CFCM

CENTRE FOR FINANCE, CREDIT AND MACROECONOMICS

Working Paper 15/04

Credit Rating Agency, Preliminary Ratings and Contact Disclosure

Marta Allegra Ronchetti

Produced By:

Centre for Finance, Credit and Macroeconomics
School of Economics
Sir Clive Granger Building
University of Nottingham
University Park
Nottingham
NG7 2RD

Tel: +44(0) 115 951 4763
Fax: +44(0) 115 951 4159
suzanne.robey@nottingham.ac.uk

Credit Rating Agency, Preliminary Ratings and Contact Disclosure

Marta Allegra Ronchetti*

June 2015

Abstract

A recent amendment to the European Regulation on credit rating agencies requires that they disclose any issuers' request of initial reviews. This paper constructs a model of preliminary ratings and uses it to investigate the effect of contact disclosure. In this setting, the CRA issues a preliminary rating. After receiving this indicative rating, the entrepreneur has the opportunity to either purchase a full report at a cost or to remain unrated. It is shown that when there is no evidence of preliminary contact four types of equilibria can arise. In two of them the entrepreneur ignores the CRA, while in the other two the CRA either issues only positive preliminary or only negative ones and the entrepreneur is responsive to the CRA's opinion. When there is disclosure of the contact between the CRA and the entrepreneur, the CRA ends up acting overconfidently more often and for lower values of the fee. This results in more projects of lower quality, accessing the final rating stage and possibly getting funded. The payoff in the conservative case shrinks because of the reputation term, providing new incentives and causing the behavioural shift. Allowing for unrated projects partial funding emphasizes even further this tendency.

JEL Classification: D82, D83, G24, G28

Keywords: rating agencies, preliminary ratings, reputation, disclosure

*PhD Student at the School of Economics and Centre for Finance, Credit and Macroeconomics (CFCM), University of Nottingham, Room C40 Sir Clive Granger Building University Park NG7 2RD, lexmaro@nottingham.ac.uk. I am particularly grateful to my supervisors Gianni De Fraja and Matthias Dahm for useful advice and huge support. I have benefited from comments of staff and postgraduate research students at the University of Nottingham.

Introduction

Credit Rating Agencies (CRAs) offer an evaluation service to those who need to obtain finance from the market. Upon request of an issuer they perform an investigation, issuing a rating, their opinion on the creditworthiness of the issuer. Their ratings assist investors making investment decisions.
In the light of the recent financial crises, international bodies, regulators and policy makers in general have been suggesting possible ways to overcome some of the industry drawbacks. Both the US and the EU Regulations underwent amendment in conjunction with international bodies such as the FSB and IOSCO[1].

The prevalent modus operandi in the industry, starting from the 1970' s, is for the issuer of a financial product to ask for a rating and to pay the rating agency for it. An issuer can contact several rating agencies for initial reviews. Subsequently the issuer decides whether or not to purchase the final rating from one of the agencies. If it does so, it provides further detailed information to the evaluator. At the end of the process the rating is published.

This work focuses on the widespread practice of obtaining an initial indicative evaluation prior to purchasing the published rating. The confidentiality of this so called preliminary ratings (or indicative ratings) is considered a problem because it can bias ratings and causes poor information provision. Indeed, in October 2009 the US Security and Exchange Commission attempted to impose mandatory disclosure of preliminary ratings[2], but this proposal has never been finalized. On the other hand, in Europe[3]

> "*a credit rating agency shall disclose on its website, and notify ESMA on an ongoing basis, information about all entities or debt instruments submitted to it for their initial review or for preliminary rating. Such disclosure shall be made whether or not issuers contract with the credit rating agency for a final rating.*"

[1]Financial Stability Board (FSB) and International Organization of Securities Commissions (IOSCO). Both the FSB and IOSCO are international bodies devoted respectively to monitor the global financial system the and to develop and promote high standards for securities regulation.

[2]The proposed rule required issuers disclosure of received preliminary ratings as opposed to the EU proposal which requires CRAs to disclose all the contacts with the issuers. Details of the proposal can be found in SEC Release No. 33-9070 available at `https:\www.sec.gov/rules/proposed/2009/33-9070.pdf`.

[3]In accordance with Point 6 of Part 1 of Section D of Annex 1 to Regulation (EC) No.1060/2009 as amended by Regulation (EU) No 462/2013.

The OECD Hearing held by The Competition Committee[4] points out that built reputation is the main competitive advantage because ratings are experience goods. This highlights the importance of having a model which accounts also for reputation concerns.

The main question here is whether the disclosure of preliminary rating affects the credit rating agencies' reputation and how their incentives change in response to this different environment. It is of interest to investigate whether disclosure of at least the contact would have a positive effect. The transparency requirement is likely to alter the rating agency's incentives, since one of the key features of the industry is the fact that a substantial part of a CRAs' payoff is the reputation effect due to the perception that investors have about the rating agency being capable. Before the amendment of the European Regulation, issuer could secretly obtain preliminary ratings. This meant that only through the publication of a proper rating the CRA could establish its reputation by either being proven right or wrong.

In order to understand the theoretical consequences of policy proposals such as those contained in the amended EU Regulation, we develop a game theoretic model of the interaction between the issuers of financial products and the credit rating agency. We investigate how the disclosure of preliminary ratings can affect the credit rating accuracy when reputation is at stake. Here considered is a basic setting with a rating agency, a mass of investors and a mass of entrepreneurs. The latter decide whether to purchase the publishable rating after having seen the preliminary one. The rating agency wants to create and maintain a reputation for accurate ratings.

Our work shows that imposing disclosure on the credit rating agency leads to more projects being given a good preliminary evaluation and in turn more projects reaching the proper rating stage and possibly accessing funding. Therefore preliminary disclosure results in a higher probability of default. The reasoning goes as follows: with disclosure in place the CRA's reputation suffers because also unrated projects are now visible to the market. In turn, investors can consistently update their believes. Thus the CRA becomes overconfident more often because this behaviour provides a higher payoff than the achievable one from acting conservatively.

[4]The hearing on Competition and Credit Rating Agencies was held in June 2010. Contributions are due to Prof. John C. Coffee, Columbia University Law School(United States) and Prof. Karel Lannoo, Center for European Policy Studies (CEPS). The document can be found at `http://www.oecd.org/competition/sectors/46825342.pdf`.

The financial crises brought about many criticisms of CRAs' conduct, generating renewed attention. The theoretical literature studying rating agencies and their functioning is relatively new, but has already identified a wealth of interesting questions. This work aims to contribute to filling the gap concerning works dealing with preliminary ratings and reputation, ensuring a better comprehension of the dynamics behind rating agencies' functioning.

Up to now preliminary ratings have been investigated by the economic literature in relation with rating shopping and rating bias[5] but reputation concerns seem to have rarely been considered. It is important to pay specific attention to the consequences of the impact of indicative ratings on CRAs reputation. For instance Sangiorgi and Spatt [2013] investigate how transparency can improve the precision of the information that the market holds regarding the issuer. When the market is aware of the existence of preliminary ratings, voluntary disclosure in equilibrium results in full disclosure whereas when no disclosure requirements exist, selective disclosure arises in equilibrium. We focus on how transparency can alter the perception that the market has on the CRA and relax the assumption that preliminary and final ratings do not diverge. Sangiorgi et al. [2009] conjecture that notching[6] can arise in equilibrium due to the selection effect of rating shopping. As opposed to these articles, our setting envisages a monopolistic CRA with reputation concerns and a two stage rating process whereby two different evaluations take place and which relates more closely to reality.

Our paper is also related to the strand of the literature focusing on the effect of reputation on the CRAs behaviour. Bolton et al. [2012] show for instance how the exogenous expected reputation cost drives the reporting strategy of the CRA. Unlike this work, our setting allows for endogenous reputation. To capture the potential gains associated with reputation in Camanho et al. [2012], the authors shift to an infinite period setting and argue that under monopoly the penalty for lying decreases with reputation because investors tend to attribute failures to bad luck. Bar-Isaac and Shapiro [2013] claim that the value of reputation depends on economic fundamentals that fluctuate over the business

[5]Ratings shopping is defined as the practice of asking several CRAs for a rating, seeking the highest rating. Rating inflation (or rating bias) refers to the possible bias that the CRas have when assessing the creditworthiness of an issuer in order to ensure related and future profits.

[6]Practice that involves the reduction of a competitor's rating when reporting the rating on another scale.

cycle. By investigating how CRAs' incentives to provide quality ratings are affected by the business cycle, they find that ratings quality is countercyclical. Mariano [2012] instead shows that in a monopolistic setting, a CRA may disregard its private information, conforming on public information when driven by reputation maximisation and market power protection[7].

In our setting, we focus only on the reputation that the CRA can gain from the market. Investors Bayesian update the probability that the CRA is well informed (i.e. the CRA's reputation). We are abstracting from the possibility for the CRA to also gain a different type of reputation among issuers[8]. We do so to concentrate on those market participants that, even though not directly purchasing ratings, still represent one of the categories relying extensively on them. As a result, the CRA wants to be perceived as accurate when evaluating financial products in order to be considered reliable and useful to investors. There are other contexts in which a player may be concerned with the perception that others have on his ability to process information. In this regard Levy [2005] analyses careerist judges who need to signal their ability to interpret correctly the law. Here the reputation motives lead to a creative behaviour whereby previous decision get contradicted more often than what would be welfare maximising. We find that the shift in the behaviour of the CRA is a result of the controversial effect that disclosure has on the CRA's reputation.

The whole role of credit rating agencies can be reduced to that of an intermediary who delivers information[9]to the market, information that the investors will be relying on either because they want to or because they have to due to regulation[10]. Several articles model information intermediaries such as Ottaviani and Sorensen [2006], where the expert awareness concerning his ability seems to make reputation concerns completely irrelevant or Lizzeri [1999], where a certification intermediary operating in an asymmetric

[7]Other contributions aim at explaining why bond and structured products markets are characterized by a different rating behaviour either in the light of reputation spillovers (Rablen [2013]) or "double reputation" (Frenkel [2013]). In the first case the analysis focuses on monitoring while in the second it focuses on market concentration.

[8]In Camanho et al. [2012] both issuers and investors have the same prior on the type of CRA and use Bayesian updating to update believes.

[9]In this particular industry, information takes the form of an opinion based on private information. CRAs observe a signal about the quality of an issuer and provide uninformed parties with additional information concerning a financial product.

[10]Regulatory reliance has been investigated in Opp et al. [2013], Stolper [2009] and Efing [2013].

information environment with market power has an incentive to manipulate information when information revelation is a strategic decision. Credibility and manipulation are at the heart of the model by Benabou and Larocque [1992], which shows that individuals with private information can manipulate public information, a mix of lies and truth can partially control the effects of actions on reputation. The main implication of the model by Pollrich and Wagner [2013] is that the tendency to push certification to be precise might end up in less reputation building and thus in less resistance to capture[11]. Strausz [2005] analyses the threat of capture in certification markets showing that the price for credibility is high; under full disclosure, in order to retain credibility and for a low discount factor, the certifier charges a fee above the monopoly price.

The reminder of this article is as follows. Section 1 is devoted to the model setup, the baseline and its results. Section 2 deals with the disclosure of preliminary contacts and the result of the extended model. In section Section 3 a discussion of the results, of the possible implications and two extensions are presented.

1 The model

This section introduces the set up of a model with a monopolistic credit rating agency (CRA), entrepreneurs (E) and investors. In this setting, investors are non strategic players[12] that observe the published rating, if available, and consequently fund the project. Details about the players and the game are explained below. In the baseline model, there is no evidence of the preliminary contact between the CRA and the entrepreneur whereas the extension allows for the disclosure of the contact.

1.1 The Baseline Model

1.1.1 The Entrepreneur

There is a continuum of entrepreneurs of mass 1. Each entrepreneur needs to finance a project. Projects differ in quality, the higher the quality of the product the lower the

[11] According to this view, in the light of the financial crisis, it might be harmful to force rating agencies to issue more precise ratings because they would be more exposed to capture problems.

[12] Under the model specification, investors form believes on the quality of the CRA.

probability of default. For simplicity we denote the quality of a project $\omega \in \{G, B\}$. If financed, a good project always succeeds (s) whereas a bad project always results in a default (f). Whether the project is good is not known ex-ante, but there is a common prior belief over it. $\alpha \in (0, 1)$ summarizes public information about the projects. The entrepreneur wants to carry out the project and to do so he needs investors to invest in it. Investors observe the published rating, if available, and subsequently fund the project. The investment takes place when an *investment grade* rating is published and does not take place when either a *junk* rating is published or the project remains unrated.

The entrepreneur, who is unaware of the quality of his project, cannot anyway credibly communicate it to the market[13]. He needs a trustworthy source to certify and issue an evaluation.[14] Asking for a rating is not compulsory, however the CRA offers a preliminary rating[15], $P \in \{G, B\}$, at no cost and thus it is always in the interest of the entrepreneur to ask for one. Knowing the result of the preliminary rating P, the entrepreneur can either ask for a full report at a fee Φ or remain unrated and abandon the project.

1.1.2 The CRA

There is a monopolistic credit rating agency offering an evaluation of the quality of the project. The certification happens in two stages. First there is a preliminary stage, resulting in a verbal message P. Subsequently there is a final rating stage producing a published full report $r \in \{IG, J\}$. The CRA charges the entrepreneur a fee Φ only in the rating stage. The fee Φ is exogenous and does not depend on the published rating.[16] Hence, the CRA is not paid for the initial evaluation but only for the report that is

[13] The unawareness of the entrepreneur concerning the quality of the project is a common feature in the CRA literature. Here the fact that the entrepreneur in uninformed is a simplifying assumption which does not however affect the results.

[14] Here, the CRA is the certifier and the evaluation is the rating.

[15] Throughout the text preliminary rating and indicative rating are used as synonyms. Similarly, publishable rating or full report have the same meaning.

[16] A common practice is that of assuming that the entrepreneur pays the CRA only if the rating is good. In the current set up, publishing occurs regardless of whether the rating is good or bad and there is no space for contingent fees. By doing so we implement what is suggested in the Parliament and the Council [May 2013] in terms of independence of the charged fee from the outcome of the performed service and in terms of non discriminatory fees. In Kovbasyuk [2013] instead, of the three regulatory environments that are taken into consideration (publicly disclosed fixed payment, publicly disclosed and rating contingent payment, private rating contingent payment) a desirable regulation should allow rating contingent fees and require their disclosure.

disclosed.

In the preliminary stage, the CRA gives the initial evaluation, either good ($P = G$) or bad ($P = B$), only to the entrepreneur. When asked to produce the full report, the CRA earns the fee and generates either an investment grade ($r = IG$) or a junk ($r = J$) rating which is published. That is, the entrepreneur cannot prevent a bad rating from being published.[17]

The quality of the CRA is captured by $\lambda \in (0, 1)$. It can either be of the *informed* type (I) with probability λ or of the *uninformed* type (U) with probability $(1 - \lambda)$. The informed type can be interpreted as the exemplary CRA and has a predetermined strategy which ensures correct ratings[18]. The CRA knows if it is informed.

In the preliminary stage the uninformed CRA can either correctly or incorrectly evaluate the project.[19] This means that the CRA is not sufficiently skilled to be sure of whether its initial evaluation is correct or not. Even if uninformed in the first stage, the CRA has a chance to become informed when asked to provide a full report. At the final rating stage the CRA has access to an information acquisition technology which generates an information signal $\sigma \in \{G, B\}$ on the quality of the project. In particular, the technology is such that the CRA learns the true quality of the project with probability e and receives an incorrect signal with probability $1 - e$.

$$Pr(\sigma = G|G, U) = Pr(\sigma = B|B, U) = e$$

$$Pr(\sigma = G|B, U) = Pr(\sigma = B|G, U) = 1 - e$$

[17] According to the Parliament and the Council [May 2013], once the final report is ready, the CRA has to communicate to the issuer the evaluation a full working day before the report becomes publicly available. The issuer can stop the publication process only if relevant information is contained in the press release or if new relevant information has become available.

[18] In Mathis et al. [2009] the exemplary CRA is a truthful one which is committed to always tell the truth; the authors employ a dynamic model of reputation where a monopolist CRA can mix between lying and truth telling to build reputation, and find two possible unique active equilibria, a truthful and a non-truthful one. Similarly to Camanho et al. [2012] "honest" CRA, our informed CRA issues the correct rating to the project.

[19] In an initial version, the model allowed, in the preliminary stage, for the CRA to have access to an information acquisition technology generating an information signal $\theta \in \{G, B\}$ on the quality of the project. In particular, the CRA would receive a correct signal with probability β whereas it would receive no signal ($\sigma = \varnothing$) with the complementary probability, where β was the signal precision, exogenously given and non costly.

where $e \in (\frac{1}{2}, 1)$ is the signal precision, exogenously given and not costly.

In the preliminary stage the informed CRA always has the ability to correctly assess the project quality even with little information and will always do so. Furthermore, in the rating stage this type of CRA correctly evaluates the project, as if the received signal was fully revealing. Namely:

$$Pr(\sigma = G|G, I) = Pr(\sigma = B|B, I) = 1$$

stating that the signal in the rating stage is always sufficient for the informed CRA to correctly assess the project.

1.1.3 Strategies and Payoffs

In the preliminary stage the uninformed CRA decides in which circumstances it is optimal to issue a good initial evaluation. The CRA makes a strategic decision $x \in X = \{0, 1\}$, where $x = 1$ is to issue a positive preliminary rating, $x = 0$ is to issue a bad preliminary rating. In other words, not being informed in the preliminary stage, results in the uninformed CRA issuing a good preliminary rating with probability x.

After the entrepreneur receives P, he has to decide when to go ahead and pay the fee to the CRA. We denote this strategic decision $y_i \in Y = \{0, 1\}$ with $i = P$, where $y_i = 1$ is to ask for the final rating at a cost Φ given the preliminary P and $y_i = 0$ is to stop and remain unrated. In other words, faced with a good preliminary rating, the entrepreneur will ask for the full report with probability y_G, whereas with probability y_B he will ask for it when the preliminary is bad.

par The entrepreneur's only concern is to carry out the project by getting it financed. Even if the entrepreneur was aware of the quality of his project, the fact that he does not invest money of his own makes him uninterested in success or failure. His payoff is given by the difference between the funding that can be obtained and the cost incurred to obtain a rating. Whenever a project gets an IG rating the entrepreneur has access to funding V_G, however the also has to bear the cost of hiring a CRA to produce a report. In the eventuality that the ratings is J, the entrepreneur doesn't get funded and loses the fee he paid. When the entrepreneur decides not to purchase the full report, he has to abandon the project.

Being well rated entitles the entrepreneur to access financing and therefore V_G has to be large enough to cover the fee that has to be paid to get rated. Formally

Assumption 1. $V_G - \Phi > 0$

This assumption states that total funding V_G has to be large enough to cover the fee that has to be paid to get rated.
The payoff can be written as

$$\Pi_{ENT} = \begin{cases} V_G - \Phi, & \text{if } r = IG \\ -\Phi, & \text{if } r = J \\ 0, & \text{otherwise} \end{cases} \quad \textbf{(1)}$$

The CRA earns the fee when the final rating is purchased which is then published and nothing otherwise. In addition, the payoff Π_{CRA} includes a reputation term defined as the perception that the market has of the CRA being of the informed type multiplied by a reputation gain which is here normalised to one. Thus the CRA is motivated by proving its ability to correctly evaluate a project. The updated belief that the investors have about the CRA being of the informed type in the light of the observed rating and of the following result (success or fail of the project) provides the reputation part. In general for the baseline

$$\Pi_{CRA} = \begin{cases} \Phi + \mu, & \text{if E asks for the final report} \\ \lambda, & \text{otherwise} \end{cases} \quad \textbf{(2)}$$

where μ represents the reputation gain in the purchase case while without evidence reputation is represented by the prior on the quality of the CRA[20].

[20]Faure-Grimaud et al. [2009] show that in order for no disclosure to be valuable it is necessary that contracting between the firm and the certifier is secret and that the true value of the firm is unknown also to the firm itself. Here the secrecy of the contact makes the contracting invisible and no disclosure is valuable in the sense that it does not affect the CRA's reputation.

Summary of Notation	
α	Prior probability of G projects
λ	Prior probability of informed CRAs
e	Final rating stage signal precision
Φ	Final rating fee
V_G	Amount of funding
y_G	Probability that E faced with $P = G$ asks for r
y_B	Probability that E faced with $P = B$ asks for r
x	Probability that the UN CRA says $P = G$
r	Final rating
P	Preliminary rating

1.1.4 The Timing

The timing of the game is as follows:

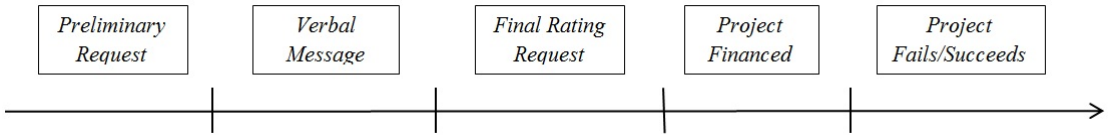


Figure 1: Order of events.

1. Nature chooses state and types;
2. the CRA costlessly checks the quality of the project and verbally discloses its preliminary evaluation (good (G) or bad (B));
3. The entrepreneur, knowing the preliminary evaluation decides whether or not to purchase the full report;
4. The CRA issues a rating (IG or J) which is published;
5. Investors invest, the good project and the bad project respectively succeed and fail, investors update their believes concerning the quality of the CRA and payoffs are realised;

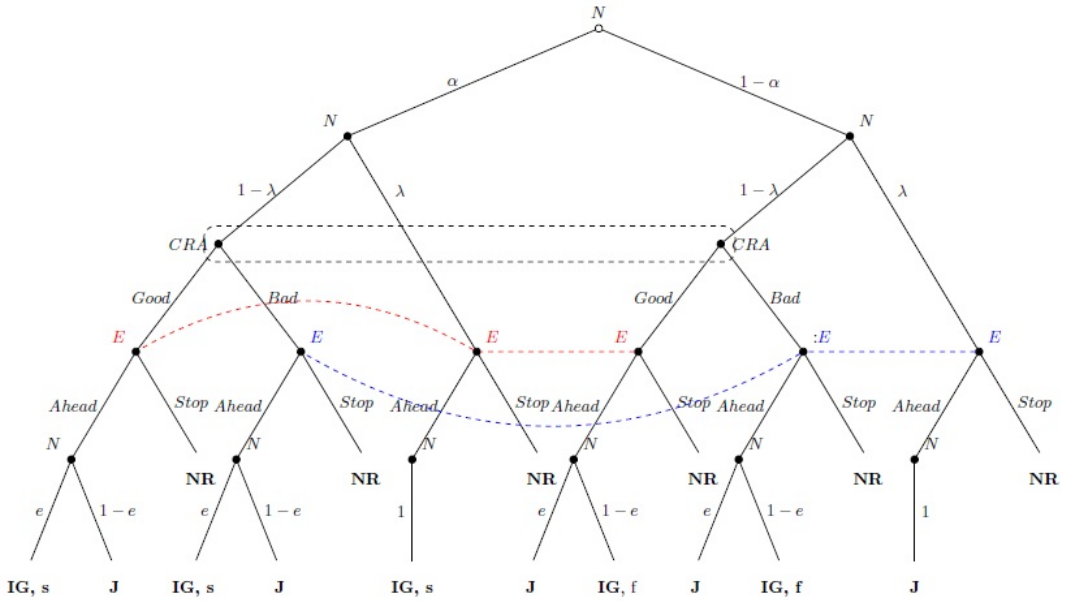


Figure 2: The game in extensive form.

Figure 1 shows the extensive form of the game. It does not indicate payoffs at the end nodes but those are implied by the type of report which is published. The end nodes labelled IG, s are those in which the entrepreneur gets funded and the uninformed CRA can be perceived as informed. Those labelled IG, f represent the cases in which the entrepreneur accesses funding but the project fails and the CRA is revealed to be uninformed. The J nodes imply no funding for the entrepreneur and reputation gain for the CRA whereas the NR nodes represent the cases in which the entrepreneur decides to stop after the preliminary.

The relevant notion of equilibrium here is perfect Bayesian equilibrium (PBE). In this preliminary rating game, a PBE consists of sequentially rational strategy profiles for the CRA and the entrepreneur consistent with the belief system held by the market. The market doesn't observe whether final rating comes from an informed or uninformed CRA. Thus it has to construct beliefs based on what has happened prior to publication of the final rating.

1.2 Equilibrium Analysis

This section is devoted to the characterisation of the equilibrium. The game is solved by backward induction.

1.2.1 Investor's believes

To begin, after funding has occurred, the market observe three possible outcomes: a project rated investment grade which succeeds (IG, s), a project rated investment grade which fails (IG, f) and a project rated junk (J) which is not carried out. For each of these possible scenarios, the market forms an updated belief μ of the quality of the rating agency. Recall that an uninformed CRA would like to impress the market by being perceived as informed in order to gain reputation whereas an informed CRA always tells the truth in order to maintain its reputation.

The investors, which value the accurateness of the CRA, update their beliefs according to the Bayesian rule. If they observe a successful investment grade rated project, their belief that the CRA is of the informed type becomes

$$\mu_{\mathrm{IG,\,s}} = \frac{\lambda y_G}{e(1-\lambda)\left((1-x)y_B + xy_G\right) + \lambda y_G} \tag{3}$$

When they observe a project which received a junk rating, the market posterior probability that the CRA is of the informed type is

$$\mu_J = \frac{(1-\alpha)\lambda y_B}{(1-\lambda)(\alpha - 2\alpha e + e)\left((1-x)y_B + xy_G\right) + (1-\alpha)\lambda y_B} \tag{4}$$

When a project rated IG fails, the market infers that the rating came from an uninformed CRA, $\mu_{\mathrm{IG,\,f}}$ is therefore 0.

1.2.2 Entrepreneur decision on full report

The entrepreneur faced with a preliminary report, has to decide whether to go ahead asking for the final report at a fee or stop and remain unrated abandoning the project. There are three possible outcomes from going ahead, either the project is valued IG and succeeds or the project is valued IG but then fails or the project is valued J and no funding occurs. Regardless of the preliminary, asking for the final report involves a cost

Φ to be paid to the CRA. With some probability q_i, with $i = \{G, B\}$, if the entrepreneur goes ahead he gets V_G and thus can fund the project. The entrepreneur is only concerned about funding, therefore whether an investment grade rated project results in a success or in a failure is of no interest to him and in turn stopping and remaining unrated gives him nothing[21]. Let q_G^x be the probability that a project is certified as IG given a positive preliminary

$$q_G^x = \frac{\alpha\lambda + \alpha(1-\lambda)xe + (1-\alpha)(1-\lambda)x(1-e)}{\alpha\lambda + \alpha(1-\lambda)x + (1-\alpha)(1-\lambda)x}$$

and similarly let q_B^x be the probability that a project is certified as IG given a negative preliminary

$$q_B^x = \frac{\alpha(1-\lambda)(1-x)e + (1-\alpha)(1-\lambda)(1-x)(1-e)}{\alpha(1-\lambda)(1-x) + (1-\alpha)\lambda + (1-\alpha)(1-\lambda)(1-x)}$$

The numerator of q_G^x (q_B^x) is the sum of the probabilities associated with ending the game with an investment grade rating after receiving a positive (negative) preliminary, whereas the denominator accounts for all the possible outcomes following the received preliminary.

In the case of $P = G$, the entrepreneur has to compare the expected payoff from asking for the full report and paying the fee with 0,[22] and will go ahead if and only if

$$\frac{\alpha\lambda - (\lambda-1)x(-\alpha + (2\alpha-1)e + 1)}{\alpha\lambda - \lambda x + x} V_G - \Phi > 0$$

which can be rewritten as $q_G^x V_G - \Phi > 0$. When the initial evaluation is bad ($P = B$), the entrepreneur compares the expected payoff for choosing to go ahead with 0 and will ask for the full report if and only if

$$\frac{(\lambda-1)(x-1)(-\alpha + (2\alpha-1)e + 1)}{-\alpha\lambda + (\lambda-1)x + 1} V_G - \Phi > 0$$

which can similarly be rewritten as $q_B^x V_G - \Phi > 0$.

[21] We assume success or failure do not affect the entrepreneurs decision because he does not invest his own funds. This assumption will be relaxed in an extension.

[22] Not going ahead gives a zero payoff because no funding occurs and no fee is paid. This assumption is similar to Camanho et al. [2012] where a bad rating and no rating are considered equivalent outcomes in the model.

Lemma 1. *If the entrepreneur receives a good preliminary ($P = G$) he goes ahead if*

$$q_G^x > \frac{\Phi}{V_G} \tag{5}$$

The entrepreneur will therefore go ahead if $q_G^x > \frac{\Phi}{V_G}$, stop if $q_G^x < \frac{\Phi}{V_G}$ and will be indifferent whenever $q_G^x = \frac{\Phi}{V_G}$.

Lemma 2. *If the entrepreneur receives a bad preliminary ($P = B$) he goes ahead if*

$$q_B^x > \frac{\Phi}{V_G} \tag{6}$$

The entrepreneur will choose to go ahead if $q_B^x > \frac{\Phi}{V_G}$, stop if $q_B^x < \frac{\Phi}{V_G}$ and will be indifferent whenever $q_B^x = \frac{\Phi}{V_G}$.

Lemma 3. *There cannot be an equilibrium in which the CRA is overconfident ($x = 1$) and the entrepreneur faced with $P = B$ asks for the final rating with a positive probability ($y_B > 0$).*

Proof. Given $x = 1$, the expected payoff of the entrepreneur faced with a bad preliminary rating when remaining unrated is 0 whereas if he asks for the full report he looses the fee Φ. $-\Phi > 0$ never holds. Thus the entrepreneur is always better off stopping at the preliminary stage. □

Intuitively, if the uninformed CRA is overconfident, a $P = B$ result of the preliminary evaluation can only be due to an informed CRA. The entrepreneur knows that the preliminary evaluation will be confirmed in the rating stage if he decides to go ahead and therefore prefers to stop and avoid the payment of the fee.

Lemma 4. *There cannot be an equilibrium in which the CRA is conservative ($x = 0$) and the entrepreneur faced with $P = G$ remains unrated with a positive probability ($y_G < 1$).*

Proof. Given $x = 0$, the expected payoff of the entrepreneur faced with a good preliminary rating when asking for the final rating is $-\Phi + V_G$ whereas if he remains unrated he gets 0.
$-\Phi + V_G > 0$ always holds. Thus the entrepreneur is always better off paying for the full report. □

Reasonably, if the uninformed CRA is conservative, a $P = G$ evaluation can only be due to an infomred CRA. The entrepreneur knows this and goes ahead because there is no risk to receive a J report in the rating stage.

1.2.3 The CRA decision on the preliminary rating

The CRA, if of the uninformed type, decides whether to issue a good preliminary or a bad one. As it is clear from Figure 1, the CRA does not know whether the project is good or bad. Recall that $\mu_{\text{IG, f}}$, $\mu_{\text{IG, s}}$ and μ_J are respectively the updated believes of the market when a successful project was given an investment grade rating, when a project which resulted in a failure was given an investment grade rating and when a project received a junk rating.
The payoff of the CRA from issuing $P = G$ in the preliminary stage is

$$\pi_{G,s}\mu_{IG,s} + \pi_{G,f}\mu_{IG,f} + \pi_{G,J}\mu_J + \lambda\pi_{G,NR} + \Phi y_G \tag{7}$$

whereas from issuing $P = B$ in the preliminary stage the CRA gets

$$\pi_{B,s}\mu_{IG,s} + \pi_{B,f}\mu_{IG,f} + \pi_{B,J}\mu_J + \lambda\pi_{B,NR} + \Phi y_B \tag{8}$$

Both **(7)** and **(8)** are made up of two parts, a profit term whereby the CRA gets the fee whenever the entrepreneur decides to go ahead and a reputation term. This term can be explained as follows; with probability $\pi_{G,s}$ ($\pi_{B,s}$) a project initially evaluated as good (bad) by an uninformed CRA succeeds and the CRA gains reputation (the investors now believe that the CRA is informed), with probability $\pi_{G,J}$ ($\pi_{B,J}$) a project initially evaluated as good (bad) gets a J rating, boosting the CRA's reputation because the actual quality cannot be verified. The third term, $\pi_{G,f}\mu_{\text{IG, f}}$ ($\pi_{B,f}\mu_{\text{IG, f}}$), equals 0 an thus there is no reputation gain. With probability $\pi_{G,NR}$ ($\pi_{B,NR}$) initially rated as $P = G$ ($P = B$) remains unrated and the CRA neither gains nor looses reputation.

The CRA knows when playing $P = G$ or $P = B$ with which probability she is going to gain reputation. As mentioned above, $\pi_{B,s}$ and $\pi_{G,s}$ are respectively the probabilities that a project rated IG succeeds when the uninformed CRA says $P = B$ or when it says $P = G$. For each information set, of all the possible end nodes, just one branch leads to this outcome, therefore $\pi_{G,s} = \alpha e y_G$ and $\pi_{B,s} = \alpha e y_B$.

Similarly $\pi_{G,J}$ and $\pi_{B,J}$ are the probabilities that a project gets a J rating when the uninformed CRA says either $P = G$ or $P = B$. Once again, for each information set, of the 8 final nodes only two are consistent with this outcome, thus $\pi_{G,J} = (\alpha - 2\alpha e + e)y_G$ and $\pi_{B,J} = (\alpha - 2\alpha e + e)y_B$. Moreover $\pi_{G,f}$ and $\pi_{B,f}$ are the probabilities that a project rated IG fails when the uninformed CRA says $P = G$ or $P = B$, thus $\pi_{G,f} = (\alpha - 1)(e - 1)y_G$ and $\pi_{B,f} = (\alpha - 1)(e - 1)y_B$. Finally, for each information set, of all the possible end nodes, just 2 branches lead to the NR outcome, which means $\pi_{G,NR} = 1 - y_G$ and $\pi_{B,NR} = 1 - y_B$.

As a result, the sum of the probabilities with which the CRA gains reputation sums up to 1.

$$\alpha e y_B + y_B(\alpha - 2\alpha e + e) + (\alpha - 1)(e - 1)y_B + 1 - y_B = 1$$

$$\alpha e y_G + y_G(\alpha - 2\alpha e + e) + (\alpha - 1)(e - 1)y_G + 1 - y_G = 1$$

The choice on whether to issue a good ($P = G$) or a bad ($P = B$) preliminary can be summarised as follows. The CRA will issue a good preliminary if

$$\frac{(1-\alpha)\lambda y_B(\alpha - 2\alpha e + e)y_G}{(1-\alpha)\lambda y_B + (1-\lambda)(\alpha - 2\alpha e + e)y_G} + \frac{\alpha e \lambda y_G}{e(1-\lambda) + \lambda} + \lambda(1 - y_G) + \Phi y_G >$$
$$\frac{\alpha e \lambda y_B y_G}{e(1-\lambda)y_B + \lambda y_G} + \frac{(1-\alpha)\lambda y_B(\alpha - 2\alpha e + e)}{(1-\alpha)\lambda + (1-\lambda)(\alpha - 2\alpha e + e)} + \lambda(1 - y_B) + \Phi y_B$$

which can be rewritten as[23]

$$y_G[(\alpha - 2\alpha e + e)\mu_J^1 + \alpha e \mu_{IG,s}^1 - \lambda + \Phi] > y_B[\alpha e \mu_{IG,s}^0 + (\alpha - 2\alpha e + e)\mu_J^0 - \lambda + \Phi] \quad \textbf{(9)}$$

The RHS of the above inequality is the expected payoff from issuing a positive preliminary. Similarly the LHS is the expected payoff from issuing a negative preliminary.
Before stating the result, for $y_G \neq y_B$ we define

$$\bar{\Phi}(y_G, y_B) \equiv \frac{\alpha e(y_B \mu_{IG,s}^0 - y_G \mu_{IG,s}^1) + (\alpha - 2\alpha e + e)(y_B \mu_J^0 - y_G \mu_J^1)}{y_G - y_B} + \lambda$$

Lemma 5. *The uninformed CRA issues a good preliminary rating ($P = G$) according to*

$$\Phi > \bar{\Phi}(y_G, y_B) \quad \textbf{(10)}$$

[23]Note that μ_J^1 (μ_J^0) and $\mu_{IG,s}^1$ ($\mu_{IG,s}^0$) are respectively **(4)** and **(3)** when $x = 1$ ($x = 0$).

if $y_G > y_B$*, otherwise* **(10)** *is reversed.*

The CRA gives a good preliminary evaluation $\Phi > \bar{\Phi}(y_G, y_B)$, gives a bad preliminary evaluation when $\Phi < \bar{\Phi}(y_G, y_B)$ and is indifferent when $\Phi = \bar{\Phi}(y_G, y_B)$.
To sum up

Proposition 1. *Equilibrium in the baseline model are as follows:*

(i) For $\Phi > \bar{\Phi}(1,0)$ *and* $0 < \frac{\Phi}{V_G} < q_G^1$ *the CRA is overconfident and issues a good preliminary* ($x = 1$)*, the entrepreneur is responsive and goes ahead after a good preliminary* ($y_G = 1$) *but stops after a bad one* ($y_B = 0$)*.*

(ii) For $q_G^1 < \frac{\Phi}{V_G} < 1$ *the CRA is overconfident and issues a good preliminary* ($x = 1$)*, the entrepreneur is pessimistic and always stops* ($y_G = y_B = 0$)*.*

(iii) For $0 < \Phi < \bar{\Phi}(1,0)$ *and* $q_B^0 < \frac{\Phi}{V_G} < 1$ *the CRA is conservative and issues a bad preliminary* ($x = 0$)*, the entrepreneur is responsive and goes ahead after a good preliminary* ($y_G = 1$) *but stops after a bad one* ($y_B = 0$)*.*

(iv) For $0 < \frac{\Phi}{V_G} < q_B^0$ *the CRA is conservative and issues a bad preliminary* ($x = 0$)*, the entrepreneur is optimistic and always goes ahead* ($y_G = y_B = 1$)*.*

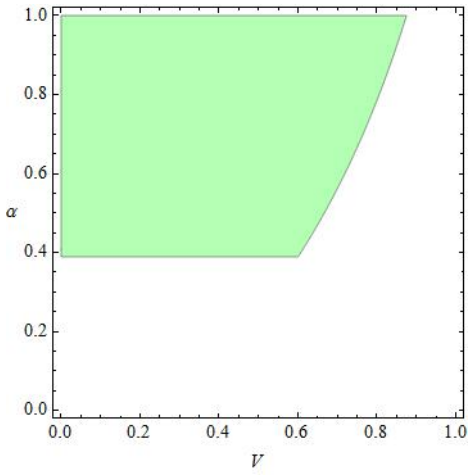
where $\bar{\Phi}(1,0) = \frac{\lambda(e(\alpha+\lambda-1)-\lambda)}{e(\lambda-1)-\lambda}$. To prove that the above mentioned are the only possible equilibria the intuition goes as follows. All the candidates in which $x = 0$ and $y_G = 0$ are ruled out by Lemma 4, similarly all the cases in which $x = 1$ and $y_B = 1$ are ruled out by Lemma 3.

Corollary 1. *For fixed parameters there is multiplicity of equilibria when*

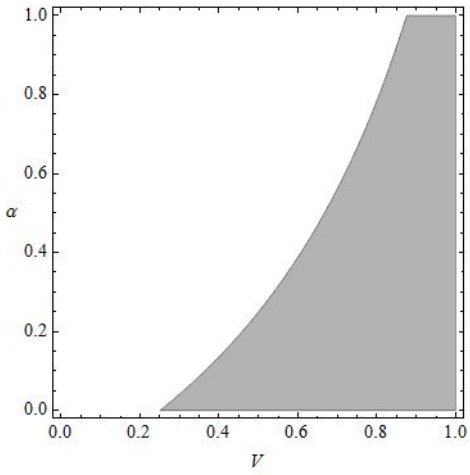
(i) $0 < \Phi < \bar{\Phi}$ *and* $q_G^1 < \frac{\Phi}{V_g} < 1$

(ii) $\Phi > \bar{\Phi}$ *and* $0 < \frac{\Phi}{V_g} < q_B^0$

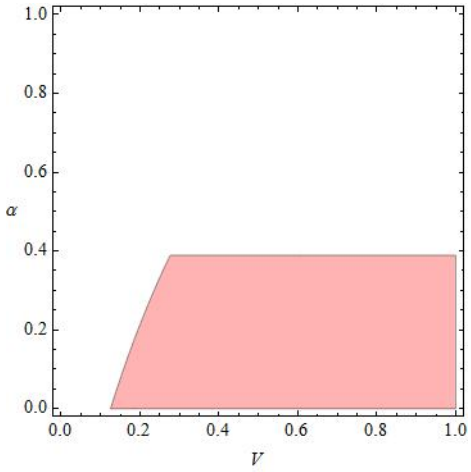
Multiplicity occurs when $\frac{\Phi}{V_G}$ is either sufficiently low or sufficiently high with respect to the likelihood of getting funded. If q_B is big enough the entrepreneur faced with a bad preliminary may be willing to go ahead and risk the fee. Similarly, if q_G is small enough, the entrepreneur faced with a good preliminary may prefer to stop and remain unrated rather than risking the fee.



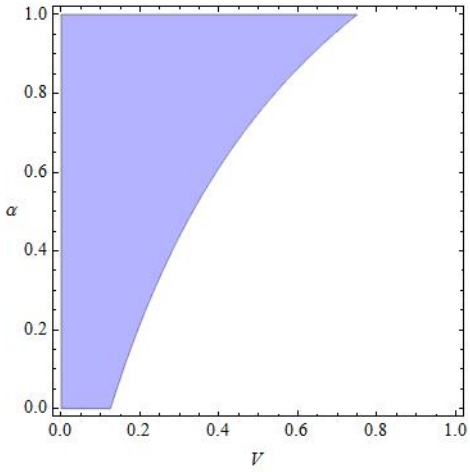
(a) Equilibrium *(i)*



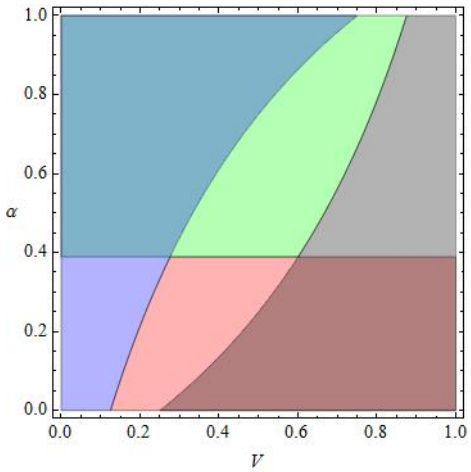
(b) Equilibrium *(ii)*



(c) Equilibrium *(iii)*



(d) Equilibrium *(iv)*



(e) Equilibrium *(i)* to *(iv)*

Figure 3: Equilibrium in the benchmark for $e = 3/4$, $\lambda = 1/2$ and $\Phi = 1/3$.

For the sake of the discussion we fix $e = 3/4$, $\lambda = 1/2$ and $\Phi = 1/3$ and we rename V the ratio between the fee and the amount of funding. In Equilibrium (i), projects are relatively good and the impact of the fee on the funding is small therefore the CRA prefers to issue a good preliminary $P = G$, the entrepreneur prefers to go ahead if he hears $P = G$ but prefers to stop if he hears $P = B$. Receiving a bad preliminary when the uninformed CRA is issuing a good preliminary implies that the preliminary has to come from the informed CRA. Under these circumstances, asking for the full report would only result in the loss of the fee.

In the Equilibrium (iii), projects are relatively bad and the impact of the fee on the funding is high therefore the CRA prefers to issue a bad preliminary $P = B$, the entrepreneur prefers to go ahead if he hears $P = G$ but prefers to stop if he hears $P = B$. Receiving a good preliminary when the uninformed CRA is issuing a bad preliminary implies that the preliminary is due to the informed CRA and therefore the entrepreneur is sure to get funded.

In Equilibrium (ii), disadvantageous combinations α and V (i.e. High proportion of good projects and huge impact of the fee on the funding or low proportion of good projects and medium-high impact of the fee) lead the entrepreneur to stop regardless of the opinion of the CRA. Similarly, in the Equilibrium (iv), advantageous combinations of α and V (i.e. Low proportion of good projects and tiny impact of the fee on the funding or high proportion of good projects and medium-low impact of the fee) lead the entrepreneur to ask for the full report regardless of the opinion of the CRA.

2 The Model with Contact Disclosure

Confidentiality of both the contact and the outcome of the preliminary evaluation result in poor information conveyed to the market. Taking the European Regulation in place at our bound, it is possible to investigate whether imposing disclosure of the contact between the CRA and the entrepreneur affects the decisions of the players and thus the resulting equilibrium[24].

[24]For the purpose of the model we refer to mandatory disclosure as a way to increase transparency in the industry while Freixas and Laux [2011] focus on the effectiveness of disclosure during the crisis and discuss proposals and policy implications highlighting the distinction between transparency and disclosure. One of their core suggestions is that more information, for instance in terms of compulsory disclosure, does

The timing of the game is similar to the baseline one. However, when costlessly checking the project, the CRA has to disclose that it has been contacted by the entrepreneur for a preliminary evaluation. Note that the actual result of the preliminary evaluation is still communicated only to the entrepreneur. If on the one hand this tiny detail enriches the payoff of the CRA, on the other it allows the payoff of the entrepreneur, to remain unchanged. As before the entrepreneur's only concern is to get an IG rating and fund the project, success an failure of the project are of no interest to him.

Unlike the baseline model, making the market aware of who has asked the services of the CRA makes unrated projects visible. This in turn affects the CRA reputation through the updated perception that the market has of it being of the informed type. In other words, in this scenario, the fact that a project remains unrateded is now a fourth outcome which still can be assimilated to the $r = J$ one in terms of possible funding[25] but which is radically different in terms of reputation. Now, even when the entrepreneur decides not to purchase the final rating, the market can update its belief on whether the preliminary rating was issued by an informed CRA or not.

2.1 The Equilibrium

The game is solved by backward induction.
To begin, the market now observes and additional outcome, a project which remains unrated but which is known to have gone through a preliminary evaluation, and can form an updated belief of the quality of the rating agency. Thus if the investors observe an unrated project, the posterior probability that the CRA is of the informed type becomes

$$\mu_{NR} = \frac{\lambda\left((\alpha-1)y_B - \alpha y_G + 1\right)}{y_B(\alpha\lambda - \lambda x + x - 1) + y_G((\lambda-1)x - \alpha\lambda) + 1} \tag{11}$$

which represents the probability that the CRA is of the informed type given no report (NR).
This in turns means that now one of the components of the reputation term in the CRA payoff has changed, therefore **(7)** and **(8)** can now be written respectively as

not necessarely lead to more transparency.

[25] As before, unrated projects don't get funded because the investors invest only if they see an IG rating.

$$\pi_{G,s}\mu_{IG,s} + \pi_{G,f}\mu_{IG,f} + \pi_{G,J}\mu_J + \mu_{NR}\pi_{G,NR} + \Phi y_G \quad \textbf{(12)}$$

$$\pi_{B,s}\mu_{IG,s} + \pi_{B,f}\mu_{IG,f} + \pi_{B,J}\mu_J + \mu_{NR}\pi_{B,NR} + \Phi y_B \quad \textbf{(13)}$$

When there is contact disclosure, the choice on whether to issue a good or a bad preliminary can be summarised as follows. The CRA will now issue a good preliminary rating if and only if

$$\frac{(1-\alpha)\lambda y_B(\alpha - 2\alpha e + e)y_G}{(1-\alpha)\lambda y_B + (1-\lambda)(\alpha - 2\alpha e + e)y_G} + \frac{\lambda\,(1-y_G)\,((\alpha-1)y_B - \alpha y_G + 1)}{(\alpha\lambda - \lambda)y_B + (-\alpha\lambda + \lambda - 1)y_G + 1} + \frac{\alpha e\lambda y_G}{e(1-\lambda) + \lambda} + \Phi y_G >$$
$$\frac{\alpha e\lambda y_B y_G}{e(1-\lambda)y_B + \lambda y_G} + \frac{(1-\alpha)\lambda y_B(\alpha - 2\alpha e + e)}{(1-\alpha)\lambda + (1-\lambda)(\alpha - 2\alpha e + e)} + \frac{\lambda\,(1-y_B)\,((\alpha-1)y_B - \alpha y_G + 1)}{(\alpha\lambda - 1)y_B - \alpha\lambda y_G + 1} + \Phi y_B$$

which can be rewritten as

$$y_G[(\alpha - 2\alpha e + e)\mu_J^1 + \alpha e\mu_{IG,s}^1 - \mu_{NR}^1 + \Phi] + \mu_{NR}^1 > y_B[\alpha e\mu_{IG,s}^0 + (\alpha - 2\alpha e + e)\mu_J^0 - \mu_{NR}^0 + \Phi] + \mu_{NR}^0 \quad \textbf{(14)}$$

The RHS of the above inequality is the expected payoff from issuing a positive preliminary while the LHS is the expected payoff from issuing a negative preliminary. As we expected, **(14)** differs from **(9)** only for the μ_{NR} term. The first thing that has to be noticed is that in the benchmark the reputation payoff in the no report case was independent of the preliminary (i.e λ). Now instead giving a good or a bad preliminary implies different payoffs, respectively μ_{NR}^1 and μ_{NR}^0.

Before stating the result, for $y_G \neq y_B$ we define

$$\hat{\Phi}(y_G, y_B) \equiv \frac{\alpha e(y_B\mu_{IG,s}^0 - y_G\mu_{IG,s}^1) + (\alpha - 2\alpha e + e)(y_B\mu_J^0 - y_G\mu_J^1)}{y_G - y_B} + \frac{\mu_{NR}^0(1-y_B) - \mu_{NR}^1(1-y_G)}{y_G - y_B}$$

Lemma 6. *With contact disclosure, the uninformed CRA issues a good preliminary rating*

$(P = G)$ *according to*

$$\Phi > \hat{\Phi}(y_G, y_B) \tag{15}$$

if $y_G > y_B$*, otherwise* **(15)** *is reversed.*

The CRA gives a good preliminary evaluation when the $\Phi > \hat{\Phi}(y_G, y_B)$, it gives a bad preliminary evaluation if $\Phi < \hat{\Phi}(y_G, y_B)$ and is indifferent when $\Phi = \hat{\Phi}(y_G, y_B)$.
To sum up:

Proposition 2. *Equilibrium in the contact disclosure model are as follows:*

(i) For $\Phi > \hat{\Phi}(1,0)$ *and* $0 < \frac{\Phi}{V_G} < q_G^1$ *the CRA is overconfident and issues a good preliminary* $(x = 1)$*, the entrepreneur is responsive and goes ahead after a good preliminary* $(y_G = 1)$ *but stops after a bad one* $(y_B = 0)$*.*

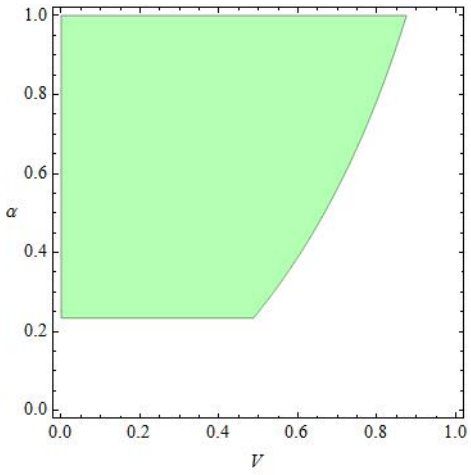
(ii) For $q_G^1 < \frac{\Phi}{V_G} < 1$ *the CRA is overconfident and issues a good preliminary* $(x = 1)$*, the entrepreneur is pessimistic and always stops* $(y_G = y_B = 0)$*.*

(iii) For $0 < \Phi < \hat{\Phi}(1,0)$ *and* $q_B^0 < \frac{\Phi}{V_G} < 1$ *the CRA is conservative and issues a bad preliminary* $(x = 0)$*, the entrepreneur is responsive and goes ahead after a good preliminary* $(y_G = 1)$ *but stops after a bad one* $(y_B = 0)$*.*

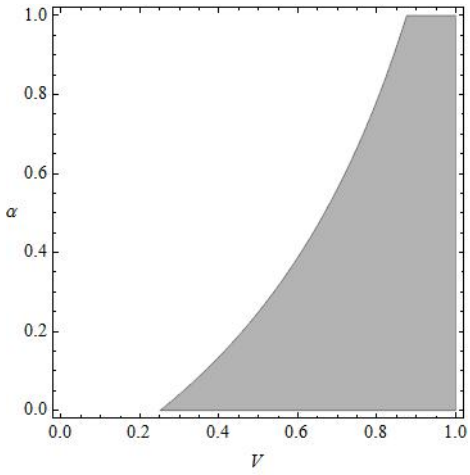
(iv) For $0 < \frac{\Phi}{V_G} < q_B^0$ *the CRA is conservative and issues a bad preliminary* $(x = 0)$*, the entrepreneur is optimistic and always goes ahead* $(y_G = y_B = 1)$*.*

where $\hat{\Phi}(1,0) = \frac{\lambda\left(-\alpha\lambda+e\left(\left(\alpha^2+\alpha-1\right)\lambda-2\alpha+1\right)+\lambda\right)}{(\alpha\lambda-1)(e(\lambda-1)-\lambda)}$. As in the benchmark, four possible equilibria can arise. Two in which the entrepreneur behaves as if the CRA was not there and two in which the entrepreneur takes into consideration the opinion of the CRA. For the sake of the discussion we once again fix $e = 3/4$, $\lambda = 1/2$ and $\Phi = 1/3$. The Equilibrium (ii) and Equilibrium (iv) perfectly resemble those in the benchmark. This is not surprising given that the introduction of disclosure only affects the CRA payoff, leaving the entrepreneur with the same payoff.

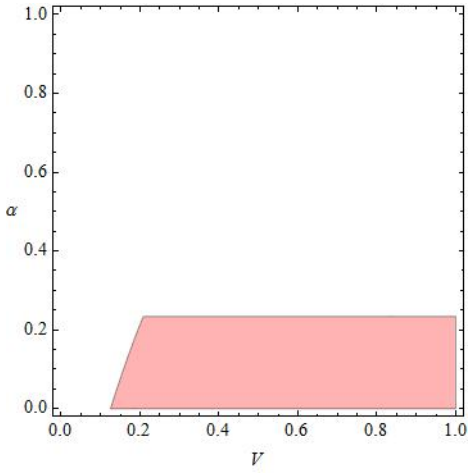
Corollary 2. *(i) For* $0 < \alpha \leq \frac{1}{2}$ *or for* $\frac{1}{2} < \alpha < 1$ *and* $\frac{(2\alpha-1)e}{-\alpha+(\alpha^2+\alpha-1)e+1} < \lambda < 1$ *there is multiplicity of equilibria either when* $0 < \Phi < \hat{\Phi}$ *and* $q_B^0 < V < 1$ *or when* $\Phi > \hat{\Phi}$ *and* $0 < \frac{\Phi}{V_G} < q_G^1$



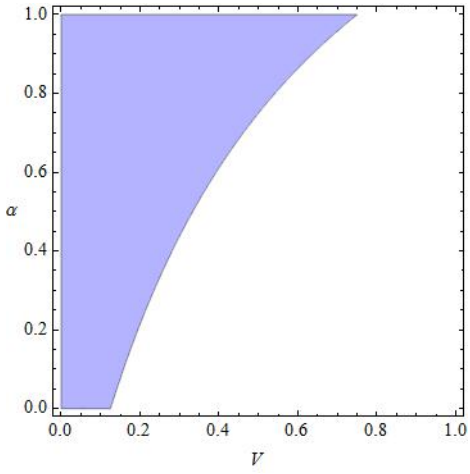
(a) Equilibrium *(i)*



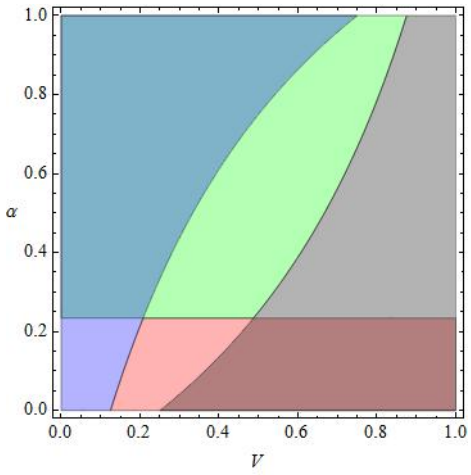
(b) Equilibrium *(ii)*



(c) Equilibrium *(iii)*



(d) Equilibrium *(iv)*



(e) Equilibrium *(i)* to *(iv)*

Figure 4: Equilibrium in the extension for $e = 3/4$, $\lambda = 1/2$ and $\Phi = 1/3$.

(ii) For $0 < \lambda \leq \frac{(2\alpha-1)e}{-\alpha+(\alpha^2+\alpha-1)e+1}$ *there is multiplicity of equilibria when* $0 < \frac{\Phi}{V_G} < q_G^1$

Multiplicity occurs for either low α or for both high α and sufficiently large λ when $\frac{\Phi}{V_G}$ is either sufficiently low or sufficiently high with respect to the likelihood of getting funded. Moreover for low enough λ multiplicity occurs when $\frac{\Phi}{V_G}$ is greater than the likelihood of getting funded.

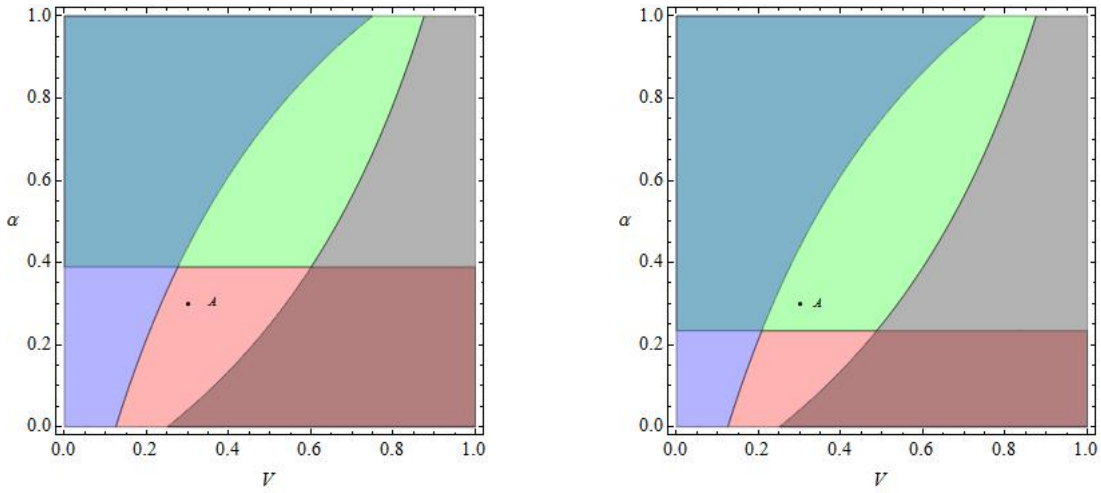
3 Discussion

The initial question can be summarized as follows: what changes when the CRA is asked to disclose the contact with a possible client? In particular the aim here is to investigate the extent to which such a requirement may affect reputation of the expert.

Results from the baseline and from the extension show that Proposition 2 resembles Proposition 1. In both settings when the uninformed CRA is overconfident ($x = 1$), either the entrepreneur is responsive and faced with a good preliminary rating asks for the full report while faced with a bad preliminary stops and remains unrated or he ignores the CRA's opinion, acts pessimistically and always stops. Similarly, when the CRA is conservative ($x = 0$), either the entrepreneur is responsive and faced with a good preliminary asks for the full report while faced with a bad preliminary stops and to remains unrated or the entrepreneur ignores the CRA's opinion, acts optimistically and always purchases the final rating. When the entrepreneur is optimistic and goes ahead ($y_G = 1$, $y_B = 1$), the CRA is conservative and earns the fee for sure. On the contrary when the entrepreneur is pessimistic and stops ($y_G = 0$, $y_B = 0$), the CRA is overconfident and never earns the fee.

The only difference between the two sets of results stands in the fact that Equilibrium (i) now absorbs part of the space previously covered by the Equilibrium (iii). In other words, under disclosure the CRA is more often willing to issue a good preliminary rather than issuing a bad one. This in turn leads to more requests for full reports and ultimately to the possibility that more projects get funded.[26] Comparing λ and μ_{NR} should shed some light on this finding. Whether λ is greater or lower of ether μ_{NR}^1 or μ_{NR}^0 crucially depends on y_G and y_B.

[26]Figure 5a and Figure 5b show that when disclosure is in place even for lower values of α the CRA is overconfident.



(a) Benchmark model **(b)** Contact disclosure model

Figure 5: Comparison of equilibrium representation.

Lemma 7. *If the CRA issues a bad preliminary report, the reputation gain associated with $r = NR$ is lower under disclosure whenever $0 \leq y_B < y_G \leq 1$.*

Proof is given in the appendix. With disclosure in place, the CRA enjoys a lower reputation payoff when issuing a bad preliminary. To compare the two settings let's focus on an example. We have already fixed e, λ and Φ and we know analyse what happens when also α and V are both fixed to 0.3.

Let A represent this specific set of fixed parameters. Through 5a and 5b it can be seen that point A was chosen as an example because it lies in the "conservative-responsive" area in the benchmark model whereas it is part of the "overconfident-responsive" area in the extension[27]. Provided that for the entrepreneur nothing has changed and that in the two equilibrium under consideration hearing good corresponds to going ahead while hearing bad corresponds to stopping, our focus is on the CRA's payoff. Note that the payoff for the CRA for issuing a good preliminary is the same in the extension and in the benchmark whereas the payoff from issuing a bad preliminary differs, namely it is lower in the extension. This is due to the different reputation gain enjoyed by the CRA in the two cases when no report is published. If the CRA knows that the entrepreneur goes ahead after having been provided with a good preliminary, issuing $P = G$ would give the CRA

[27]The "conservative-responsive" area is equivalent to Equilibrium *(iii)* whereas the "overconfident-responsive" area is equivalent to Equilibrium *(i)*.

the same profit in both settings[28] because it is as if it is avoiding the possibility to end at the no report situation. On the other side, knowing that the entrepreneur faced with a bad preliminary will stop creates a divergence in the payoff of the two settings. The reputation payoff from saying $P = B$ is higher in the benchmark and this is what causes the shift in the decision of the CRA. Employing Lemma 7, when $y_B = 0$ and $y_G = 1$, the reputation gain associated with $r = NR$ is lower under disclosure. Given $y_B = 0$ and $y_G = 1$, the payoff of the CRA from issuing a bad preliminary is λ in the benchmark case as opposed to $\frac{\lambda(1-\alpha)}{1-\alpha\lambda}$ in the contact disclosure case. It can be easily seem that the first payoff is greater than the second one, meaning that the reputation gain from an NR report in the benchmark is higher than in the case in which disclosure is in place. This shows that when disclosure is in place the payoff from issuing a bad preliminary is lower than the one related to a good preliminary whereas in the benchmark the payoff relation is reversed.

Proposition 1 and Proposition 2 show that in Equilibrium (i) and in Equilibrium (iii) the role of the fee is crucial; the tradeoff fee in the benchmark always exceeds the tradeoff fee in the extension. In other words, when disclosure is in place, the conservative equilibrium loses out to the overconfidence equilibrium.

Lemma 8. *For all parameters values* $\bar{\Phi}(1,0) > \hat{\Phi}(1,0)$.

Proof is given in the appendix. The intuition here works as follows. Recall that below the tradeoff fee the CRA prefers to issue a bad preliminary whereas above this fee the CRA chooses to issue a good preliminary. With disclosure in place we have seen that the CRA gains less in terms of reputation when the entrepreneur decides to stop. If the payoff for saying $P = B$ goes down, the tradeoff fee which identifies the shift from the Equilibrium (iii) to the Equilibrium (i) is lowered as well. Now the CRA is willing to be overconfident even for lower fees because this still provides a higher payoff than the achievable one from being conservative.

With no final rating and without disclosure the market cannot update its belief and therefore would stick to the prior λ whereas with disclosure the CRA's reputation is subject to an update. Indeed the market knows that with some probability the entrepreneur

[28] Recall that **(7)** and **(12)** differ only with respect to the NR reputation payoff part, namely $\mu_{NR}\pi_{G,NR}$ in the extension and $\lambda\pi_{G,NR}$ in the benchmark. Given that $\pi_{G,NR} = 1 - y_G$, when $y_G = 1$ both terms go to 0. Hence the CRA enjoys the same payoff in the two cases.

stopped because of a $P = B$ indicative rating due to an uninfomred CRA. Thus the market updates its belief of whether the issuing CRA is of the informed type. The reputation concerns aren't strong enough to lead to a better outcome under disclosure, instead they end up making the CRA more responsive to the fee.

3.1 Availability of partial funding

Absence of funding when no report is available can be far from reality. We therefore relax this assumption, allowing for partial funding and look at the case in which the entrepreneur can carry out the project even if unrated. Let $V_{NR} > 0$ be a high cost funding which allows alternative funding for the project

Assumption 2. $V_G - \Phi > V_{NR}$

Similarly to Assumption 1. this assumption states that low cost funding net of the fee has to be greater than high cost funding. Given that the objective of the entrepreneur is to get funded, if Assumption 2. was not satisfied, the entrepreneur would always remain unrated.

The entrepreneur now has to compare the payoff from asking the full report and paying the fee with V_{NR}, and will go ahead according to

$$\begin{cases} q_G^x > \frac{\Phi + V_{NR}}{V_G}, & \text{if } P = G \\ q_B^x > \frac{\Phi + V_{NR}}{V_G}, & \text{if } P = B \end{cases} \tag{16}$$

Even though the market now observes more outcomes,[29] the payoff of the uninformed CRA when disclosure is not in place remains unchanged. The payoff of the CRA from issuing $P = G$ in the preliminary stage is

$$\pi_{G,s}\mu_{IG,s} + \pi_{G,f}\mu_{IG,f} + \pi_{G,J}\mu_J + \lambda\pi_{G,NR,f} + \lambda\pi_{G,NR,s} + \Phi y_G \tag{17}$$

[29] An unrated projects now gets funded, therefore the market will eventually observe whether it succeeds or fails. Thus the possible outcomes are a project rated investment grade which succeeds (IG, s), a project rated investment grade which fails (IG, f) a project rated junk (J), a project not rated which succeeds (NR, s) and a project not rated which fails (NR, f).

whereas from issuing $P = B$ in the preliminary stage the CRA gets

$$\pi_{B,s}\mu_{IG,s} + \pi_{B,f}\mu_{IG,f} + \pi_{B,J}\mu_J + \lambda\pi_{B,NR,f} + \lambda\pi_{B,NR,s} + \Phi y_B \tag{18}$$

where $\pi_{G,NR,f}$ ($\pi_{B,NR,f}$) and $\pi_{G,NR,s}$ ($\pi_{B,NR,s}$) are respectively the probabilities $(1-\alpha)(1-y_G)$ ($(1-\alpha)(1-y_B)$) and $\alpha(1-y_G)$ ($\alpha(1-y_B)$) that a project rated NR fails or succeeds when the uninformed CRA says $P = G$ ($P = B$). In all four cases the market is anaware of the contact between the CRA and the entrepreneur and therefore sticks to the prior λ. It is straightforward that **(17)** and **(18)** perfectly resemble **(7)** and **(8)** because $\pi_{G,NR,f} + \pi_{G,NR,s} = \pi_{G,NR}$ and similarly $\pi_{B,NR,f} + \pi_{B,NR,s} = \pi_{B,NR}$.
When disclosure is in place instead, if the investors observe an unrated project which succeeds, their posterior probability that the CRA is of the informed type becomes

$$\mu_{NR,s} = \frac{\lambda\,(y_G - 1)}{(\lambda - 1)(x - 1)y_B + y_G(\lambda - \lambda x + x) - 1} \tag{19}$$

whereas if the investors observe an unrated project which fails, their posterior probability that the CRA is of the informed type becomes

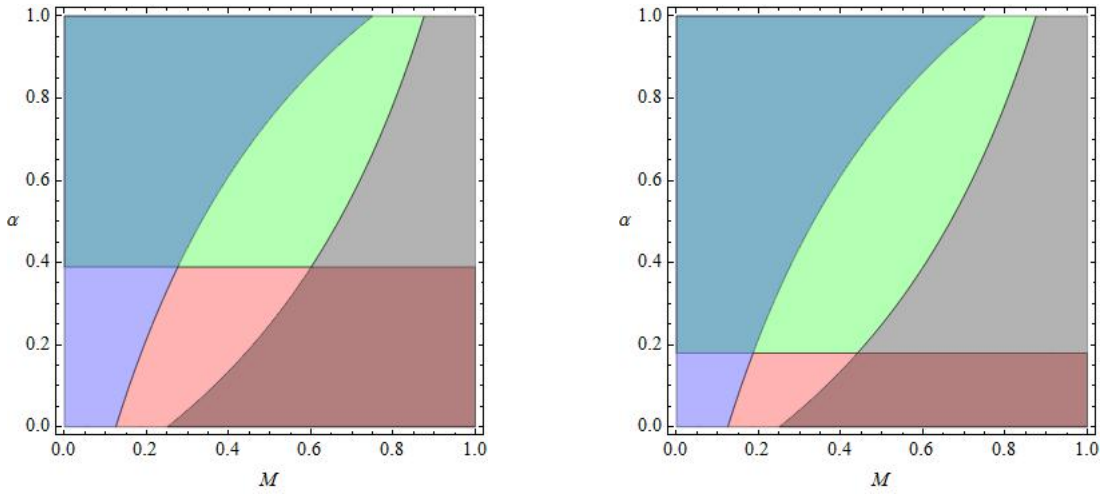
$$\mu_{NR,f} = \frac{\lambda\,(y_B - 1)}{y_B((\lambda - 1)x + 1) + y_G(x - \lambda x) - 1} \tag{20}$$

Thus the CRA compares the payoff from issuing a good preliminary

$$y_G[(\alpha - 2\alpha e + e)\mu_J^1 + \alpha e\mu_{IG,s}^1 - \alpha\lambda - (1-\alpha)\mu_{NR,f}^1 + \Phi] + \alpha\lambda + (1-\alpha)\mu_{NR,f}^1 \tag{21}$$

with the payoff from issuing a bad preliminary

$$y_B[\alpha e\mu_{IG,s}^0 + (\alpha - 2\alpha e + e)\mu_J^0 - (1-\alpha)\lambda - \alpha\mu_{NR,s}^0 + \Phi] + (1-\alpha)\lambda + \alpha\mu_{NR,s}^0 \tag{22}$$



(a) Benchmark model **(b)** Contact disclosure model

Figure 6: Comparison of equilibrium representation with high cost funding.

For $y_G \neq y_B$ we can define the tradeoff fee which determines the CRA's decision, namely

$$\begin{aligned}\widetilde{\Phi}(y_G, y_B) \equiv & \frac{\alpha e(y_B\mu^0_{IG,s} - y_G\mu^1_{IG,s}) + (\alpha - 2\alpha e + e)(y_B\mu^0_J - y_G\mu^1_J)}{y_G - y_B} \\ & - \frac{\alpha(y_B\mu^0_{NR,s} - y_G\lambda) + \alpha(y_B\lambda - y_G\mu^1_{NR,f})}{y_G - y_B} \\ & + \frac{\alpha(\mu^0_{NR,s} - \lambda) + (1-\alpha)(\lambda - \mu^1_{NR,f})}{y_G - y_B}\end{aligned}$$

Thus the CRA issues a good preliminary ($P = G$) according to

$$\Phi > \widetilde{\Phi}(y_G, y_B) \tag{23}$$

It is still the case that four types of equilibria arise, for the sake of the discussion we fix $e = 3/4$, $\lambda = 1/2$ and $\Phi = 1/3$, rename M the ratio $\frac{\Phi + V_{NR}}{V_G}$ and we use Figure 6 to summarise the findings. The outside option which ensures some funding also in the absence of a rating results in the CRA being overconfident even more often than in the case without partial funding.

Lemma 9. *For all parameters values* $\hat{\Phi}(1,0) > \widetilde{\Phi}(1,0)$.

The intuition goes as follows: when there exists another source of funding, for the

entrepreneur to ask for the full report[30] the probability that the project will be certified as IG given a certain preliminary has to be higher. This means that the entrepreneur is less willing to go ahead and pay the fee. Thus the only reasonable thing the CRA can do is to start issuing good preliminary in order to attract the entrepreneur.

3.2 Entrepreneur's Preference for Success

The fact that the only concern of the entrepreneur is to get funded seems too extreme, therefore we relax this assumption. In order to have an entrepreneur who prefers success rather than default, let $v < V_G$ be the entrepreneurs own funds. In order to carry out the project v is not sufficient, thus funding from the investors is needed.
The payoff of the entrepreneur can now be written as

$$\begin{cases} {q_G}^{IG} V_G - {q_G}^{J} v > \Phi, & \text{if } P = G \\ {q_B}^{IG} V_G - {q_B}^{J} v > \Phi, & \text{if } P = B \end{cases} \tag{24}$$

where ${q_P}^{IG} + {q_P}^{J} = q_P^x$. In this setting, with some probability the project gets funded and succeeds and the entrepreneur gets V_G, wherase if the project gets funded and fails the entreprenur looses its own money v.
Under these new preferences it can be shown that all four equilibria still arise and that contact disclosure makes the CRA more overconfident.

[30] Recall that without funding the entrepreneur goes ahead if $q_G^x > \frac{\phi}{V_G}$ ($q_B^x > \frac{\phi}{V_G}$) whereas in the current setting he goes ahead if $q_G^x > \frac{\Phi + V_{NR}}{V_G}$ ($q_B^x > \frac{\Phi + V_{NR}}{V_G}$).

Concluding Remarks

We develop a model of preliminary ratings and use it to investigate the effect of contact disclosure. The model features a monopolistic CRA which has an incentive to gain reputation among investors and a mass of entrepreneurs who need funding. We first look at the case where no evidence of preliminary ratings is available to the market and then shift the analysis towards what happens when preliminary rating contact has to be disclosed by the CRA.

We show that in both settings four types equilibria can arise. An equilibrium in which the CRA acts overconfidently and one in which the CRA acts conservatively where the entrepreneur is responsive and remains unrated following a bad preliminary or continues following a good one. We find that under contact disclosure, when the entrepreneur is responsive, the equilibrium where the CRA is overconfident gains prominence to the expenses of the equilibrium where the CRA is conservative. Thus more projects, even of lower quality, access the final rating stage and can get funded.

In the light of these findings, the CRA's reputation is negatively affected by the disclosure requirement and this results in a laxer behaviour.

We also find that there are other two equilibria, one in which the entrepreneur is optimistic and goes ahead regardless of the preliminary and one in which he is pessimistic and stops regardless of the preliminary which are shown to be unaffected by the disclosure requirement. In these cases the opinion of the CRA is useless for the entrepreneur and his decision seems to be driven by the magnitude of the impact of the fee on funding and by the likelihood that the project is of high quality. Advantageous combinations of the two lead the entrepreneur to continue, disadvantageous ones result in a stop.

We verify that the result are robust in extensions where funding of unrated projects is available or where the entrepreneur has a preference for success.

References

H. Bar-Isaac and J. Shapiro. Ratings quality over the business cycle. *(Journal of Financial Economics*, 108:62–78, 2013.

R. Benabou and G. Larocque. Using privileged information to manipulate markets: insiders, gurus, and credibility. *Quarterly Journal of Economics*, 107 (3):921–958, 1992.

P. Bolton, J. Freixas, and J. Shapiro. The credit ratings game. *Journal of Finance*, 67: 85–112, 2012.

N. Camanho, P. Deb, and Z. Liu. Credit rating and competition. *LSE Financial Markets Group Discussion Paper*, 2012.

M. Efing. Bank capital regulation with an opportunistic rating agency. *CESifo Working Paper Series*, 2013.

A. Faure-Grimaud, E. Peyrache, and L.Quesada. The ownership of ratings. *RAND Journal of Economics*, 40(2):234–257, 2009.

X. Freixas and C. Laux. Disclosure, transparency and market discipline. Working Paper 381, CFS, 2011.

S. Frenkel. Repeated interaction and rating inflation: A model of double reputation. Working paper, 2013.

S. Kovbasyuk. Seller-paid ratings. Working paper, 2013.

G. Levy. Careerist judges and the appeal process. *RAND Journal of Economics*, 36(2): 275–297, 2005.

A. Lizzeri. Information revelation and certification intermediaries. *RAND Journal of Economics*, 30(2):214–231, 1999.

B. Mariano. Market power and reputational concerns in the ratings industry. *Journal of Banking and Finance*, 36:1616–1626, 2012.

J. Mathis, J. McAndrews, and J.C. Rochet. Rating the raters: Are reputation concerns powerful enough to discipline rating agencies? *Journal of Monetary Economics*, 56: 657–674, 2009.

C.C. Opp, M.M. Opp, and M. Harris. Rating agencies in the face of regulation. *Journal of Financial Economics*, 108 (1):46–61, 2013.

M. Ottaviani and P.N. Sorensen. Reputational cheap talk. *RAND Journal of Economics*, 37 (1):155–175, 2006.

The European Parliament and the Council. Regulation (eu) no 462/2013 amending regulation (ec) no 1060/2009 on credit rating agencies. *Official Journal of the European Union*, May 2013.

M. Pollrich and L. Wagner. Information opacity and honest certification. Discussion Paper 1291, DIW Berlin, 2013.

M.D. Rablen. Divergence in credit ratings. *Finance Research Letters*, 10:12–16, 2013.

F. Sangiorgi and C. Spatt. Opacity, credit rating shopping and bias. Under revision, 2013.

F. Sangiorgi, J. Sokobin, and C. Spatt. Credit-rating shopping, selection and the equilibrium structure of ratings. *NBER Working Paper Series*, 2009.

A. Stolper. Regulation of credit rating agencies. *Journal of Banking and Finance*, 33 (7): 1266–1273, 2009.

R. Strausz. Honest certification and the threat of capture. *International Journal of Industrial Organization*, 23:45–62, 2005.

Appendix

Proof of Lemma 7.

To prove that issuing a bad preliminary leads to a lower reputation payoff in the case of no final report, we have to focus on λ and μ^0_{NR}. For Lemma 7 to be true it has to be the case that

$$\lambda > \frac{\lambda\left(\alpha\left(y_B - y_G\right) - y_B + 1\right)}{\alpha\lambda\left(y_B - y_G\right) - y_B + 1} \quad \text{which implies} \quad 1 > \frac{\alpha\left(y_B - y_G\right) - y_B + 1}{\alpha\lambda\left(y_B - y_G\right) - y_B + 1}$$

If $0 \leq y_B < y_G \leq 1$ then the numerator of the RHS of the inequality is lower than the denominator. This in turn makes the ratio lower than 1.

Proof of Lemma 8.

From Proposition 1 and Proposition 2 we know that

$$\bar{\Phi}(1,0) = \frac{\lambda(e(\alpha+\lambda-1)-\lambda)}{e(\lambda-1)-\lambda} \quad \text{and} \quad \hat{\Phi}(1,0) = \frac{\lambda\left(-\alpha\lambda + e\left(\left(\alpha^2+\alpha-1\right)\lambda - 2\alpha + 1\right) + \lambda\right)}{(\alpha\lambda-1)(e(\lambda-1)-\lambda)}$$

To prove that $\bar{\Phi} > \hat{\Phi}$, let's assume that this is the case, therefore

$$\frac{\lambda(e(\alpha+\lambda-1)-\lambda)}{e(\lambda-1)-\lambda} > \frac{\lambda\left(-\alpha\lambda + e\left(\left(\alpha^2+\alpha-1\right)\lambda - 2\alpha + 1\right) + \lambda\right)}{(\alpha\lambda-1)(e(\lambda-1)-\lambda)}$$

$$(\alpha\lambda-1)(e(\alpha+\lambda-1)-\lambda) > -\alpha\lambda + e\left(\left(\alpha^2+\alpha-1\right)\lambda - 2\alpha + 1\right) + \lambda$$

We have divided both sides by $e(\lambda-1)-\lambda$ and multiplied by $(\alpha\lambda-1)$. Both rearrangements require a sign change due to the fact that both are lower than 0. [31] Simplifying and collecting leads to

$$e\lambda^2 - 2e\lambda + e - \lambda^2 + \lambda > 0$$

$$(\lambda-1)(e(\lambda-1)-\lambda) > 0$$

which holds for any value of e and λ. Hence $\bar{\Phi}(1,0)$ is greater than $\hat{\Phi}(1,0)$.

[31] $e(\lambda-1)-\lambda < 0$ holds for $\lambda > \frac{e}{e-1}$ which is true $\forall e$. Similarly $(\alpha\lambda-1) < 0$ holds for $\alpha\lambda < 1$ which is true $\forall \lambda, \alpha$.