than of high-grade and up-grade. They also, empirically support their findings with particular reference to the Asian markets. In this paper we present a simple model that provides some important efficiency and policy issues regarding solicited versus unsolicited ratings. We also explore the possibility of both forms of ratings co existing.

Our modeling of credit rating agencies (CRAs) is based upon the CRAs information producing roles. There has been a substantial empirical study, on the effectiveness of rating agencies. Partnoy (2001), provides a brief survey of empirical work. Empirical studies by Ederington, Goh and Nelson (1996) compares the information effectiveness of rating agencies and stock market analysts on market movement and efficiency. White (2001) also study the effectiveness of bond ratings and proposes welfare implications. Partnoy (2001), tests the hypothesis those ratings are effective, although the market may actually anticipate it in advance and hence, ratings are published with a lag. Recent attempts in theoretical modeling of rating agencies, start with Nayar (1993). In his paper, Nayar establishes the case for voluntary ratings as against compulsory ratings for the Malaysian firms. Kuhner (2001) develops a model that identifies the likely scenarios where the investor may completely disregard or base their decisions based on the ratings. He identifies a a separating Bayesian Nash equilibrium where some meaningful information by the rating agency is disseminated and used by the investors. In another interesting recent paper, Boot and Milbourn (2001) show that rating agencies usually act as a mechanism that coordinates to ‘focal points’. In Boom (2001), a monopolistic rating agency sets the quality and the fees.

Although we study a problem that is much closer to Byoun and Shin (2002), we ask very different questions and hence propose very different theoretical frameworks. While, Byoun and Shin ask whether there is any reason to be conservative about unsolicited ratings, we ask whether such a system is efficient. Unsolicited ratings in their model corresponds to voluntary information disclosure by the firm. In our model, unsolicited ratings are characterized by the following salient features:

- Unsolicited ratings are not paid for their services immediately.
- Unsolicited ratings do it ‘to build reputation’.
- Unsolicited ratings have lesser access to firm specific information than solicited ratings.

In our view, a theoretical framework that studies unsolicited ratings, must address the three above issues. The literature does not consider the reputation building role of unsolicited ratings. This is particularly interesting as a-priori the last two features seem to be contradictory. How can
a rating agency hope to build up reputation when it has lesser access to firm specific information than solicited ratings? It appears that this vindicates RBI’s apprehensions. We find that in equilibrium, CRAs providing unsolicited ratings to build reputation can profitably co exist with CRAs providing solicited ratings. Our model also, confirms many of the empirical findings. We also investigate whether unsolicited ratings are efficient. Finally, we provide Some policy implication issues.

Our model has three sets of risk neutral agents - competitive investors, a firm and credit rating agencies. The investors are rational and has Bayesian beliefs. The rating agency evaluates the firms using its screening technology. Information production by a rating agency depends upon the screening function it has and the extent of information it is privy to about the firm. The accuracy with which the rating agency can infer a firm’s type, increases with level of information available to it.

In section 2 we present the basic model. In section 3 we set up the framework that accommodates solicited as well as unsolicited rating agencies. Section 3.1 describes the equilibrium. Subsection 3.2 considers the case where the rating agencies enter sequentially with the incumbent being a solicited type. Subsection 3.3 allows simultaneous entry of rating agencies. Section 4 discusses some welfare issues and policy implications. Section 5 is the concluding section. All the proofs are relegated to the appendix.

2 Model

We consider a simple model where the economy consists of three sets of risk neutral agents - a set of competitive investors, a firm and a credit rating agency (CRA).

**Investors:** The investors are small and competitive. A representative investor is endowed with capital. She can either invest a part of this in the risk free asset or can invest in the firm.\(^2\) For simplicity, assume that the risk free rate is zero.

**Firm:** The firm has a project with stochastic returns, that requires one unit of capital as input today to produce output tomorrow. The firm has no funds available to finance the project.\(^3\) Therefore, the firm has to raise the required amount from the investor if the project has to be started.

Let \(v\) denote the returns from the project to the firm. However,\(v\) is

\(^2\)To avoid confusion, the investor is ‘she’ while the firm is ‘he’.

\(^3\)To be precise, any available funds with the firm is either low enough or is prohibited by the existing stake holders to fund any new project.
realized with a probability $p$ where $0 \leq p \leq 1$. With $1 - p$, the returns are zero. We would interpret $p$ as the probability of success. The probability of success is *type specific* to the firm. A firm is of type $p$ if its project succeeds with probability $p$.

To raise the required amount from the investor, the firm resorts to debt financing, by issuing *Standard Debt Contract* (Gale and Hellwig, 1985). The debt contract involves a face value of $R$ per unit of capital borrowed ($R \leq v$). The claim of $R$ is satisfied when $v$ is realized. This occurs with a probability $p$. Protected by limited liability, the firm pays nothing if the project fails.\footnote{We restrict ourselves to debt financing as they are the most commonly rated instruments by the CRA.} We implicitly assume that there is no strategic default, i.e., the firm does not default on meeting its debt obligations if the realization is $v$.

**Information:** The true type of the firm is known only to the firm. This is the only source of asymmetric information. Although $p$ is not known to the others, the distribution, denoted by $F(p)$ with corresponding density function $f(p)$, from which $p$ is drawn, is common knowledge. All other information is common knowledge.

**A.1:** $p \in [0, 1]$ with a density function of $f(p)$. $F(0) = 0, F(1) = 1$.

Once, the investor knows $R$, she can calculate the expected payoff from lending the one unit to the firm. Her expected payoff is $p.R + (1 - p).0 = R.p$. To the investor, a firm is investment worthy if his $p$ exceeds $\bar{p}$ where $\bar{p}.R = 1$. although the investor can calculate $\bar{p}$, she does not know whether he has $p$ is greater than or less than $\bar{p}$. Therefore, the investor calculates $E(p)$, the expected value of $p$. We will assume,

**A.2:** $R.E(p) < 1$.

A.2 implies, the investor will never invest in the firm without any additional information. This is so, because, if the investor invests, her expected returns do not match her costs of lending the one unit. The CRA now provides additional information about the firm that helps the investor in her decision making.

**CRA:** The CRA has access to a technology that helps it to evaluate the risk of any firm. The accuracy with which it can distinguish the firm’s success rate $p$, depends upon the extent to which it has access to the firm. If the firm wants to get himself rated, then apart from paying the fees, the
firm will also have to disclose specific information about himself to the CRA as and when required by the latter. Let \( e \) denote the extent to which the firm discloses these ‘specific information’. Note that, if the CRA wants to rate the firm in an unsolicited manner, the firm has no obligation to disclose these information to it. Denote, \( s \) and \( u \) as the information accessibility to the CRA for solicited as well as unsolicited ratings, therefore, \( e = s, u \) and \( s, u \in [0, 1] \).

If a CRA wants to provide only solicited ratings, for its services, it charges the firm (if the firm wishes himself to be rated) an ex ante fee. We denote \( X \) as the present value of the fees it gets per firm it rates. In practice, the ratings are not just one time ratings. It involves periodical ratings by the CRA of the firm. In this model, although we do not consider periodical ratings explicitly, the same can be incorporated in the structure. If the CRA provides unsolicited ratings, its returns from doing so has slightly different interpretation. Note, that, because the ratings are unsolicited, none of the types whom the CRA rates, will pay for the ratings. The CRA wants unsolicited ratings because it wants to establish ‘reputation’ in the market. Therefore, its returns are the present value of what it can expect to earn in the future. If \( \delta \) is the probability that it establishes a good reputation in the market, its expected returns are \( \delta X + (1 - \delta) 0 = \delta X \).

Once the firm has been rated by the CRA (whether solicited or unsolicited), the CRA announces its findings about the firm to the investor. The CRA announces the firm to be ‘good’ if it concludes that the firm’s type is at least as much as \( \bar{p} \) and ‘bad’ if it concludes the firm’s type to be less than \( \bar{p} \). We assume that there is no \textit{strategic announcements} by the CRA. That is, the CRA always announces according to its announcement rule. In other words, we rule out the possibility that the CRA announcement about the firm is contrary to what it inferred about the firm.

The investor has Bayesian beliefs, and updates her priors regarding the firm’s type, conditional on the announcements made about the firm. The decision whether or not to invest in the firm, depends upon these announcements. The announcements made by the CRA will be denoted by \( a \). Given any announcement by the CRA the investor invests if it is profitable for her to do so. An announcement ‘good’ will be denoted by ‘g’ and ‘bad’ will be denoted by ‘b’.

\textbf{Technology:} The technology then generates output in the form of reports, \( r(p) \) that classify a firm having \( p \) either greater than or less than \( \bar{p} \). The accuracy with which a type is inferred correctly depends upon \( e \). Higher \( e \) allows it to infer the actual type of a firm more accurately. In particular, with \( e = 1 \) the CRA knows the exact \( p \). On the other extreme, with
$e = 0$, the technology does not convey any additional information regarding the firm’s type other than the fact that $p$ is drawn from $F(p)$ and lies between 0 and 1. Particular values of $e$ narrows down the possible reports, $r(p)$ can generate, within the range $[l(p,e), h(p,e)]$, such that, such that $0 \leq l(p,e) \leq r(p) \leq h(p,e) \leq 1$. The technology and $e$ determines $l(p,e)$ and $h(p,e)$. If $r(p) \geq \bar{p}$, then the CRA concludes it to be good. Similarly, if $r(p) < \bar{p}$ it concludes the firm to be bad.

A reasonable technology should satisfy, if $e = s = 1$, $l(p,s) = u(p,s) = r(p) = p$ and with $e = 0$, $l(p,0) = 0$ and $h(p,e) = 1$. If $e = 1$, that is if the available information is perfect, the CRA can infer the true type of the firm accurately. However, if the CRA has no specific information about the firm ($e = 0$), the technology does not refine at all. This is intuitive. If the CRA does not have access to any additional information about the firm that the investors always possess, it cannot make a more refined recommendation to the investor. Therefore, if $e = 0$ then any type can generate a report between $[0,1]$ with equal probability. For example, if $p$ follows uniform distribution, then $l(p,e) = pe$ and $h(p,e) = 1 - e(1-p)$.

**Announcement**: Let $\alpha \in [0,1]$ denote the probability that any particular type will lead to an announcement ‘good’. The probability with which any type is announced good is therefore simply the probability that $r \geq \bar{p}$. Therefore, the probability with which any type is announced good is therefore simply the probability that $r \geq \bar{p}$.

Therefore,

$$
\alpha(p, \bar{p}, 1) = \begin{cases} 
1 & \text{if } p \geq \bar{p}; \\
0 & \text{if } p < \bar{p}
\end{cases}
$$

and $\forall e \in [0,1)$,

$$
\alpha(p, \bar{p}, e) = \begin{cases} 
0 & \text{if } F(h(p,e)) < F(\bar{p}) \\
F(h(p,e)) - F(l(p,e)) & \text{if } F(h(p,e)) \geq F(\bar{p}) \geq F(l(p,e)) \\
1 & \text{if } F(\bar{p}) < F(l(p,e))
\end{cases}
$$

Note that, $\alpha(.)$ given in (1), satisfies the following conditions for $e \in [0,1)$.

$\alpha(p,e)$ is continuous, differentiable everywhere in $e$. $\alpha(p,e)$ is continuous, non-decreasing and differentiable in $p$ almost everywhere, except at $p = \bar{p}$. $\alpha(.)$ is non decreasing in $p$; and $\alpha$ increases in $e\forall p \geq \bar{p}$ and decreases with $e \forall p < \bar{p}$.

**Figure 1 here:**
In the above figure, note that for a given \( e \), \( \alpha(p_1, e) = 0 < \alpha(p_2, e) < 1 = \alpha(p_3, e) \). This means that, there could exist types such that they are never announced good \( (p_1) \) or never announced bad \( (p_3) \). However, there are types \( p_2 \) who are announced good or bad with positive probabilities.

We end this section with an assumption that links \( u \) and \( s \).

**A.3:** \( 0 < u < s = 1 \). Further, \( u \) is such that, \( l(1, u) > \bar{p} \).

A.3 implies the CRA has complete access to the firm specific information with solicited ratings, whereas, it has only limited access to those information with unsolicited ratings. However, this access to information with unsolicited ratings are not zero. The CRA can access some information through its network. Certainly, all information available in the public domain (say the website) can be used for ratings purpose. Although A.3 states \( s = 1 \), this is done to simplify the algebra. The model is robust to the case where \( 0 < u < s < 1 \). Finally, A.3 also asserts a minimum required information availability to the unsolicited rating agency.

### 3 Modeling Unsolicited and Solicited Ratings

We calculate the equilibrium in the ratings industry involving two types of CRAs. The CRAs are different in the sense that one is already in the market - as a solicited CRA while the other is contemplating operating in the market. We identify conditions under which the entrant would prefer to operate as an unsolicited ratings agency. We will denote the rating agency, which follows solicited ratings by \( S \) and the other by \( U \).

**Sequencing of moves:** The various agents in the model move in the following sequence.

**First Stage:** \( S \) is passive. It rates and announces any firm that comes to it and pays the fees \( X \). The other CRA, \( U \), rates the remainder of the firms.\(^6\) Each firm decides whether or not to get rated by \( S \). Therefore, the firms’ decision to approach \( S \) or not can have two possible outcomes. One, he does not approach \( S \) and is rated only by \( U \). Two, he approaches \( S \), and hence is rated by \( U \).

\(^5\)With uniform density, this implies, \( u > \bar{p} \).

\(^6\)Alternately, we could have modeled \( U \)'s choice in the first stage as the proportion of firms (say \( \theta \)) it wants to rate. This modification is not central to the model and hence we ignore it. To interpret it differently, we assume that \( \theta = 1 \) in equilibrium.
Second Stage: $S$ and $U$ rates the measure of firms - the measure as decided in the previous stage. The CRA then discloses these ratings to the investor. The investor can learn this information without incurring any cost.

Third Stage: An investor decides whether or not to invest in a firm once he approaches her for funding. Note that, when the firm approaches the investor- he discloses the ratings he has and the nature of ratings- solicited or unsolicited. Therefore, the investor decides whether or not to invest based on four distinct possibilities. These are- ‘good’ and solicited, ‘bad’ and solicited, ‘good’ and unsolicited and ‘bad’ and unsolicited. Her decision is to invest in the firm depending upon these ratings information.

Denote $\gamma_k, k = S, U$ as the probability with which the investor will invest in a firm, which is announced good by a CRA of type $k$. Similarly, let $\beta_k, k = S, U$ denote the probability with which the investor will invest in a firm, which is announced bad by a CRA of type $k$. Thus, $\gamma_k, \beta_k : \{\text{good, bad}\} \Rightarrow [0, 1]$.

Fourth Stage: Depending upon the investor’s decision, the project is either taken up or not taken up by the firm. If the project succeeds the firm pays $R$ to the investor retaining the residual, $v - R$ for himself. If the project fails, neither the firm nor the investor gets any positive returns from it.

Firm’s Decision: If the firm of type $p$ goes to $S$, the expected profit he earns is,

$$\pi_S = p.(v - R)\{\alpha(p, s)\gamma_S + [1 - \alpha(p; s)]\beta_S\} - X. \quad (2)$$

Similarly, if he does not go to $S$, his expected profits are

$$\pi_U = p.(v - R)\{\alpha(p, u)\gamma_U + [1 - \alpha(p; u)]\beta_U\}. \quad (3)$$

Note that in RHS of (3), the expression in the curly bracket indicates the expected returns from being rated by $U$.

Investor’s Decision: The investor decides $\gamma_k, k = S, U$ and $\beta_k, k = S, U$. The expected net returns to the investor when she invests in a firm that comes with an announcement of good by $k$ is,

$$\pi^k_g = \int_{p \in P_k} \gamma_k\{\alpha(p, e).pR - 1\}dF(p).$$
Similarly, the expected net returns to the investor when she invests in a firm that comes with an announcement of bad by $k$ is,

$$\pi_b^k = \int_{p \in P_k} \beta_k \{[1 - \alpha(p, e)]pR - 1\}dF(p).$$

Let $P_S, P_U$ are the sets of firms rated by $S$ and by $U$ respectively.

The expected probability of success corresponding to any announcement is given by

$$E(p|a = g, k) = \frac{\int_{p \in P_k} p \cdot \alpha(p; e) dF(p)}{\int_{p \in P_k} \alpha(p; e) dF(p)}.$$  

$$E(p|a = b, k) = \frac{\int_{p \in P_k} p \cdot [1 - \alpha(p; e)] dF(p)}{\int_{p \in P_k} [1 - \alpha(p; e)] dF(p)}.$$  

where $k = S, U$. Therefore,

$$E(p|a = g, k) \geq \bar{p} \Rightarrow \int_{p \in P_k} (p - \bar{p}) \alpha(p; e) dF(p) \geq 0. \quad (4)$$

$$E(p|a = b, k) \geq \bar{p} \Rightarrow \int_{p \in P_k} (p - \bar{p})[1 - \alpha(p; e)] dF(p) \geq 0. \quad (5)$$

**Proposition 1** In equilibrium,\(^7\) if $U$ has to operate alongside $S$, $\gamma_S^* = \gamma_U^* = 1$ while $\beta_S^* = \beta_U^* = 0$.

The intuition underlying proposition 1 is straightforward. The investor makes a distinction between the announcements. In equilibrium, she uses a simple rule- invest if the announcement is good (irrespective of the type of CRA who rates) and not otherwise. This is because, given the capabilities of the technology function, the investor knows for sure that if a firm is rated good, on an average he will be good. Similarly, if a firm is rated bad, on an average, he will be bad. The above result means that in equilibrium type $p_m$ considers,

$$p_m(v - R)\{\alpha(p_m, s) - \alpha(p_m, u)\} = X. \quad (6)$$

The left hand side of (6) is the marginal benefits to the firm of type $p_m$ if he gets rated by $S$. Note that, if he gets rated by $S$ as against by $U$, his marginal benefits are only the incremental probability of being announced good by $S$ vis--vis by $U$. The right hand side is the marginal cost of going

\(^7\)Equilibrium variables are denoted by asterisk ($^*$).
to $X$. This is simply the rating fees $X$. In equilibrium the firm of type $p_m$ is indifferent between going to $S$ and being rated by $U$ if the relative advantages of being rated by $S$ and costs of going to $X$ are equal.

Denote $P_S = \{ p | \pi_S \geq \pi_U \}$. The following are true,

**Proposition 2** (a) Consider any $q$ such that $q < \bar{p}$. Then, $q \notin P_S$.

(b) If $\bar{p}(v - R)[1 - \alpha(\bar{p}, u)] > X$, then $P_S$ is non empty.

Proposition 2 has interesting implications. Part (a) states that ‘bad’ types do not seek ratings. This is because, any type that seeks ratings, has to pay the $X$. However, they do not expect to gain anything from being rated as they know they will be never announced good. Therefore, they know that their projects will not be funded. Unless, the project gets funded, they can never recover $X$. Therefore, ‘bad’ types will not seek ratings.

The condition in (b) guarantees that $\bar{p}$ finds it profitable to go to $S$. The term $\bar{p}(v - R)[1 - \alpha(\bar{p}, u)]$ is the (opportunity cost) of going to $U$. This is measured as the expected profits $\bar{p}(v - R)$ foregone in all the cases when he is unable to find investors. Note that he will be able to find funding with a probability of $\alpha(\bar{p}, u)$. This is so because, he will be announced good with a probability of $\alpha(\bar{p}, u)$. Therefore, $1 - \alpha(\bar{p}, u)$ is the probability with which he will not get funded. On the right hand side of the inequality is the direct costs of going to $S$- that is $X$. The firm will decide to go to $S$ if he calculates the direct cost to be lower than the opportunity cost of waiting.

Suppose $P_S$ is non-empty. Then, given proposition 2, $P_U$ can be further decomposed into two mutually exclusive and exhaustive subsets $P^H$ and $P^L$. Here,

$$P^H = \{ p | \pi_u(p, u) \geq \pi_s(p, s); \text{ and } p > \bar{p} \}$$

$$P^L = \{ p | \pi_u(p, u) \geq \pi_s(p, s); \text{ and } p < \bar{p} \}.$$ 

However, $P^L$ consists of types that are not good and hence, do not go to $S$. The set $P^H$ is the set consisting of types that do not go to $S$, but are actually ‘good’. The next proposition characterizes $P^H$ and $P^L$.

**Proposition 3** Under A.1-A.3, $P^H$ and $P^L$ are nonempty. Further, if $p' \in P^H$, then any $q \in [p', 1] \in P^H$.

The above result is important. Note that, if $p^H$ is empty, then the investors will discard any firm that is rated by $U$. This is because, if $P^H$ is
empty, the investors can correctly infer that \( U \) does not rate any firm that is actually good. Therefore, the investor will not invest in any firm that is rated by \( U \) irrespective of the announcement made by the later. \( P^L \) is non empty because all types that are not good would not apply to \( S \) and hence, will be rated only by \( U \). The non emptiness of \( P^H \) plays a crucial role for the \( U \) to successfully operate.

3.1 Equilibrium with Solicited and Unsolicited Ratings

The model set up so far identifies the conditions under which firms would decide whether to go to \( S \) for ratings, or wait his turn to be picked and rated by \( U \). The investors’ decision in this set up is simple. Invest if the announcement is good- and not invest otherwise. However, it is not obvious whether the CRA would like to operate as an unsolicited ratings agency. This is especially true, if the CRA had an option to operate as a solicited ratings agency.

Denote, \( \Pi_k, k = S, U \) as the expected profit to a rating agency of type \( k \). Therefore,

\[
\Pi_S = X \int_{p \in P_S} dF(p) \quad (7)
\]

\[
\Pi_U = \delta X \int_{p \in P_U} \alpha(p, u) dF(p). \quad (8)
\]

The expected profits for \( S \) is the per firm revenue \( X \) times the measure of firms it expects will come to it. The expected profits to \( U \) is slightly involved. Note that, \( U \) does not receive any payments for its services instantaneously. It can expect to get returns from its services if it can establish a reasonably good reputation for itself in the market. We have assumed that once it establishes a reputation in the market with a probability \( \delta \), it earns \( X \) per firm. However, the only way it can establish reputation in the market is by ‘getting it right’. Getting it right in this context means, if it had announced ‘good’ and the firm had a chance to operate in the market- it indeed turned out to be good. Note that, from all the firms that are rated, only the ones which are announced good are the ones, which gets a chance to operate. Therefore, the scope for building reputation arises only with those that are announced good. Finally, if the firm is indeed good, then the reputation of the CRA is made, otherwise not. Thus, the per firm ex ante payoff to the CRA is, \( \delta \alpha(p, u) \). If it announces a firm good he turns out to be bad, then it loses its reputation. In this case it does not expect any future payoffs.
Therefore,
\[ \delta = \frac{\int_{p \in P^H} \alpha(p, u) dF(p)}{\int_{p \in P^U} \alpha(p, u) dF(p)}. \]

Thus,
\[ \Pi_U = X \int_{p \in P^H} \alpha(p, u) dF(p). \] (9)

The CRA has to decide whether it wants enter the market as a solicited rating agency or an unsolicited rating agency.

In subsection 3.2 we consider the case where a market already has a CRA that operates as a solicited rating agency. We then identify the conditions under which the entrant would operate as an unsolicited rating agency. In subsection 3.3 we analyze the possibility that the market is new, and two CRAs are contemplating entering the market.

### 3.2 Sequential Entry of CRAs

Denote \( \Pi(j, k), \forall j, k = U, S \) as the expected profits to a CRA if it wants to operate as type \( j \) (where \( j \) could be unsolicited or solicited ratings) when the other one is operating as type \( k \) (where \( k \) is could be unsolicited or solicited ratings). In this section we are only interested in comparing \( \Pi(U, S) \) with \( \Pi(S, S) \). This is because, the market already has a CRA that is of type \( S \).

Let the condition (b) in proposition 2 be satisfied. This would imply that prior to the entry of the second CRA, the incumbent agency makes positive profits.\(^8\) The next result identifies the condition under which the entrant CRA will be operating as \( U \) or as \( S \).

**Proposition 4** Suppose, \( \bar{p}(v - R) > X \), then under A.1-A.3, \( \forall X < \bar{p}(v - R), \exists \tilde{u} \) such that if \( u > \tilde{u} \), the incumbent will act as \( U \), otherwise it operates as \( S \).

For an unsolicited CRA to operate profitably alongside a solicited CRA, it has to be the case that, the unsolicited CRA manages to draw sufficient number of ‘good’ firms towards it. For the good firms, their advantage in going to \( S \) lies in the fact that they will be announced good with higher probability by \( S \). However, there is a cost \( X \) they have to incur immediately. However, a type with a very high \( p \) will be announced good with certainty

---

\( ^8 \) \( \Pi_S = X[1 - F(\bar{p})] > 0 \). This follows from condition (b) in proposition 2. Note, \( \bar{p}(v - R) > X \) implies that all types with \( p \geq \bar{p} \) go to \( S \).
by both $U$ and $S$. These firms will not approach $S$. The measure of such firms increase as $u$ increases. Thus, as $u$ increases the chances of a CRA operating as $U$ making profits improves. In equilibrium, for $U$ to operate, $E(p|a = g, U) > \bar{p}$ must hold. If this was not the case, then the investor will never invest in any firm based on the announcements made by the CRA. This would earn zero expected revenues to the CRA and it will not operate.

The above result is interesting because it shows that even if the ratings industry has an existing player, which has access to better information about firms, another ratings agency, which has lower information access, can profitably coexist.

It appears that the result is partially driven by the fact that the existing CRA finds it costly to relocate its status from a solicited CRA to an unsolicited CRA. In the next section we identify the conditions under which two CRAs contemplating entering a market, would prefer to operate as $U$ or as $S$.

### 3.3 Simultaneous Entry of CRAs

Let us consider a new market, which has no CRAs. Two CRAs are contemplating entering the market. The available strategies to them are whether to operate as solicited or as unsolicited CRAs.

The expected profits for the CRA under alternate entry decision by different CRAs is give by,

$$
\Pi(S, S) = 0.5X[1 - F(\bar{p})]
$$
$$
\Pi(U, S) = X\int_{p_m}^{1} \alpha(p, u)dF(p)
$$
$$
\Pi(S, U) = X[F(p_m) - F(\bar{p})]
$$
$$
\Pi(U, U) = 0.5X\int_{\bar{p}}^{1} \alpha(p, u)dF(p).
$$

Note that in equilibrium, $p_m^*$ is a function of $\bar{p}$, $X$ and $v$. Further, $p_m^*$ is increasing in $v$ and $\bar{p}$ while it is decreasing in $X$. The negative relationship between $p_m^*$ and $X$ is easy to see. This is because, $X$ is paid by the firm to $S$. An increase is $X$, ceteris paribus will make going to $S$ less lucrative than going to $U$. An increase in $\bar{p}$ would lead to a decrease in $p_m^*$, because, higher $\bar{p}$ would lead to a lower chances of getting funded for a ‘good’ firm for a given $u$. This makes $S$ more attractive. Finally, a positive relationship between $v$ and $p_m^*$ comes from the fact that, with higher $v$ the firms would
rather get funded with probability 1 (in which case their residual claims are high) and pay $X$ for it than take chances with $U$.

The $2 \times 2$ matrix representing the choice of operating as $S$ or as $U$ is given below:

<table>
<thead>
<tr>
<th></th>
<th>S</th>
<th>U</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>$0.5X [1 - F(\bar{p})]$, $0.5X [1 - F(\bar{p})]$</td>
<td>$X[F(p_m) - F(\bar{p})]$, $X \int_{p_m}^{1} \alpha(p, u) dF(p)$</td>
</tr>
<tr>
<td>U</td>
<td>$X \int_{p_m}^{1} \alpha(p, u) dF(p)$, $X[F(p_m) - F(\bar{p})]$</td>
<td>$0.5X \int_{\bar{p}}^{1} \alpha(p, u) dF(p)$, $0.5X \int_{p_m}^{1} \alpha(p, u) dF(p)$</td>
</tr>
</tbody>
</table>

Define,

$$G(\bar{p}) \equiv 1 - F(\bar{p}), G_1(\bar{p}) \equiv 2 \int_{p_m}^{1} \alpha(p, u) dF(p)$$

and

$$G_2(\bar{p}) \equiv 1 - F(p_m^*) + 0.5 \int_{\bar{p}}^{1} \alpha(p, u) dF(p).$$

The above game has the following possible Nash equilibria.

**Proposition 5** Under A.1-A.3, $\exists \bar{p}, u$ and $X$ such that the following are true:

(a) $\{S, S\}$ is a dominant strategy Nash equilibrium if $G(\bar{p}) \geq \max\{G_1(\bar{p}), G_2(\bar{p})\}$.

(b) $\{U, U\}$ is a dominant strategy Nash equilibrium if $G(\bar{p}) \leq \min\{G_1(\bar{p}), G_2(\bar{p})\}$.

(c) $\{S, S\}, \{U, U\}$ are pure strategy Nash equilibria if $G_2(\bar{p}) > G(\bar{p}) > G_1(\bar{p})$,

while $\{S, U\}, \{U, S\}$ are pure strategy Nash equilibria if $G_2(\bar{p}) \leq G(\bar{p}) \leq G_1(\bar{p})$.

The conditions in the above follows from comparing the payoffs in (10). The reason as to why both forms of ratings can co exist profitably follows mainly from proposition 3. This is because, while all firms that go to $S$ are ‘good’, the ones that get rated by $U$ also consists of some good firms. Further, by definition, $E(p|p \in P^H) > E(p|p \in P_S)$. Therefore, as long as the average of all firms rated by $U$ are comparable to those rated by $S$, the investor will invest in a firm announced good by either $U$ or $S$.

Figure 2 here:
In Figure 2, $\pi_U$ and $\pi_S$ are the expected profits earned by a firm if it is rated by $U$ or $S$. Note that, as $s = 1$, no types with $p < \bar{p}$ is announced good with positive probability. Therefore, $\pi_S = -X$ for $p < \bar{p}$. However, for types with very low $p$ (i.e., $p < \bar{p}$), they are not announced good with any positive probability even by $U$. Given, $s = 1$, all types with $p \geq \bar{p}$ will be announced good with certainty by $S$. Therefore, $\pi_S = p.(v-R) - X$ for $p \geq \bar{p}$. Given, A.3. $\exists q < 1$ such that all types with $p \geq q$ are announced good with certainty by $U$. Therefore, any type with $p \geq q$ will have $\pi_U = p.(v-R) > p.(v_R)X = \pi_S$. By continuity, types with $p$ less than $q$ but close to it will have $\pi_U > \pi_S$. This follows from the diagram as $\pi_U \geq \pi_S$ for all $p \geq p_\pi^*$. 

**Proposition 6** $\exists q$ such that, if $\bar{p} \geq q$, then $E(p|p \in P_S) \geq E(p|p \in P_U)$, and if $\bar{p} < q$, then $E(p|p \in P_S) < E(p|p \in P_U)$.

Proposition 6 has interesting interpretations. It states that if the risk premium is low, i.e., if $R - 1$ is low (high $\bar{p}$), then the average probability of success of all those firms who seek solicited ratings exceed those who seek unsolicited ratings. However, if the risk premium is high, then the reverse is true. The intuition is, straightforward. With a low risk premium, the investor will be stricter in deciding the firm in which she will invest. The firm will internalize this in his decision process. Therefore, fewer ‘good’ type firms will not seek solicited ratings. Therefore, the measure of firms that will have unsolicited ratings will be dominated by bad firms.

The above result confirms the findings of Poon (2003a) where they find that the firms ‘self select’ in going to rating agencies. In particular, they find that those issuers who choose not to obtain rating services from S&P’s have weaker financial profiles.

### 4 Welfare and Policy Implications

Which is the more efficient outcome? Note that to measure efficiency, we need to concentrate only on the following. In equilibrium, all projects that are rated by $U$ are funded with probability $\alpha(p,u)$, while they are funded with probability one if it is rated by $S$.

Denote $W(k,j)$ as the net surplus in the system, when one CRA is of type $k$ while the other is of type $j, k, j = S, U$. Therefore,

$$W(S,S) = \int_{\bar{p}}^{1} (p.v - 1) dF(p)$$
\[ W(S, U) = \int_{\bar{p}}^{\bar{p}_m} (p.v - 1)\alpha(p, u)dF(p) + \int_{\bar{p}}^{\bar{p}_m} (p.v - 1)dF(p) \]

\[ W(U, U) = \int_{\bar{p}}^{1} (p.v - 1)\alpha(p, u)dF(p). \]

The expressions for \( W(k, j) \) are obtained by evaluating,

\[ W(j, k) = \Pi(j, k) + \Pi(k, j) + \pi_k + \pi_j + \pi^j, \forall j, k = \{S, U\}, j \neq k. \]

Recall that in the above expression, \( \Pi(j, k) \) denotes the expected profits to a CRA who operates as \( j \) when the other CRA is operating as \( k \). Similarly, \( \pi_j \) denotes the expected profits to a firm who gets rated by CRA of type \( j \). Finally, \( \pi^j \) denotes the expected net returns to the investor who invests in a firm that is rated by a CRA of type \( j \). For example, if \( j = S, k = S \) we have,

\[ \Pi(S, S) = 0.5X[1 - F(\bar{p})] \]

\[ \pi_S = \int_{\bar{p}}^{1} \{p.(v - R) - X\}dF(p) \]

\[ \pi^S = \int_{\bar{p}}^{1} \{pR - 1\}dF(p) \]

\[ W(S, S) = \int_{\bar{p}}^{1} (p.v - 1)dF(p). \]

Note that, since any project requires a funding of 1 unit, the expected profitability of a project is \( p.v - 1 \). This is because, if the project is funded its payoff is \( v \) which is obtained with a probability of \( p \). However, whether the project gets funded or not depends upon the probability with which it is announced good. This happens with probability \( \alpha(p, u) \) for it being rated by \( U \) and with a probability of one if it is rated by \( S \). As the various agents in the economy are paid from the project realization- the aggregate net surplus is simply the net expected returns from the project. The three surplus terms precisely measures that. The main result concerning efficiency of ratings industry market structure is presented below.

**Proposition 7** A rating industry with one CRA operating as \( U \) and the other operating as \( S \) is more efficient than both operating as \( S \) if \( \bar{p} \) is low. A rating industry where both CRAs operate as unsolicited rating agencies are inefficient.
Note that the first best efficiency would require all types with $p \geq 1/v$ get funded with certainty while those with $p < 1/v$ never get funded. However, with the industry operating with only solicited CRAs, only those with $p \geq 1/R$ get funded. The measure of profitable firms $1/R - 1/v = \bar{p} - 1/v$ never get funded. Allowing $U$ to operate alongside $S$, means that more of the profitable firms get funded. There is a tradeoff. Allowing $U$ to operate with $S$ vis a vis preventing $U$, would mean lower underinvestment, while increasing overinvestment.

The total measure of firms that are rated good with positive probability is the same with one as well as two identical CRAs. The only difference in terms of the aggregate net surplus is the probability with which some firms are announced good when both CRAs are $U$ against when only one of them is $U$. Note that, for firms with $p < \bar{p}$ and $p > p^*_m$, presence of $S$ does not make any difference because they do not approach $S$ and hence, is never rated by them. However, those with $p \in [\bar{p}, p^*_m]$ are now announced good with higher probability. These firms also has positive NPVs- and hence, efficiency demands that they are announced good with higher probability. Allowing one CRA to operate as $S$ while the other as $U$ as against both as $U$ would mean that all these firms are announced good with a probability of one by $S$ while they would have been announced good with a probability of $\alpha(p, u) < 1$ if they were rated by $U$ only. Therefore presence of $S$ along with $U$ increases efficiency as compared to the case that only type $U$ CRAs operate in the market.

Note that, in view of the above discussion, a regulator who is interested in maximizing $W(j, k)$ can do the following:

- Enable unsolicited rating agency to operate in the market. In other words, the regulator should frame policies that allows unsolicited rating agencies to operate. However, it is not entirely obvious that merely allowing unsolicited rating agencies to operate will actually ensure that they operate. Interestingly, if the access to information for the unsolicited rating agency is poor, (low $u$), investors will discard any information that comes from these CRAs. Therefore, CRAs with insufficient abilities to screen good from bad will automatically be screened out. The regulator therefore needs to ensure two things. One, allow free entry of unsolicited ratings and two, make firms disclose greater information in the public domain. Without the second, the unsolicited rating agency will never be able to operate profitably.

We will end with a discussion on robustness of our results to the framework and the assumptions. The crucial assumption that drives most of the results in our model are that of the technology function available to the CRA. The technology function does possess some interesting and im-
portant properties. One, it allows firms with higher success probability to be announced good with at least as much probability as firms with lower $p$. Two, firms with higher $p$ as compared to those with lower $p$ stands to be announced good, with higher information availability to the CRA. This two property allows together ensures that there exists firm with very high $p$ those are announced good with certainty by two CRAs even if the accessible information to the CRAs is slightly different and high. The assumptions regarding complete access to firm specific information (i.e., $e_S = 1$) is not crucial. As long as $e_S > e_U$, the most reasonable outcome, the results will go through. This is because, for firms with very high $p$, they will be funded with certainty if rated by either of the CRAs. However, as it costs $X$ to get rated, they will prefer to be rated by $U$. Note that, if we allow $U$ to rate only a certain proportion of the firms, with an increasing cost of rating more CRAs, the results will not change either.

5 Conclusion

In this paper, we develop a theoretical framework that is appropriate in understanding the operations, need and efficiency of unsolicited ratings. Our model, considers the existence of unsolicited ratings based on the following salient features. Unsolicited ratings are not paid for their services immediately; they do so ‘to build reputation’ and that they have lesser access to firm specific information than solicited ratings.

Our model has three sets of risk neutral agents - Competitive investors, firms and a credit rating agency, which does, solicited ratings. We then investigate the possibility of another rating agency providing unsolicited ratings. The investors are rational and has Bayesian beliefs. The rating agency evaluates the firms using its screening technology. Information production by a rating agency depends upon the screening function it has and the evaluation standard it sets. The accuracy with which the rating agency can infer a firm’s type, increases with level of information available to it. Our result validates the empirical findings as well as prescribe a policy guideline as to when (if at all) unsolicited ratings should be encouraged.
Appendix

Lemma 1 Under A.1-A.3, For both $S$ and $U$, $E(p|a = g) \geq E(p|a = b)$.

Proof: Follows from the fact that $\alpha(p, e)$ is increasing in $p$.

Proof of proposition 1.

Proof: Note that, $\alpha(p, s) = 1; \forall p \geq \bar{p}$ and $\alpha(p, s) = 0; \forall p < \bar{p}$. Therefore, $E(p|a = g, S) > \bar{p} > E(p|a = b, S) \Rightarrow \gamma^*_S = 1, \beta^*_S = 0$.

Proof of proposition 2.

Proof:
(a) As $s = 1 > u$, for any $q < \bar{p}$, $\alpha(q, s) = 0 < \alpha(q, u)$. From equation (6), it follows that $q \notin P_S$.
(b) Consider $p_m = \bar{p}$. The above condition implies that, $p_m \in P_S$.

Proof of proposition 3.

Proof:
$P^L$ is non-empty: The proof is obvious from part (a) of proposition 2. This is because, if $p < \bar{p}$ then $p \notin P_S$.

$P^H$ is non-empty: From A.3, note that, by continuity, $\exists q \rightarrow 1$ such that $\alpha(q, u) = 1$. Consider that $q$. Note that, $\pi_s(q, s) = q.(v-R)-X < \pi_u(q, u) = q.(v-R)$. Therefore, $P^H$ is non-empty.

Finally, consider, $p', q$ such that $q \in [p', 1]$. If $p' \in P^H$, then, $\pi_u(p', u) \geq \pi_s(p', s)$. As $\alpha(q, u) \geq \alpha(p', u)$ while, $\alpha(q, s) = \alpha(p', s) = 1$, the proof is immediate.

Lemma 2 Under A.1 and A.3, $\forall \theta, \exists q < \bar{p}$ such that $\alpha(q, u) = 0$.

Proof: Note that under A.3, $u > \bar{p}$. Consider, $q < \bar{p}$. $\alpha(q, u) = 1 - u(1-q) - \bar{p}$. Under A.1 and A.2, and the fact that $u > \bar{p}, u + \bar{p} > 1$. This contradicts, $\alpha(q, u) > 0$. 

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Proof of proposition 4.

Proof:
Consider $u \rightarrow 1$. For any firm with $p > \bar{p}$, note that, $\alpha(p, u) \rightarrow \alpha(p, 1)$ and for any $p < \bar{p}$, $\alpha(p, u) \rightarrow 0$. From equations (2) and (3), we have $p_m \rightarrow \bar{p}$. This implies, together with the fact that $1 - \alpha(p, u) \rightarrow 0$ for $p \in P_L$,

\[
\frac{\int_{p \in P_U} p \cdot \alpha(p, u) dF(p)}{\int_{p \in P_U} \alpha(p, u) dF(p)} \approx \frac{\int_{p \in P_H} p \cdot \alpha(p, u) dF(p)}{\int_{p \in P_H} \alpha(p, u) dF(p)} > \bar{p}.
\]

Therefore, the investor would indeed invest in a firm that is announced good by $U$. Then $U$ can operate profitably.

Proof of Proposition 6.

Proof: The result follows from the fact that $p_m^*$ increases in $\bar{p}$. Note that, as $\bar{p}$ increases, the measure of ‘good’ firms that goes to $S$ increases.

Proof of proposition 7.

Proof: The proof is obvious from comparing $\Pi(U, S)$, $\Pi(U, U)$ and $\Pi(S, S)$.

References


